

5.11 **NOISE**

5.11.1 **METHODOLOGY**

This section analyzes the potential noise impacts associated with the implementation of the MDPI. This section provides background information on noise and community noise assessment criteria; presents existing noise sources in the project area; and discusses noise impacts that could potentially occur during construction and operation of the proposed facilities and improvements in the WNDBRA.

5.11.2 **EXISTING CONDITIONS**

Noise and Vibration Definitions

Noise

“Sound” is a vibratory disturbance created by a moving or vibrating source and is capable of being detected. “Noise” is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance and, in the extreme, hearing impairment (Caltrans 1998).

Decibels and Frequency

In its most basic form, a continuous sound can be described by its frequency or wavelength (pitch) and its amplitude (loudness). Frequency is expressed in cycles per second, or hertz. Frequencies are heard as the pitch or tone of sound. High-pitched sounds produce high frequencies; low-pitched sounds produce low frequencies. Sound pressure levels are described in units called the decibel (dB).

Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB.

Perception of Noise

A typical noise environment consists of a base of steady “background” noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. The local sources can vary from an occasional aircraft or train passing by, to intermittent periods of sound (such as amplified music), to virtually continuous noise from traffic on a major highway, for example.

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average healthy ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Therefore, the “A-weighted” noise scale is used for measurements and standards involving human noise perception. Noise levels using A-weighted measurements are abbreviated dB(A) or dBA.

Human noise perception has no simple correlation with acoustical energy. Due to subjective tolerance thresholds, the annoyance of a given noise source is perceived very differently from person to person. The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at 3 feet is approximately 60 dBA, while loud jet engine noises equate to 110 dBA, which can cause serious discomfort. Exhibit 5.11-1 shows the relationship of various noise levels to commonly experienced noise events.

Two noise sources do not “sound twice as loud” as one source. As stated above, a doubling of noise sources results in a noise level increase of 3 dBA. It is widely accepted that (1) the average healthy ear can barely perceive changes of a 3 dBA increase or decrease; (2) a change of 5 dBA is readily perceptible; and (3) an increase (or decrease) of 10 dBA sounds twice (or half) as loud (Caltrans 1998). In community situations, noise exposure and changes in noise levels occur over a number of years, unlike the immediate comparison made in a field study situation. The generally accepted level at which changes in community noise levels become “barely perceptible” typically occurs at values of greater than 3 dBA.

Noise Descriptors

Several rating scales (or noise “metrics”) exist to analyze effects of noise on a community. These scales include the equivalent noise level (L_{eq}), the community noise equivalent level (CNEL), and the day-night average sound level (DNL or L_{dn}). Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq} , which is the equivalent noise level for that time period. The period of time being averaged may be specified; $L_{eq(3)}$ would be a 3-hour average. When no period is specified, a 1-hour average is assumed. Noise of short duration (i.e., substantially less than the averaging period) is averaged into ambient noise during the period of interest. Thus, a loud noise lasting many seconds or a few minutes may have minimal effect on the measured sound level averaged over a 1-hour period.

To evaluate community noise impacts, L_{dn} was developed to account for human sensitivity to nighttime noise. L_{dn} represents the 24-hour average sound level with a penalty for noise occurring at night. The L_{dn} computation divides the 24-hour day into 2 periods: daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM). The nighttime sound levels are assigned a 10-dBA penalty prior to averaging with daytime hourly sound levels. CNEL is similar to L_{dn} except that it separates a 24-hour day into 3 periods: daytime (7:00 AM to 7:00 PM), evening (7:00 PM to 10:00 PM), and nighttime (10:00 PM to 7:00 AM). The evening sound levels are assigned a 5-dBA penalty, and the nighttime sound levels are assigned a 10-dBA penalty prior to averaging with daytime hourly sound levels.

Several statistical descriptors are also often used to describe noise, including L_{max} , L_{min} , and L_x . L_{max} and L_{min} are respectively the highest and lowest A-weighted sound levels that occur during a noise event. The L_x signifies the noise level that is exceeded x percent of the time; for example, L_{10} denotes the level that was exceeded 10 percent of the time.

Vibration

Vibration is the periodic movement of mass over time. It is described in terms of frequency and amplitude. The frequency of a vibrating object describes how rapidly it is oscillating. The number of cycles per second of oscillation is the vibration frequency, which is described in terms of hertz (Hz).

Common Outdoor Activities	Common Indoor Activities	A - Weighted Sound Level dBA	Subjective Loudness	Effects of Noise
Threshold of Pain		140	Intolerable or Deafening	Hearing Loss
Near Jet Engine		130		
		120		
Jet Fly-Over at 1000 ft	Rock Band	110		
Loud Auto Horn		100	Very Noisy	Speech Interference
Gas Lawn Mower at 3 ft		90		
Diesel Truck at 50 ft, at 50 mph	Food Blender at 3 ft	80		
Noisy Urban Area, Daytime	Vacuum Cleaner at 10 ft	70	Loud	Speech Interference
Heavy Traffic at 300 ft	Normal Speech at 3 ft	60		
Quiet Urban Daytime	Large Business Office	50	Moderate	Sleep Disturbance
Quiet Urban Nighttime	Theater, Large Conference Room (Background)	40		
Quiet Suburban Nighttime	Library	30	Faint	No Effect
Quiet Rural Nighttime	Bedroom at Night, Concert Hall (Background)	20		
	Broadcast/Recording Studio	10		
Lowest Threshold of Human Hearing	Lowest Threshold of Human Hearing	0	Very Faint	

Source: Noise Technical Supplement by Caltrans

Typical Noise Levels and Their Subjective Loudness and Effects

Exhibit 5.11-1

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Perception of Vibration

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings caused by construction activities may be perceived as motion of building surfaces or rattling of windows, items on shelves, and pictures hanging on walls. Vibration of building components can also take the form of an audible low-frequency rumbling noise, which is referred to as groundborne noise. The source of groundborne noise is typically from trains and similar transit vehicles and not from construction activities. Exhibit 5.11-2 illustrates common vibration sources and typical human and structural responses.

The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz. Groundborne vibration is almost never annoying to people who are outdoors (FTA 2006).

Vibration Metrics

Unlike sound, there is no standard way of measuring and reporting amplitude. Vibration levels are usually expressed as single-number measure of vibration magnitude, in terms of velocity or acceleration, which describes the severity of the vibration without the frequency variable. The peak particle velocity (ppv) is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in inches per second (in/sec). Since it is related to the stresses that are experienced by buildings, ppv is often used to monitor blasting vibration. Vibration is also described in decibel units, written as VdB, to distinguish from noise level decibels.

Regulatory Setting

Noise Standards

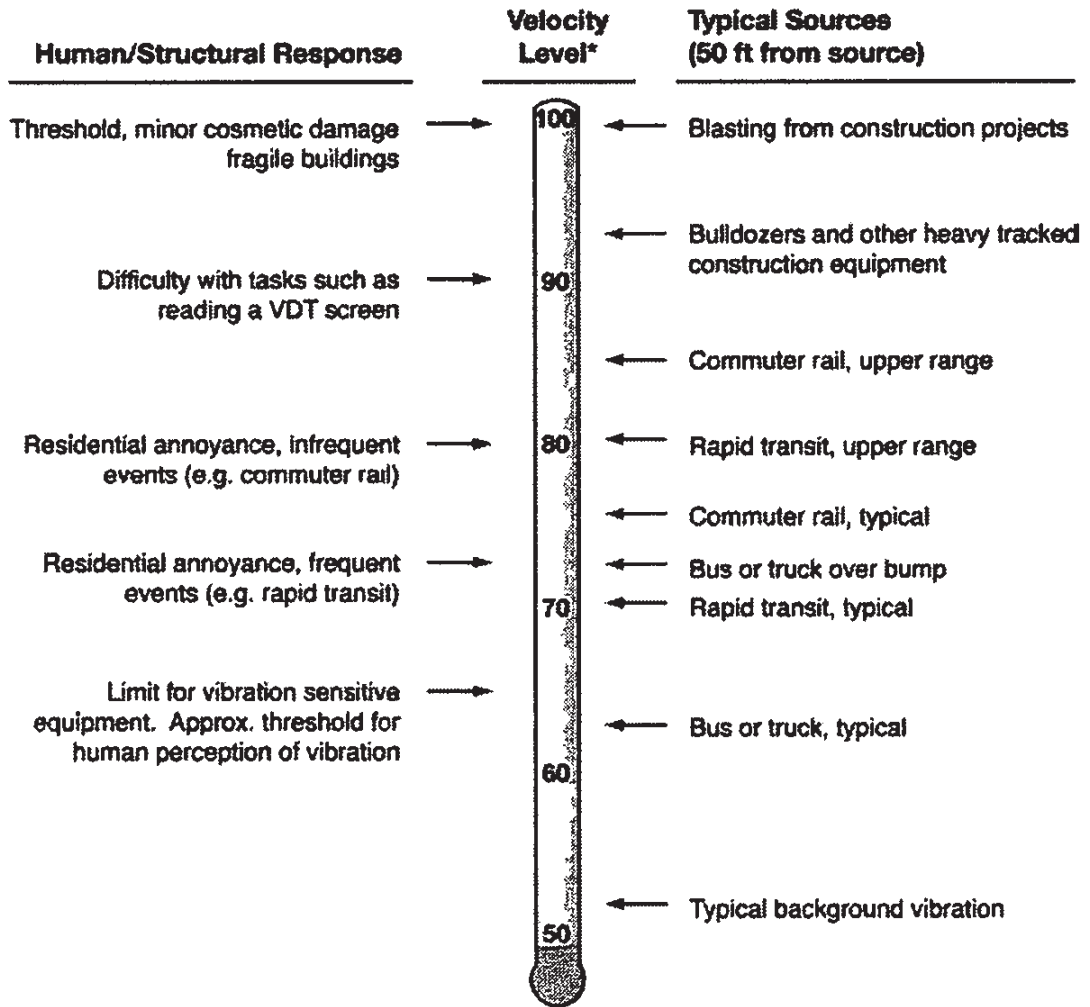
Public agencies have established noise guidelines and standards to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise. Control of mobile noise sources is preempted by federal and State laws. As such, local noise ordinances are not applicable to mobile noise sources, such as automobiles or heavy trucks, when traveling in a legal manner on public roadways or on private property. Similarly, noise ordinances are not applicable to railroad or aircraft noise. Instead, local jurisdictions usually address noise as it relates to land use compatibility for transportation sources in the General Plan and regulate stationary sources in a noise ordinance. Noise regulations that address land use compatibility and stationary sources are discussed below.

State of California

Noise compatibility guidelines from the State General Plan Guidelines are shown below in Table 5.11-1 (OPR 2003).

**TABLE 5.11-1
CALIFORNIA LAND USE COMPATIBILITY GUIDELINES**

Land Use Category	Community Noise Exposure						
	L _{dn} or CNEL, dB						
	55	60	65	70	75	80	85
Residential (Low-Density Single-Family, Duplex, Mobile Homes)	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Residential (Multi-Family Homes)	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Transient Lodging (Motels, Hotels)	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Schools, Libraries, Churches, Hospitals, Nursing Homes	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Auditoriums, Concert Halls, Amphitheaters	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Sports Arena, Outdoor Spectator Sports	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Playgrounds, Neighborhood Parks	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Golf Courses, Riding Stables, Water Recreation, Cemeteries	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Office Buildings, Business, Commercial and Professional	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
Industrial, Manufacturing, Utilities, Agriculture	[Hatched]		[Diagonal Lines]			[Cross-hatched]	
	[Hatched]	[Diagonal Lines]	[Cross-hatched]	[Solid Black]			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable			
Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.	New construction or development should generally not be undertaken.				
<p>L_{dn}: day-night average sound level; CNEL: community noise equivalent level; dB: decibel Source: OPR 2003</p>							



* RMS Vibration Velocity Level in VdB relative to 10^{-6} Inches/second

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Common Vibration Sources and Typical Human and Structural Responses

Exhibit 5.11-2

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County of Los Angeles

General Plan Noise Element

The currently adopted General Plan Noise Element identifies major noise sources and issues in the County and outlines goals and policies to maintain acceptable noise levels. It also includes an implementation program that evaluates existing programs and outlines an action program that the County would implement to establish an effective noise abatement program. The Noise Element does not include standards for noise-land use compatibility or quantitative noise standards that relate to recreational uses or the WNCBRA.

County of Los Angeles Noise Ordinance

Section 12.08 of the *County of Los Angeles Code* (County Code) contains the County’s Noise Ordinance. The County of Los Angeles Noise Ordinance is designed to control unnecessary, excessive, and annoying sounds by setting limits that cannot be exceeded at adjacent properties.

Construction

Section 12.08.440 of the County Code prohibits construction noise between the hours of 7:00 PM and 7:00 AM on weekdays, and at any time on Sunday or a federal holiday if it creates a disturbance across a residential or commercial property line. The County also sets maximum noise levels not to exceed the following maximum noise levels from mobile equipment (non-scheduled, intermittent, short-term operations for less than 30 days) as summarized in Table 5.11-2.

**TABLE 5.11-2
 COUNTY OF LOS ANGELES MOBILE EQUIPMENT NOISE LIMITS**

Time Interval	Single-Family Residential (dBA)	Multi-Family Residential (dBA)	Semi-Residential or Commercial (dBA)
Daily, except Sundays and legal holidays, 7:00 AM to 8:00 PM	75	80	85
Daily, 8:00 PM to 7:00 AM, and all day Sunday and legal holidays	60	64	70
dBA: A-weighted decibels			
Source: <i>County of Los Angeles Code</i> §12.08			

Maximum noise levels from stationary equipment (repetitively scheduled and relatively long-term operations of ten days or more) are summarized in Table 5.11-3.

**TABLE 5.11-3
COUNTY OF LOS ANGELES STATIONARY EQUIPMENT NOISE LIMITS**

Time Interval	Single-Family Residential (dBA)	Multi-Family Residential (dBA)	Semi-Residential or Commercial (dBA)
Daily, except Sundays and legal holidays, 7:00 AM to 8:00 PM	60	65	70
Daily, 8:00 PM to 7:00 AM, and all day Sunday and legal holidays	50	55	60
dBA: A-weighted decibels			
Source: County of Los Angeles Code, Section 12.08, 2009			

Operation

Exterior Standards

The County of Los Angeles Noise Ordinance also specifies exterior noise levels that cannot be exceeded at the receiving properties for a specified time period. The general application of these standards is to noise made from one property to another. As stated in the ordinance,

Unless otherwise herein provided, no person shall operate or cause to be operated, any source of sound at any location within the unincorporated county, or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level, when measured on any other property either incorporated or unincorporated, to exceed any of the following exterior noise standards.

Exceptions to the exterior standards include, but are not limited to (1) construction and (2) residential air conditioning or refrigeration equipment; these two cases are regulated separately, as described below.

The County-specified noise standards are listed in Table 5.11-4. These standards do not apply to the assessment of land use compatibility for transportation noise.

**TABLE 5.11-4
COUNTY OF LOS ANGELES EXTERIOR NOISE STANDARDS**

Noise Zone	Designated Noise Zone Land Use	Time Interval	Exterior Noise Level (dBA)
I	Noise-Sensitive Area	Anytime	45
II	Residential Area	10:00 PM to 7:00 AM 7:00 AM to 10:00 PM	45 50
III	Commercial Area	10:00 PM to 7:00 AM 7:00 AM to 10:00 PM	55 60
IV	Industrial Area	Anytime	70
dBA: A-weighted decibels			
Source: County of Los Angeles Code §12.08			

The applicable standards listed in Table 5.11-4 should not be exceeded at the property line of the noise-sensitive use for:

- a cumulative period of more than 30 minutes in any hour (if the ambient L_{50} exceeds the foregoing level, then the ambient L_{50} becomes this standard);
- the applicable standard plus 5 dBA for a cumulative period of more than 15 minutes in any hour (if the ambient L_{25} exceeds the foregoing level, then the ambient L_{25} becomes this standard);
- the applicable standard plus 10 dBA for a cumulative period of more than 5 minutes in any hour (if the ambient L_8 exceeds the foregoing level, then the ambient L_8 becomes this standard);
- the applicable standard plus 15 dBA for more than the standard for a cumulative period of more than 1 minute in any hour (if the ambient L_2 exceeds the foregoing level, then the ambient L_2 becomes this standard); or
- the noise standard plus 20 dBA for any time period (if the ambient L_0 exceeds the foregoing level, then the ambient L_0 becomes this standard).

If the measurement location is on a property boundary between two different noise zones (see Table 5.11-4), the exterior noise level shall be the arithmetic mean of the exterior noise levels of the subject zones.

Loading and Unloading Operations

Loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of 10:00 PM and 6:00 AM in such a manner as to cause noise disturbance is prohibited.

Places of Public Entertainment

Per Section 12.08.480, operating, playing, or permitting the operation or playing of any radio, television, phonograph, drum, musical instrument, sound amplifier, or similar device which produces, reproduces, or amplifies sound in any place of public entertainment at a sound level greater than 95 dBA, as read by the slow response on a sound level meter at any point that is normally occupied by a customer, is prohibited unless a conspicuous and legible sign is located outside such place, near each public entrance, stating, "WARNING: SOUND LEVELS WITHIN MAY CAUSE HEARING IMPAIRMENT."

Exemptions

Per Section 12.08.570 C, Outdoor Activities, activities conducted on public playgrounds and public or private school grounds, including but not limited to school athletic and school entertainment events, are exempt from the noise ordinance standards.

County Building Construction Noise Regulations

The County Building Construction Noise Regulations (Chapter 12.12 of the County Code) also state that on any Sunday, or at any other time between the hours of 8:00 PM and 6:30 AM the following day, a person shall not perform any construction or repair work of any kind upon any

building or structure, or perform any earth excavating, filling or moving, where any of the foregoing entails the use of any air compressors; jackhammers; power-driven drills; riveting machines; excavators, diesel-powered trucks, tractors or other earth-moving equipment; hand hammers on steel or iron; or any other machine, tool, device, or equipment that makes loud noises to the disturbance of persons occupying sleeping quarters in a dwelling, apartment, hotel, mobilehome, or other place of residence.

Vibration Standards

Federal

There are no Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) standards for construction-related vibration impacts. According to the FHWA, highway traffic and construction vibrations pose no threat to buildings and structures.

State

Potential structural damage and human annoyance associated with vibration from construction activities are based on the recommended California Department of Transportation (Caltrans) vibration limits, identified in Tables 5.11-5 and 5.11-6, respectively.

**TABLE 5.11-5
VIBRATION THRESHOLDS FOR STRUCTURAL DAMAGE**

Structure and Condition	Maximum ppv (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

ppv: peak particle velocity; in/sec: inch(es) per second
 Note: Transient sources, such as blasting or drop balls, create a single, isolated vibration event. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.
 Source: Caltrans 2004

**TABLE 5.11-6
HUMAN RESPONSE TO TRANSIENT VIBRATION**

Average Human Response	ppv (in/sec)
Severe	2.000
Strongly perceptible	0.900
Distinctly perceptible	0.240
Barely perceptible	0.035

ppv: peak particle velocity; in/sec: inch(es) per second
 Source: Caltrans 2004

County

Section 12.08.560 of the County Code prohibits the operation of any device that creates vibration that is above the vibration perception threshold of any individual at or beyond the property boundary of the source if the source is on private property. According to the County Noise Ordinance, the perception threshold is a motion velocity of 0.01 in/sec (80 VdB) over the range of 1 to 100 Hz.

Environmental Setting

Noise Sources

The WNCBRA is located in the urbanized area of Los Angeles County at the southwestern edge of the San Gabriel Valley. Noise levels within the project site area are dominated by vehicle traffic noise on State Route 60 (SR-60) and Interstate 605 (I-605), Rosemead Boulevard, Durfee Avenue, and other roadways on and near the site. Industrial uses to the north, east, and southeast of the WNCBRA are also stationary noise sources that affect adjacent land uses and areas at the edges of the WNCBRA.

Existing noise sources in the WNCBRA consist primarily of noise associated with use of the recreational facilities on the site. Noise comes from large groups and various activities at the festival area, soccer fields, shooting range, model airplane/model car hobby area, the trap and skeet range, sports arena, and from large groups at the WNCBRA. Other sources include the use of maintenance equipment at intermittent times and scattered locations. Due to the relatively large area of the WNCBRA (1,500 acres), the scattered locations of recreational facilities, and staggered use of these facilities, the areas of the WNCBRA that are away from the freeways and major roads have a relatively quiet noise environment typical of low-density areas, ranging from 45 to 60 dBA.

Sensitive Receptors

Noise-sensitive receptors are generally considered to be humans who are engaged in activities or who are utilizing land uses that may be subject to the stress of significant interference from noise. Activities usually associated with sensitive receptors include but are not limited to talking, reading, and sleeping. Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals and places where quiet is an essential element of the intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure to excessive, disturbing, or offensive interior or exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. Schools, places of worship, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Vibration-sensitive receptors are generally considered to be humans who are engaged in activities or who are utilizing land uses that may be subject to significant interference from vibration. Activities and land uses often associated with vibration-sensitive receptors are similar to those associated with noise-sensitive receptors. Construction vibration is generally associated with pile driving and rock blasting. Occasionally, large bulldozers and loaded trucks can cause perceptible vibration levels at close proximity. Vibration generated by construction activity has the potential to cause structural damage (i.e., cracking of floor slabs, foundations, columns, beams, or wells) or cosmetic/architectural damage (i.e., cracked plaster, stucco, or tile). Although it is possible for vibration from construction projects to cause building damage,

the vibration from construction activities are almost never of sufficient amplitude to cause more than minor cosmetic damage to buildings. The nearest vibration-sensitive uses to the WNDDBRA are the existing residences, schools, and industrial uses adjacent to the project site.

The various maintenance yards, river channels, dam, conservation pool, wastewater treatment plant, agricultural fields, and water wells at the WNDDBRA are not considered noise-sensitive land uses. Noise-sensitive receptors include South El Monte High School to the east; Loma Elementary School to the north; and residential uses to the north, northeast, west, and south of the WNDDBRA. These land uses are also considered vibration-sensitive receptors.

5.11.3 THRESHOLDS OF SIGNIFICANCE

The following significance criteria are derived from Appendix G of the State CEQA Guidelines. A project would result in a significant adverse impact related to noise if it would:

- Threshold 5.11.1:** *Expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;*
- Threshold 5.11.2:** *Expose people to or generate excessive groundborne vibration or groundborne noise levels;*
- Threshold 5.11.3:** *Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;*
- Threshold 5.11.4:** *Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;*
- Threshold 5.11.5:** *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels; or*
- Threshold 5.11.6:** *For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.*

5.11.4 ENVIRONMENTAL IMPACTS

Project Design Features

There are no project design features that specifically relate to noise.

Standard Conditions

There are existing local regulations that relate to noise control. Compliance with these regulations would be required for proposed facilities and improvements in the WNDDBRA. These include:

- SC 5.11.1** Prior to approval of grading plans and/or prior to issuance of building permits, contractor specifications shall include a note indicating that construction noise shall not occur between the hours of 7:00 PM and 7:00 AM on weekdays, and at any time on Sunday or a federal holiday if it creates a disturbance across a residential or commercial property line in accordance with the County's Noise Ordinance. The contractor specifications shall also include compliance with the limits for mobile and stationary equipment noise levels in the ordinance.

- SC 5.11.2** In accordance with the County Building Construction Noise Regulations, on any Sunday, or at any other time between the hours of 8:00 PM and 6:30 AM the following day, a person shall not perform any construction or repair work of any kind upon any building or structure, or perform any earth excavating, filling or moving, where any of the foregoing entails the use of any air compressors; jackhammers; power-driven drills; riveting machines; excavators, diesel-powered trucks, tractors or other earth-moving equipment; hand hammers on steel or iron; or any other machine, tool, device or equipment that makes loud noises to the disturbance of persons occupying sleeping quarters in a dwelling, apartment, hotel, mobilehome, or other place of residence. Prior to approval of grading plans and/or prior to issuance of building permits, contractor specifications shall include a note indicating this standard condition.
- SC 5.11.3** Prior to approval of grading plans and/or prior to issuance of building permits, the project sponsor shall provide the County with documentation to show that the proposed facilities and improvements in the WND BRA would comply with County Noise Ordinance on acceptable exterior noise levels for abutting land uses, as defined in Table 5.11-4 above.
- SC 5.11.4** In accordance with the County's Noise Ordinance, loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of 10:00 PM and 6:00 AM in such a manner as to cause noise disturbance is prohibited.
- SC 5.11.5** In accordance with the County's Noise Ordinance, the operation or playing of any radio, television, phonograph, drum, musical instrument, sound amplifier, or similar device that produces, reproduces, or amplifies sound in any place of public entertainment at a sound level greater than 95 dBA, as read by the slow response on a sound level meter at any point that is normally occupied by a customer, is prohibited unless a conspicuous and legible sign is located outside such place near each public entrance stating, "WARNING: SOUND LEVELS WITHIN MAY CAUSE HEARING IMPAIRMENT."
- SC 5.11.6** Prior to approval of grading plans and/or prior to issuance of building permits, contractor specifications shall include a note indicating that construction activities shall comply with Section 12.08.560 of the County Code, which prohibits the operation of any device that creates vibration that is above the vibration perception threshold of any individual at or beyond the property boundary of the source if the source is on private property. The County Noise Ordinance defines the perception threshold as a motion velocity of 0.01 in/sec (80 VdB) over the range of 1 to 100 Hz.
- SC 5.11.7** If the project would be located in or within 500 feet of an adjacent City that has different noise regulations, the project sponsor shall comply with the more stringent noise standards or regulations.

Impact Analysis

Increase in Noise Levels

Threshold 5.11.1: Would the project expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Threshold 5.11.2: Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Noise Impacts to proposed WNCBRA facilities

Future outdoor recreational uses within the WNCBRA could be exposed to high noise levels from SR-60 and I-605, Rosemead Boulevard, Durfee Avenue, and other major roadways on and near the site.

The noise compatibility matrix from the State General Plan Guidelines presented in Table 5.11-1 provides standards for evaluating new land use development, including proposed uses for the WNCBRA, such as the amphitheater, playgrounds, and water recreation areas. These guidelines are primarily used to assess transportation noise impacts to new developments and should be incorporated into land use planning to reduce future noise and land use incompatibilities. Where the matrix indicates that unmitigated noise levels would not be compatible with the proposed land use, noise abatement must be provided to assure that long-term noise exposure to a noise-sensitive area is acceptable for that use.

Since no project designs, site improvement plans, or building plans have been developed for individual projects, subsequent review of potential noise exposure would be necessary. The noise studies required by Mitigation Measure (MM) 5.11-2 would be prepared prior to approval for each proposed project and would ensure that the proposed uses would be compatible with future exterior ambient noise levels. Noise mitigation for these projects can be accomplished by siting noise-sensitive areas away from the roadways and/or behind berms, hills, and structures or by using noise barriers. Compliance with MM 5.11-2 would ensure that impacts from traffic noise to future land uses within the WNCBRA would be less than significant.

Noise Impacts to Adjacent Uses

Proposed facilities and improvements under the MDPI would create project-related traffic noise to off-site receptors and “stationary”¹ noise to on-site and off-site receptors. These stationary sources would include the typical noise sources associated with recreational land uses, such as vehicles arriving and leaving the parking lots, noise from large groups/crowds, and stationary equipment use.

Project-Related Traffic

One of the principal sources of project-related noise would be project-related traffic on roadways and freeways in and near the WNCBRA. The long-term, project-related noise would accompany increases in vehicle trips to the WNCBRA, as analyzed in the traffic report by Fehr and Peers.

¹ For purposes of this analysis, “stationary” is used to describe non-transportation noise sources.

Roadway segments that are likely to experience the increase in traffic volumes and related noise include:

- Rosemead Boulevard;
- Durfee Avenue;
- SR-60; and
- Santa Anita Avenue.

Under CEQA, consideration must be given to the magnitude of the increase and the existence of noise-sensitive receptors in order to determine if the noise increase is a significant adverse environmental effect. Since CEQA does not define the magnitude of a significant increase, other applicable sources must be referenced. In general, a noise level increase of 3 dBA is considered barely perceptible, while an increase of 5 dBA is considered clearly noticeable. An increase of 3 dBA is generally created by the doubling of traffic volumes. Since projected traffic volume increases with the proposed facilities and improvements under the MDPI would not double existing traffic volumes, increases in noise levels would be less than 3 dBA and would not be perceptible. Thus, project-related traffic noise would only create negligible changes (i.e., less than 3 dBA in traffic noise). Thus, permanent noise increases attributed to project-generated traffic would be less than significant, and no mitigation is required.

Project-Related Stationary Noise

Proposed improvements under the MDPI (such as Arundo Removal and Riparian Enhancement, reintroduction of native species, water quality improvement programs in natural areas, storm water BMPs, water quality treatment at drainage outlets on the Rio Hondo, entry signage, riparian restoration at islands at Legg Lake, green streets, and traffic-calming measures) would only generate short-term construction noise but would not generate long-term noise impacts. However, proposed facilities (skate park or court sports, expansion of existing soccer fields, natural area river parks, river crossings along Rio Hondo, amphitheater/special events area, playground, loop trails, disc golf areas, mountain bike facility, archery range reconstruction, waterplay/splash park, welcome center, fitness stations, additional fishing areas, performance pavilions or small event areas, group picnic area, and campground restoration) would attract a user population that would generate vehicle and stationary noises that could affect adjacent land uses or activities. However, the noise impacts would depend on the size and type of proposed facilities, such that passive activities and less intensive uses (i.e., natural area river parks, river crossings along Rio Hondo, and loop trails in Area C and welcome center, additional fitness stations and fishing areas in Area D) would generate less noise than facilities that would be utilized by larger groups and accommodating more active uses (i.e., skate park or court sports and soccer fields in Area A, splash park in Area D, amphitheater in Area B, group picnic area, performance pavilions or small event areas, and campground in Area F).

In accordance with Standard Conditions (SCs) 5.11.3 and 5.11.7, no facility in the WNDBRA can operate or cause to be operated, any source of sound, or allow the creation of any noise which causes the noise level, when measured on any other property, to exceed the most strict exterior noise standards. SC 5.11.5 also requires the County to post warning signs if the operation or playing of any radio, television, phonograph, drum, musical instrument, sound amplifier, or similar device which produces, reproduces, or amplifies sound in any place of public entertainment (such as at the proposed amphitheater in Area B) at a sound level greater than 95 dBA.

Since the WNDBRA accommodates a variety of existing outdoor recreational uses and the proposed facilities would also support outdoor recreational activities, noise from large groups and crowds is not expected to adversely affect nearby recreational uses within the WNDBRA. Also, distance separation afforded by existing areas or recreational facilities in the WNDBRA would provide noise attenuation to off-site noise-sensitive receptors. Specifically, the Whittier Narrows Golf Course and the Rio Hondo serve as a buffer to residential areas to the west from the intensive recreational uses in Area A. The conservation pool and Natural Area separate the recreational areas in Areas C and D from the residential areas to the south. Industrial uses, which are not noise sensitive, are located southeast of the Bicentennial Park and Sports Arena in Area F and in some areas north and northeast of the WNDBRA. In addition, large groups are not expected at each recreational facility in the WNDBRA every day and during all hours. Rather, the presence of large groups would be sporadic and at different facilities at different times from sunrise to sunset, and mostly during the weekends. Thus, residences would experience limited noise intrusion during the evening and early morning hours when the WNDBRA is closed, and schools would not likely experience continuous noise during the school hours.

However, additional soccer fields in Area A could generate noise that would affect residential uses and a school to the north. Based on sound level data collected at similar park facilities (EDAW 2008), soccer activities measured 60 dBA L_{eq} from the edge of midfield (approximately 65 feet away) at a field with approximately 85 participants and spectators. As noise dissipates at a rate of approximately 6 to 7.5 dBA per doubling of distance, at a distance of 500 feet, average soccer field noise levels would be 38 to 42 dBA L_{eq} and would not likely be perceptible. The proposed amphitheater in Area B could affect residential uses adjacent to the site to the northeast, especially during the evening hours. The proposed disc golf course and mountain bike facility in Area C could generate noise that would affect residential areas to the west during major events or large group use. The proposed splash park in Area D could affect residential areas and a school to the east, depending on the location and number of users. To minimize the noise impacts from recreational activities, SC 5.11.3 requires compliance with the County's exterior noise standards. SC 5.11.7 requires that if the project would be located in or near an adjacent City that has different noise regulations, the project sponsor shall comply with the more stringent noise standards or regulations.

MM 5.11.3 requires that a noise study be prepared for all projects that would be located within 500 feet of a home or school and would support large crowds and outdoor recreational activities (such as the skate park or court sports, expansion of existing soccer fields, amphitheater/special events area, waterplay/splash park, performance pavilions, or small event areas) to demonstrate that the project would not adversely affect nearby noise-sensitive uses. Compliance may be achieved by limiting of activities to the daytime hours, siting of noise-generating activities as far as practicable from the nearest homes and schools, site design (bleachers and sound amplifiers/speakers facing away from noise-sensitive uses, use of intervening structures and topography), and the construction of noise barriers.

In summary, all proposed facilities would have to comply with applicable County and/or nearby City regulations (SCs 5.11.1 to 5.11.7), as outlined above. With the implementation of MM 5.11-3 and compliance with SCs 5.11.1 to 5.11.7, existing and future adjacent land uses to the WNDBRA would not be exposed to noise levels in excess of County and/or nearby City standards. Therefore, impacts related to operation of the WNDBRA would be less than significant.

Temporary Increase in Noise Levels

Threshold 5.11.3: Would the project result in a temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Construction activities at the WNDDBRA would result in temporary and periodic increases in noise levels. Due to the short-term use of the recreational areas and facilities at the WNDDBRA and the staggered times and scattered locations where construction would occur, impacts would be less than significant. However, construction at the edges of the WNDDBRA would affect adjacent land uses such as the amphitheater construction that could occur near existing residences; soccer field expansion near residences and a school; Green Streets on roadways leading into the WNDDBRA that have abutting schools, residences, and other noise-sensitive uses; and traffic-calming measures near a school.

Construction equipment can operate in two modes: stationary and mobile. Stationary equipment operates in one location for one or more days at a time, with either a fixed-power operation (such as pumps, generators, and compressors) or a variable noise operation (such as pile drivers, rock drills, and pavement breakers). Mobile equipment (such as bulldozers, graders, and loaders) moves around the construction site with power applied in cyclic fashion. Noise impacts from stationary equipment are assessed from the location of the specific equipment, while noise impacts from mobile construction equipment are assessed from the center of the equipment activity or construction site.

Variation in power imposes additional complexity in characterizing the noise source levels from construction equipment. Power variation is accounted for by describing the noise at a reference distance from equipment operating at full power and adjusting it based on the duty cycle of the activity to determine the L_{eq} of the operation. Typical duty cycles and associated noise levels generated by representative pieces of equipment are listed in Table 5.11-7.

**TABLE 5.11-7
TYPICAL MAXIMUM CONSTRUCTION EQUIPMENT NOISE LEVELS**

Equipment	Noise Level (dBA) at 50 ft	Typical Duty Cycle (%)
Auger Drill Rig	85	20
Backhoe	80	40
Chain Saw	85	20
Compactor (ground)	80	20
Compressor (air)	80	40
Concrete Mixer Truck	85	40
Concrete Pump	82	20
Crane (mobile or stationary)	85	20
Dozer	85	40
Dump Truck	84	40
Excavator	85	40
Front End Loader	80	40
Generator (25 KVA or less)	70	50
Generator (more than 25 KVA)	82	50
Grader	85	40

**TABLE 5.11-7 (Continued)
TYPICAL MAXIMUM CONSTRUCTION EQUIPMENT NOISE LEVELS**

Equipment	Noise Level (dBA) at 50 ft	Typical Duty Cycle (%)
In situ Soil Sampling Rig	84	20
Jackhammer	85	20
Paver	85	50
Pneumatic Tools	85	50
Pumps	77	50
Rock Drill	85	20
Scraper	85	40
Tractor	84	40
Vacuum Excavator (vac-truck)	85	40
Vibratory Concrete Mixer	80	20
dBA: A-weighted decibel; ft: feet; KVA: kilovolt amps. Source: Thalheimer 2000		

Each phase of construction has a specific equipment mix, depending on the work to be accomplished during that phase. Each phase also has its own noise characteristics; some would have higher continuous noise levels than others, and some have high-impact noise levels. The L_{eq} of each phase is determined by combining the L_{eq} contributions from each piece of equipment used in that phase.

Proposed facilities and improvements at the WND BRA would be constructed at various time periods and at scattered locations. During construction, nearby noise-sensitive receptors would be exposed to occasional high noise levels associated with the operation of heavy mobile equipment (including dozers, loaders/backhoes, and haul trucks) during the grading phase. In typical construction projects where pile driving and rock blasting do not occur—such as the proposed project—grading activities generate the highest noise levels since this phase involves the largest equipment. Temporary and periodic increase in noise levels would occur at individual construction sites, and could affect off-site, noise-sensitive receptors, such as the residences north and east of the WND BRA, as well as on-site recreational activities.

Table 5.11-7 above shows that the maximum noise levels from operation of construction equipment can reach 85 dBA L_{max} . By applying a 6-dBA attenuation with each doubling of distance from source to receptor, construction equipment operation in unmitigated conditions has the potential to exceed the stricter daytime 60-dBA L_{max} standard when operating within 900 feet of a residential receptor or 70-dBA L_{max} when operating within 300 feet of a commercial receptor. Most construction sites would be more than 900 feet from an occupied home or school, or more than 300 feet from a commercial use. While temporary and periodic increases in noise levels would occur at individual construction sites, compliance with the County and local noise regulations would reduce these impacts.

Heavy-duty equipment use at the edges of the WND BRA could lead to daytime noise levels exceeding the County Noise Ordinance standards for residential and commercial uses presented in Table 5.11-4. Depending on the location of nearby noise sensitive receptors, this could be a significant impact. Compliance with the County noise regulations regarding (1) the timing of construction activities and the maximum noise levels from mobile equipment (SC 5.11.1); (2) the times when the use of a machine, tool, device, or equipment that makes loud noises is prohibited (SC 5.11.2); and (3) restrictions on loading and unloading operations

between 10:00 PM and 6:00 AM (SC 5.11.4) would reduce construction noise during the evening and early morning hours and avoid impacts on nearby residents. SC 5.11.7 requires that if a nearby City has different noise regulations, the project sponsor shall comply with the more stringent noise standards or regulations.

MM 5.11.1 requires the preparation of an acoustical study for construction projects where heavy construction equipment would be utilized within 900 feet of a residential property or school, or within 300 feet of a commercial property. The acoustical study shall incorporate noise reduction methods necessary to meet applicable construction noise standards. Implementation of MM 5.11.1 would reduce noise from both mobile equipment and stationary construction equipment. With application of SC 5.11.4, SC 5.11.7, and MM 5.11.1, construction noise impacts would be less than significant.

Construction Traffic Noise

In addition to construction noise from the project site, project construction would cause increased traffic noise along access routes to the site due to haul trucks and workers commuting to and from the site. However, with SR-60 crossing through the site, I-605 passing at the southeastern edge of the site and Rosemead Boulevard providing direct access to Interstate 10 (I-10) to the north, construction traffic is expected to utilize these major freeways and roadways instead of local streets where noise-sensitive receptors may be located. Thus, construction traffic would not result in a substantial increase in traffic noise on local streets in the vicinity of the WNDBRA. Impacts would be less than significant, and no mitigation is required.

Groundborne Noise and Vibration

Threshold 5.11.4: Would the project expose persons to or generate excessive groundborne vibration or groundborne noise levels?

The proposed facilities and improvements under the MDPI have the potential to generate vibration impacts. Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures, and soil type. Groundborne vibration generated by construction projects is usually highest during rock blasting, pile driving, soil compacting, jackhammer use, and demolition-related activities.

According to Caltrans, the threshold for structural vibration damage is 0.3 in/sec for intermittent sources, which include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment. Below this level, there is virtually no risk of building damage. If heavy equipment were to operate very near existing structures, structural damage may occur. The County's Noise Ordinance prohibits the operation of any device that creates vibration levels greater than 0.01 in/sec (80 VdB) over the range of 1 to 100 Hz at or beyond the property boundary of the source. Table 5.11-8 summarizes the typical vibration levels during construction activities in in/sec at 25 feet from the equipment.

**TABLE 5.11-8
TYPICAL VIBRATION LEVELS DURING CONSTRUCTION ACTIVITIES**

Equipment		PPV at 25 ft (in/sec) ^a
Pile Driver (impact)	Upper range	1.518
	Typical	0.644
Pile Driver (sonic)	Upper range	0.734
	Typical	0.170
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003
<small>ft: feet; ppv: peak particle velocity; in/sec: inch(es) per second ^aThe ppv is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in in/sec.</small>		
<small>Source: FTA 2006</small>		

Thus, depending on underlying soil characteristics and distance from the equipment, vibration may affect users in and near the WNDBRA during the construction of individual facilities and improvements. On-site and off-site vibration would be temporary and short-term at scattered locations throughout and near the WNDBRA. As vibration levels would drop rapidly with distance, construction vibration levels would be below the 0.3 in/sec ppv threshold for structural damage when heavy construction equipment (such as large bulldozers and loaded trucks) are operating at distances over 20 feet from the affected receptor. Vibration levels would be below the County's standard of 0.01 in/sec when heavy construction equipment is operating at distances over 100 feet away. Therefore, vibration may be noticeable for short periods, but it would not likely be annoying and would not be a significant impact.

Pile driving and rock blasting, which are less common activities, have the potential to generate higher vibration levels than discussed above. Implementation of MM 5.11.4 would require that a technical study be prepared to evaluate and mitigate potential vibration impacts to nearby structures and persons if pile driving and/or blasting are anticipated during the construction of a project within 900 feet of an existing structure. Potential mitigation may include using non-explosive rock removal methods and low-impact pile driving methods. Implementation of MM 5.11.4 would reduce impacts related to pile driving and rock blasting to less than significant levels.

Long-term use of the proposed recreational facilities is not expected to result in vibration impacts as no heavy equipment or machinery would be used at the WNDBRA. Thus, no long-term vibration impacts are expected to affect nearby residences, schools, and other land uses. Long-term vibration impacts would be less than significant.

Truck vibration levels depend on vehicle characteristics, load, speed, and pavement condition. Typical vibration levels for heavy trucks on normal traffic speeds can reach levels of up to 65 VdB. However, on-site truck deliveries would be very limited due to the recreational use of the facilities; therefore any truck vibration impacts would be less than significant in or near the WNDBRA.

Airport Noise

Threshold 5.11.5: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Threshold 5.11.6: For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

The WND BRA is not located near an airport or private airstrip. The nearest airport to the WND BRA is the El Monte Airport, located approximately three miles northeast of the WND BRA at 4233 North Santa Anita Avenue in the City of El Monte. Noise from aircraft flying over the WND BRA is occasionally audible but does not adversely affect existing recreational uses. No impacts to airport or aircraft operations would occur with the proposed facilities and improvements under the MDPI, and the MDPI would not expose WND BRA users to excessive noise levels from aircraft. No impacts would occur.

5.11.5 CUMULATIVE IMPACTS

The cumulative noise and vibration impact of the MDPI is the effect on the environment resulting from the incremental noise and vibration impact of the proposed facilities and improvements as set forth in the MDPI, when combined with the noise and vibration impacts of growth and development throughout the San Gabriel Valley.

Cumulative Construction Noise and Vibration

Adverse noise and vibration impacts during construction of the proposed facilities and improvements would be localized and would occur intermittently for varying periods of time and at dispersed locations throughout the WND BRA. Short-term cumulative impacts related to ambient noise and vibration levels could occur if construction associated with the proposed project and surrounding future development was to occur simultaneously. Noise or vibration associated with construction of the proposed project in combination with other another project near the WND BRA boundaries could adversely impact sensitive receptors in the vicinity of the project with a cumulative noise level greater than the noise generated solely at the project site. With adherence to construction time limits and applicable noise and vibration regulations, and considering that the majority of parcels along the site boundaries are developed, cumulative noise and vibration impacts would be less than significant.

Additionally, construction activities for other development projects near the WND BRA would also be required to comply with the affected jurisdiction's noise ordinance, which generally restricts construction to normal daytime work hours, which is considered the least noise- or vibration-sensitive period. Construction activities conducted consistent with the Los Angeles County Noise Control Ordinance and affected local jurisdictions' regulations are not expected to result in a significant cumulative impact.

Cumulative Operational Noise

An increase in potential traffic-related noise impacts would occur, as new vehicle trips are generated by proposed facilities and improvements in the WNCBRA, as estimated by the Traffic Analysis prepared for the proposed MDPI and included in Appendix H. The traffic analysis considers cumulative traffic from future growth and development in the surrounding area and not just within the WNCBRA. The anticipated increase in traffic volumes on local streets and freeways would not result in a perceptible ambient noise increase nor significant traffic noise impacts. Therefore, cumulative noise impacts would be less than significant.

As discussed above, operation of the proposed facilities set forth in the MDPI would contribute to ambient noise levels but would be less than significant. Because the proposed facilities would have less than significant operational noise impacts, the incremental contribution of the MDPI to ambient noise levels would also be considered less than significant. In addition, because operation of the proposed project would not involve any significant vibration sources, there would be no incremental contribution to cumulative vibration impacts from the MDPI.

5.11.6 MITIGATION PROGRAM

To reduce or avoid significant adverse impacts related to noise, the following mitigation measures are required:

MM 5.11.1 Prior to the start of construction activities for individual projects, preparation of an acoustical study would be required for construction projects where heavy construction equipment would be utilized within 900 feet of a residential property or school, or within 300 feet of a commercial property. The acoustical study shall incorporate methods, such as the installation of a temporary noise barrier/curtain at the boundaries of the construction site, to meet applicable construction noise standards.

MM-5.11.2 Noise studies shall be prepared prior to approval of each proposed project that includes recreational uses such as playgrounds, amphitheaters, a sports arena, and water recreation areas to ensure that the proposed facilities are compatible with the future exterior ambient noise environment. For amphitheaters, the ambient noise above conditionally acceptable levels shall be above 65 dBA CNEL; for sports arenas and outdoor spectator sports levels, above 70 dBA CNEL; and for water recreation facilities, above 70 dBA CNEL. Noise mitigation at these areas can be accomplished through use of noise barriers or by siting use areas away from the roadways and/or behind berms, hills, and structures.

MM-5.11.3 A noise study shall be prepared for all projects that would be located within 500 feet of a home or school and that would support large crowds and outdoor recreational activities (such as the skate park or court sports, expansion of existing soccer fields, amphitheater/special events area, waterplay/splash park, performance pavilions, or small event areas) in order to demonstrate that the project would not adversely affect nearby noise-sensitive uses. Compliance may be achieved through limiting of activities to the daytime hours; siting of noise-generating activities as far as practicable from the nearest homes and schools; site design (bleachers and sound amplifiers/speakers facing away from noise-sensitive uses, use of intervening structures and topography); and the construction of noise barriers.

MM-5.11.4 If pile driving and/or blasting are anticipated during the construction of a project that would be located within 900 feet of an existing structure, a technical study shall be prepared to evaluate and mitigate potential noise and vibration impacts to nearby structures and persons. Potential mitigation may include the use of non-explosive rock removal methods and low-impact pile driving methods.

5.11.7 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of the Mitigation Program (SCs 5.11.1 to 5.11.7 and MMs 5.11.1 to 5.11.4) would reduce noise and vibration impacts to less than significant levels. Impacts would be less than significant after mitigation. Cumulative noise and vibration impacts would also be less than significant.

5.11.8 REFERENCES

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