4.10 NOISE

INTRODUCTION

This section addresses the existing noise conditions in the City, identifies the regulatory framework with respect to regulations that address noise, and evaluates the significance of the potential stationary and mobile source noise impacts that could result from implementation of the Azusa TOD Specific Plan. In addition, to reduce impacts, mitigation measures are included when applicable.

4.10.1 ENVIRONMENTAL SETTING

Characteristics of Sound (Noise and Vibration)

Noise

Noise is usually defined as unwanted sound that is an undesirable byproduct of society's normal day-to-day activities. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, and/or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). The human ear does not respond uniformly to sounds at all frequencies; for example, it is less sensitive to low and high frequencies than medium frequencies, which more closely correspond with human speech.

In response to the sensitivity of the human ear to different frequencies, the A-weighted noise level (or scale), which corresponds better with people's subjective judgment of sound levels, has been developed. This A-weighted sound level, referenced in units of dB(A), is measured on a logarithmic scale such that a doubling of sound energy results in a 3 dB(A) increase in noise level. Examples of typical A-weighted sound sources are presented in **Figure 4.10-1, Examples of Typical A-Weighted Sound Levels**. In general, changes in a community noise level of less than 3 dB(A) are not typically noticed by the human ear.[1] Changes from 3 to 5 dB(A) may be noticed by some individuals who are extremely sensitive to changes in noise.[2] A greater than 5 dB(A) increase is clearly noticeable, while the human ear perceives a 10 dB(A) increase in sound level to be a doubling of sound.

Noise sources occur in two forms: (1) point sources, such as stationary equipment; and (2) line sources, such as a constant flow of traffic on a busy roadway. Sound generated by a point source typically diminishes (attenuates) at a rate of 6 dB(A) for each doubling of distance from the source to the receptor

1 Federal Highway Administration, *Highway Noise Fundamentals*, (1980) 81.

2 Engineering Noise Control, Bies & Hansen, 1988.

at acoustically "hard" sites and 7.5 dB(A) at acoustically "soft" sites.[3] For example, a 60 dB(A) noise level measured at 50 feet from a point source at an acoustically hard site would be 54 dB(A) at 100 feet from the source and 48 dB(A) at 200 feet from the source. Sound generated by a line source typically attenuates at a rate of 3 dB(A) and 4.9 dB(A) per doubling of distance from the source to the receptor for hard and soft sites, respectively.[4] **Table 4.10-1 Noise Level Attenuation over Distance**, illustrates the relationship of distance to noise levels.

Table 4.10-1
Noise Level Attenuation over Distance

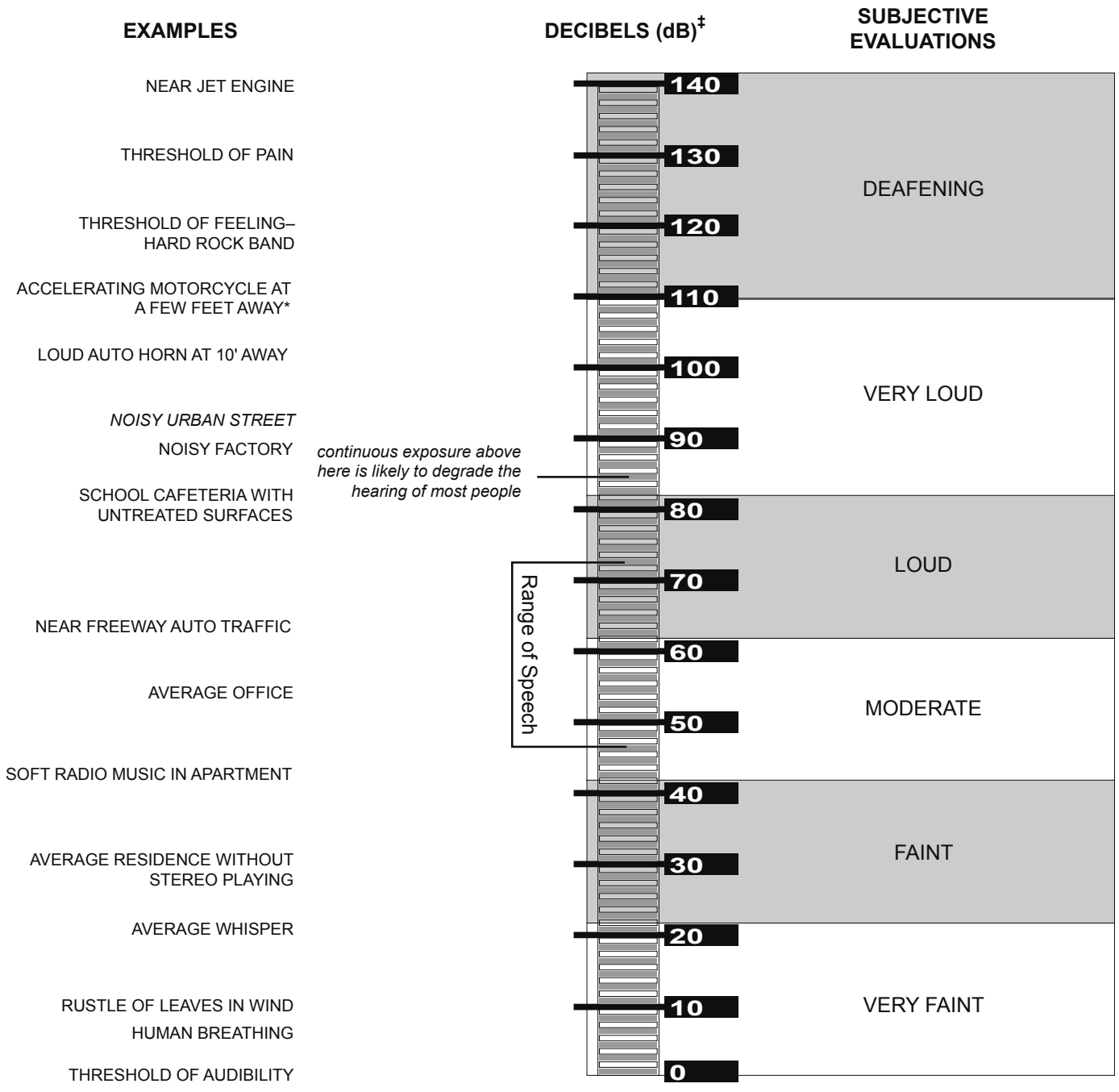
Distance to Sensitive Receptor	Noise Level dB(A)
50 feet	99
100 feet	93
200 feet	87
400 feet	81
800 feet	75
1,000 feet	74.5
1,600 feet	69

Source: Impact Sciences, Inc. 2015.

Sound levels also can be attenuated by man-made or natural barriers (e.g., sound walls, berms, ridges), as well as elevational differences, as illustrated in **Figure 4.10-2, Noise Attenuation by Barriers and Elevation Differences**.

3 Federal Highway Administration, *Highway Noise Fundamentals*, (1980) 97. Examples of "hard" or reflective sites include asphalt, concrete, and hard and sparsely vegetated soils. Examples of acoustically "soft" or absorptive sites include soft, sand, plowed farmland, grass, crops, heavy ground cover, etc.

4 Federal Highway Administration, *Highway Noise Fundamentals*, (1980) 97.

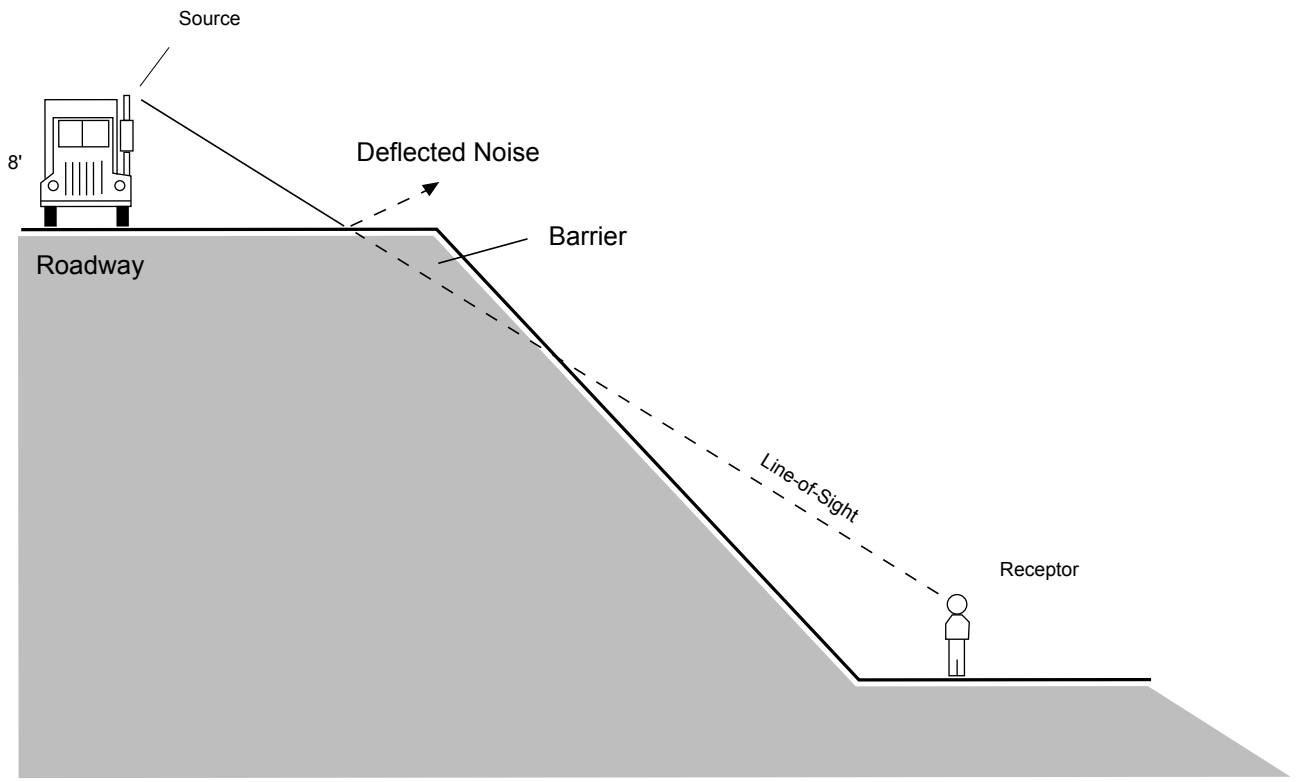


** NOTE: 50' from motorcycle equals noise at about 2000' from a four-engine jet aircraft.*

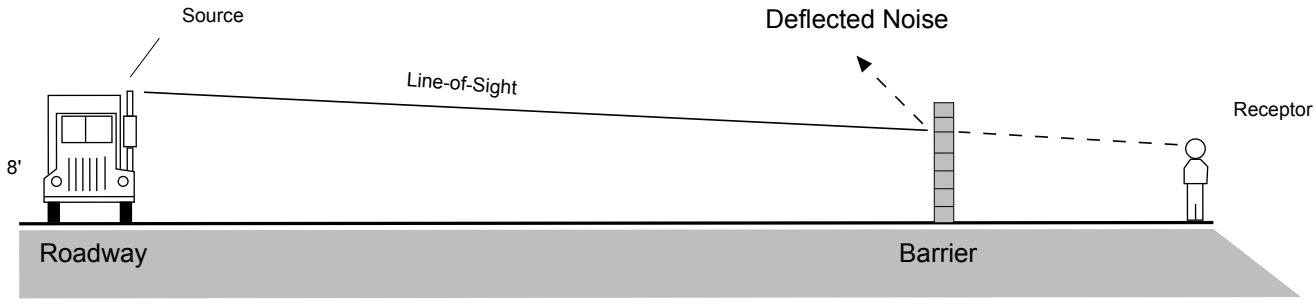
‡*NOTE: dB are "average" values as measured on the A–scale of a sound–level meter.*

FIGURE **4.10-1**

Examples of Typical A-Weighted Sound Levels



"Barrier Effect" Resulting from Differences in Elevation.



"Barrier Effect" Resulting from Typical Soundwall.

SOURCE: Impact Sciences, Inc., June 2015

FIGURE **4.10-2**

Noise Attenuation by Barriers and Elevation Differences

Solid walls and berms may reduce noise levels by 5 to 10 dB(A) depending on their height and distance relative to the noise source and the noise receptor.[5] Sound levels may also be attenuated 3 to 5 dB(A) by a first row of houses and 1.5 dB(A) for each additional row of houses.[6] The minimum noise attenuation provided by typical structures in California is provided in **Table 4.10-2, Outside-to-Inside Noise Attenuation (dB(A))**.

Table 4.10-2
Outside-to-Inside Noise Attenuation (dB(A))

Building Type	Open Windows	Closed Windows
Hotels/Motels	17	25
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Convalescent Homes	17	25
Offices	17	25
Theaters	20	30

Source: Gordon, C.G., W.J. Galloway, B.A. Kugler, and D.L. Nelson. NCHRP Report 117: Highway Noise: A Design Guide for Highway Engineers. Washington, D.C.: Transportation Research Board, National Research Council, 1971.

Sound Rating Scales

Various rating scales approximate the human subjective assessment to the "loudness" or "noisiness" of a sound. Noise metrics have been developed to account for additional parameters, such as duration and cumulative effect of multiple events. Noise metrics are categorized as single event metrics and cumulative metrics, as summarized below.

In order to simplify the measurement and computation of sound loudness levels, frequency weighted networks have obtained wide acceptance. The A-weighted (dB(A)) scale has become the most prominent of these scales and is widely used in community noise analysis. Its advantages are that it has shown good correlation with community response and is easily measured. The metrics used in this analysis are all based upon the dB(A) scale.

5 Federal Highway Administration, *Highway Noise Mitigation*, (1980) 18.

6 T.M. Barry and J.A. Reagan, *FHWA Highway Traffic Noise Prediction Model*, (1978) 33.

Equivalent Noise Level

Equivalent Noise Level (Leq) is the sound level corresponding to a steady-state A-weighted sound level containing the same total energy as several single event noise exposure level events during a given sample period. Leq is the "energy" average noise level during the period of the sample. It is based on the observation that the potential for noise annoyance is dependent on the total acoustical energy content of the noise. Leq can be measured for any period, but is typically measured for 15 minutes, 1 hour, or 24-hours. Leq for a 1-hour period is used by the Federal Highway Administration (FHWA) for assessing highway noise impacts. Leq for 1-hour is referred to as the Hourly Noise Level (HNL) in the California Airport Noise Regulations and is used to develop Community Noise Equivalent Level values for aircraft operations. Construction noise levels and ambient noise measurements in this section use the Leq scale.

Community Noise Equivalent Level

Community Noise Equivalent Level (CNEL) is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. It is a measure of the overall noise experienced during an entire day. The term "time-weighted" refers to the penalties attached to noise events occurring during certain sensitive periods. In the CNEL scale, 5 dB are added to measured noise levels occurring between the hours of 7:00 PM and 10:00 PM. For measured noise levels occurring between the hours of 10:00 PM to 7:00 AM, 10 dB are added. These decibel adjustments are an attempt to account for the higher sensitivity to noise in the evening and nighttime hours, and the expected lower ambient noise levels during these periods. Existing and projected future traffic noise levels in this section use the CNEL scale.

Day-Night Average Noise Level

The day-night average sound level (Ldn) is another average noise level over a 24-hour period. Noise levels occurring between the hours of 10:00 PM and 7:00 AM are increased by 10 decibels (dB). This noise is weighted to take into account the decrease in community background noise of 10 dB(A) during this period. Noise levels measured using the Ldn scale are typically similar to CNEL levels.

Vibration

Vibration consists of waves transmitted through a solid medium. Groundborne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be comprised of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in Hertz (Hz). Most environmental vibrations consist of a composite, or "spectrum" of many frequencies, and are generally classified as broadband or random vibrations. 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. Vibration is often measured in terms of

the peak particle velocity (PPV) in inches per second (in/sec) when considering impacts on buildings or other structures, as PPV represents the maximum instantaneous peak of vibration that can stress buildings. Because it is a representation of acute vibration, PPV is often used to measure the temporary impacts of short-term construction activities that could instantaneously damage built structures. Vibration is often also measures by the Root Mean Squared (RMS) because it best correlates with human perception and response. Specifically, RMS represents "smoothed" vibration levels over an extended period of time and is often used to gauge the long-term chronic impacts of a project's operation on the adjacent environment.

Vibration energy attenuates as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. High frequency vibrations reduce much more rapidly than low frequencies, so that in the far-field from a source, the low frequencies tend to dominate. Soil properties also affect the propagation of vibration. When groundborne vibration interacts with a building, there is usually a ground-to-foundation coupling loss (i.e., the foundation of the structure does not move in sync with the ground vibration), but the vibration can also be amplified by the structural resonances of the walls and floors. Vibration in buildings is typically perceived as rattling of windows or of items on shelves, or the motion of building surfaces. At high levels, vibration can result in damage to structures.

Man-made groundborne vibration is generally limited to areas within a few hundred feet of certain types of construction activities, especially pile driving. Road vehicles rarely create enough groundborne vibration to be perceptible to humans unless the road surface is poorly maintained and there are potholes or bumps. If traffic, typically heavy trucks, induces perceptible vibration in buildings, such as window rattling or shaking of small loose items, then it is most likely an effect of low-frequency airborne noise or ground characteristics. Human annoyance by vibration is related to the number and duration of events. The more events or the greater the duration, the more annoying it would be to humans.

Adverse Effects of Noise Exposure

Noise is known to have several adverse effects on humans, which has led to laws and standards being set to protect public health and safety, and to ensure compatibility between land uses and activities. Adverse effects of noise on people include hearing loss, communication interference, sleep interference, physiological responses, and annoyance. Each of these potential noise impacts on people is briefly discussed in the following narrative.

Hearing Loss

Hearing loss is generally not a community noise concern, even near a major airport or a major freeway. The potential for noise induced hearing loss is more commonly associated with occupational noise

exposures in heavy industry, very noisy work environments with long term exposure, or certain very loud recreational activities, such as target shooting, motorcycle or car racing, etc. The Occupational Safety and Health Administration (OSHA) identifies a noise exposure limit of 90 dB(A) for 8 hours per day to protect from hearing loss (higher limits are allowed for shorter duration exposures). Noise levels in neighborhoods, even in very noisy neighborhoods, are generally not sufficiently loud to cause hearing loss assuming local governments ensure that new and existing land uses are compatible with their noise environment.

Communication Interference

Communication interference is one of the primary concerns in environmental noise problems. Communication interference includes speech interference and interference with activities such as watching television. Noise can also interfere with communications within school classrooms, as well as classroom activities. Normal conversational speech is in the range of 60 to 65 dB(A) and any noise in this range or louder may interfere with speech.

Sleep Interference

Noise can make it difficult to fall asleep, create momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages, and cause awakening. Noise may even cause awakening that a person may or may not be able to recall.

Annoyance

Annoyance is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. Noise that one person considers tolerable can be unbearable to another of equal hearing capability. The level of annoyance depends both on the characteristics of the noise (including loudness, frequency, time, and duration), and how much activity interference (such as speech interference and sleep interference) results from the noise. However, the level of annoyance is also a function of the attitude of the receiver. Personal sensitivity to noise varies widely. It has been estimated that 2 to 10 percent of the population is highly susceptible to annoyance from any noise not of their own making, while approximately 20 percent are unaffected by noise. Attitudes may also be affected by the relationship between the person affected and the source of noise, and whether attempts have been made to abate the noise.

Existing Conditions

Existing Noise Sources

Based upon the existing land uses within and adjacent to the specific plan area, noise-sensitive receptors include residential uses, places of worship, parks, assisted-living centers, and academic buildings. The most pervasive noise sources in developed areas are typically related to transportation. Heavily traveled roadways and the Burlington Northern and Santa Fe (BNSF) Railway are the primary noise sources within the specific plan area. These noise sources as well as ambient noise sources are discussed in greater detail below.

Railroad Operations

Railroad operations generate high, relatively brief, intermittent noise events. These noise events are an environmental concern for sensitive uses located along rail lines and in the vicinities of switching yards. Locomotive engines and the interaction of steel wheels and rails primarily generate rail noise. The latter source creates three types of noise: (1) rolling noise due to continuous rolling contact, (2) impact noise when a wheel encounters a rail joint, turnout or crossover, and (3) squeal generated by friction on tight curves. For very-high-speed rail vehicles, air turbulence can be a significant source of noise. In addition, use of air horns and crossing bell gates contribute to noise levels in the vicinity of grade crossings. **Table 4.10-3, Reference Noise Levels for Various Rail Operations,** provides reference noise levels in terms of Sound Exposure Levels for different types of rail operations.

Table 4.10-3
Reference Noise Levels for Various Rail Operations[1]

Source/Type		Reference Condition	Reference Noise Level (SEL, dB(A)
Commuter Rail, At-Grade	Locomotives	Diesel-electric, 3,000 horsepower, throttle 5	92
		Electric	90
	Diesel Multiple Unit	Diesel-powered, 1,200 horsepower	85
	Horns	Within 0.25 mile of grade crossing	110
	Cars	Ballast, welded rail	82
Rail Transit		At-grade, ballast, welded rail	82
Transit Whistles/Warning Devices		Within 0.125 mile of grade crossing	93
Automated Guideway Transit	Steel Wheel	Aerial, concrete, welded rail	80
	Rubber Tire	Aerial, concrete, guideway	78
Monorail		Aerial, straddle beam	82
Maglev		Aerial, open guideway	72

Source: FTA, Transit Noise and Vibration Impact Assessment, May 2006
Notes: SEL = Sound exposure level which describes a receiver's cumulative noise exposure from a single noise event.
[1] = 50 feet from the track with the train travelling 50 miles an hour.

High noise impacts can be expected within approximately 100 feet of the main line railroad tracks, moderate impacts from 100 to 700 feet, and low impacts at distances greater than about 700 feet. The above-noted impacts may be lesser or greater depending on site-specific factors such as sound walls, grade crossings, and topographic shielding.

As discussed above, BNSF railroad tracks are located in the northern portion of the specific plan area and would be used by the Metropolitan Transportation Agency (MTA, or Metro), to operate the Gold Line light rail cars.

Truck Routes

Truck routes direct large trucks onto roadways that are designed to accommodate them. Truck routes are typically distant from sensitive receptor locations or noise levels have been appropriately mitigated to acceptable levels. The City's General Plan identifies Foothill Boulevard as a proposed truck route.[7]

Motor Vehicle Noise

Traffic noise is a significant source of ambient noise throughout the City. Foothill Boulevard, a principal arterial, and Azusa Avenue, a secondary arterial, are both located within the specific plan area. These roadways have been designed to carry heavy volumes of traffic, although long-established land use patterns have placed residential uses and schools (including St. Francis of Rome School and Azusa Pacific University) along some portions of these roadways.

Stationary Sources

Stationary ambient noise sources include residential noise such as people talking, car doors slamming, dogs barking, landscape maintenance, and mechanical equipment such as air conditioners. These noise sources may result in environmental effects when they are within close proximity to sensitive receptors.

Construction Activities

Construction sites are located throughout the region and can be located within, or adjacent to, residential districts. In general, construction activities generate high noise levels intermittently on and adjacent to the construction sites, and the related noise impacts are short-term in nature. The dominant source of noise from most construction equipment is the engine, usually a diesel engine, with inadequate muffling.

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7 City of Azusa 2005 General Plan, Chapter 3 Built Environment, Figure M-4.

Construction equipment can be considered to 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 (pumps, generators, compressors) or a variable noise operation (pile drivers, pavement breakers). Mobile equipment moves around the construction site with power applied in cyclic fashion (bulldozers, loaders), or movement to and from the site (trucks).

Construction-related noise levels generally fluctuate depending on the construction phase, equipment type and duration of use, distance between noise source and receptor, and presence or absence of barriers between noise source and receptor. **Table 4.10-4, Construction Equipment 50-Foot Noise Emission Limits,** shows typical noise levels associated with various types of construction-related machinery. These noise levels, which correspond to a distance of 50 feet, decrease by approximately 6 dB(A) to 7.5 dB(A) with each doubling of distance from the construction site (e.g., noise levels from excavation might be approximately 83 dB(A) at 100 feet from the site, and about 77 dB(A) at 200 feet from the site). Interior noise levels from construction are approximately 10 dB(A) (open windows) to 20 dB(A) (closed windows) less than exterior noise levels due to the attenuation provided by building facades.

Table 4.10-4
Construction Equipment 50-Foot Noise Emission Limits

Equipment	Lmax Level (dBA)
Backhoe	80
Bulldozer	85
Compactor	82
Concrete Mixer	85
Generator	81
Grader	85
Jackhammer	88
Paver	89
Pile Driver (impact)*	101
Pile Driver (sonic)	96
Roller	74
Scraper	89
Truck	88

Source: Federal Railroad Administration. Transit Noise and Vibration Impact Assessment, 2006.

** Pile driving is not anticipated to occur during most development.*

Existing Groundborne Vibration Sources

Similar to the environmental setting for noise, the vibration environment is typically dominated by traffic from nearby roadways and activity on construction sites. Heavy trucks can generate groundborne vibrations that vary depending on vehicle type, weight, and pavement conditions. Nonetheless, vibration levels adjacent to roadways are typically not perceptible. The primary sources of groundborne vibration within and adjacent to the specific plan area are construction activities, roadway truck traffic, and railway activity along the BNSF (and future Gold Line) Railway. Seismic events also cause vibration, but occur sporadically and are unpredictable in nature.

4.10.2 REGULATORY FRAMEWORK

Federal

Federal Highway Administration

Federal regulations for railroad noise are contained in 40 Code of Federal Regulations (CFR) Part 201 and 49 CFR Part 210. The regulations set noise limits for locomotives and are implemented through regulatory controls on locomotive manufacturers.

Federal regulations also establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 CFR Part 205, Subpart B. The federal truck passby noise standard is 80 dB at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers. The Federal Highway Administration (FHWA) regulations for noise abatement must be considered for federal or federally funded projects involving the construction of a new highway or significant modification of an existing freeway when the project would result in a substantial noise increase or when the predicted noise levels approach or exceed the Noise Abatement Criteria (NAC).

Title 23 of the Code of Federal Regulations (23 CFR § 772) provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23 CFR § 772.7, projects are categorized as Type I or Type II projects. FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes. A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment.

Type I projects include those that create a completely new noise source, as well as those that increase the volume or speed of traffic or move the traffic closer to a receiver. Type I projects include the addition of

an interchange, ramp, auxiliary lane, or truck-climbing lane to an existing highway, or the widening an existing ramp by a full lane width for its entire length. Projects unrelated to increased noise levels, such as striping, lighting, signing, and landscaping projects, are not considered Type I projects.

Under 23 CFR § 772.11, noise abatement must be considered for Type I projects if the project is predicted to result in a traffic noise impact. In such cases, 23 CFR § 772 requires that the project sponsor "consider" noise abatement before adoption of the environmental document. This process involves identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project, and of noise impacts for which no apparent solution is available.

Traffic noise impacts, as defined in 23 CFR § 772.5, occur when the predicted noise level in the design year approaches or exceeds the NAC specified in 23 CFR § 772, or a predicted noise level substantially exceeds the existing noise level (a "substantial" noise increase). Under these regulations, an impact could result unrelated to the Plan if existing noise levels already exceed the NAC. A "substantial increase" is defined as an increase in Leq of 12 dB during the peak hour of traffic noise. For sensitive uses, such as residences, schools, churches, parks, and playgrounds, the NAC for interior and exterior spaces is Leq 57 and 66 dB, respectively, during the peak hour of traffic noise. **Table 4.10-5 Noise Abatement Criteria,** summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual land use in a given area.

Table 4.10-5
Noise Abatement Criteria

NAC, Hourly A-Weighted Noise Level	Description of Activities
57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
72 (Exterior)	Developed lands, properties, or activities not included in above.
52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Caltrans, Technical Noise Supplement, November 2009

Federal Transit Administration Criteria

The Federal Transit Administration (FTA) has published guidelines for assessing the impacts of groundborne vibration associated with construction activities, which have been applied by other jurisdictions to other types of projects. The FTA measure of the threshold of architectural damage for non-engineered timber and mason buildings (e.g., residential units) is 0.2 in/sec PPV and 0.5 in/sec PPV

for reinforced-concrete, steel, or timber buildings. The threshold of perception of vibration is 0.01 in/sec PPV. There are no FHWA standards for traffic-related vibrations. The FHWA position is that highway traffic and construction vibrations pose no threat to buildings and structures.

Federal Noise Control Act of 1972

The Federal Noise Control Act of 1972 established programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, the US Environmental Protection Agency (US EPA) administrators determined that subjective issues such as noise would be better addressed at more local levels of government, thereby allowing more individualized control for specific issues by designated federal, state, and local government agencies. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to specific federal agencies, and state and local governments. However, noise control guidelines and regulations contained in the US EPA rulings in prior years remain in place.

State

California Department of Transportation

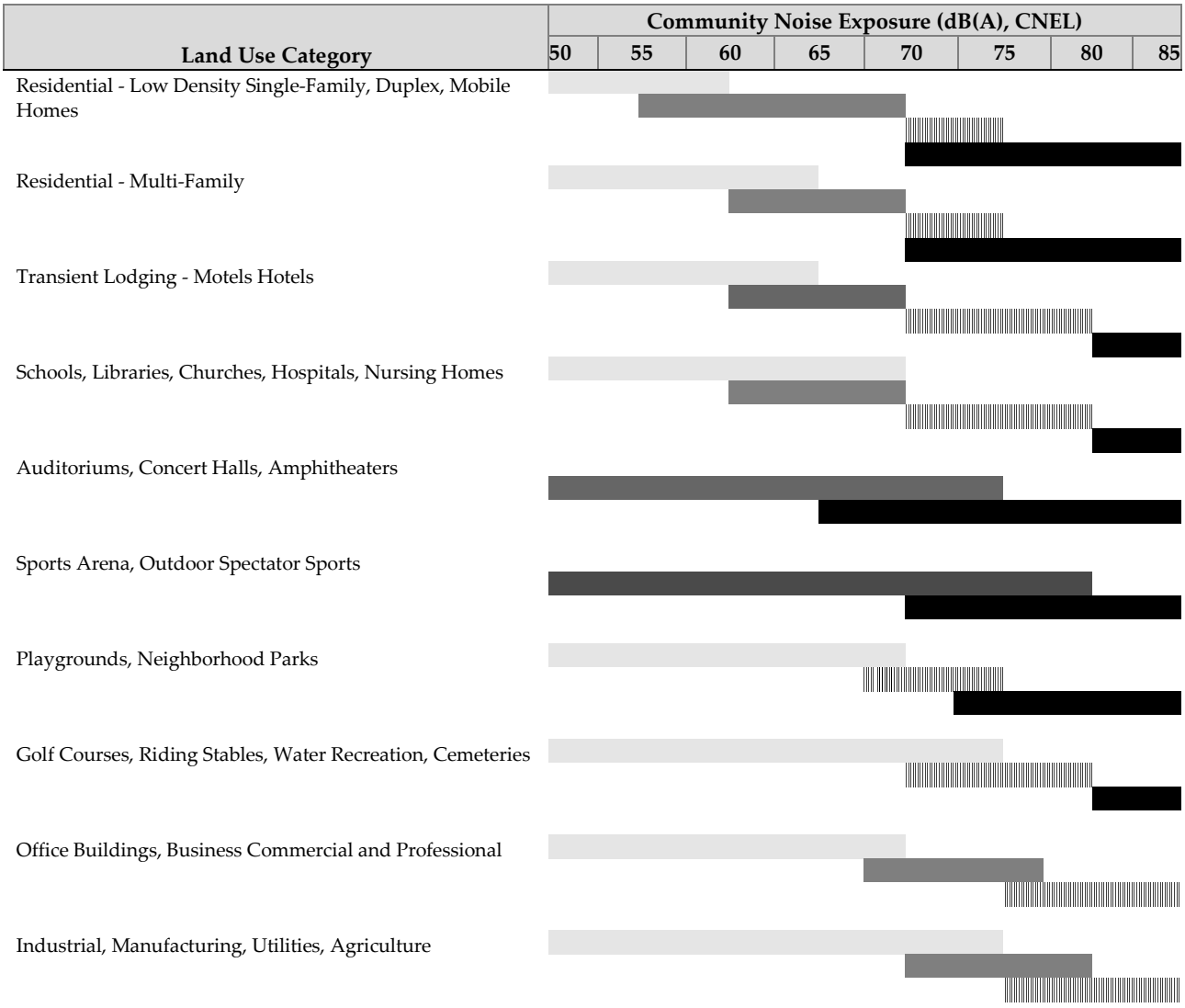
The State of California establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state passby standard is consistent with the federal limit of 80 dB. The state passby standard for light trucks and passenger cars (less than 4.5 tons gross vehicle rating) is also 80 dB at 15 meters from the centerline. For new roadway projects, Caltrans employs the Noise Abatement Criteria, discussed above in connection with FHWA.

There are no state standards for traffic-related vibrations. Caltrans position is that highway traffic and construction vibrations generally pose no threat to buildings and structures. For continuous (or steady-state) vibrations however, Caltrans considers the architectural damage risk level to be somewhere between 0.2 and 2.0 in/sec.

California Department of Health Services

The State has published guidance for locating land uses in areas compatible with the existing noise environment. These guidelines are shown in **Table 4.10-6 Land Use Compatibility for Community Noise Environments.** For example, it would normally be acceptable for a single-family residence to be located in an area with an existing noise level of 60 dB(A) CNEL or less.

Table 4.10-6
Land Use Compatibility for Community Noise Environments



Normally Acceptable - Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Conditionally Acceptable - New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply system or air conditionally will normally suffice.

Normally Unacceptable - 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.

Clearly Unacceptable - New construction or development should generally not be undertaken.

Source: California Office of Noise Control, Department of Health Services.

California Noise Insulation Standards

The California Noise Insulation Standards found in Title 24 of the California Code of Regulations set requirements for new multi-family residential units, hotels, and motels that may be subject to relatively high levels of transportation-related noise. For exterior noise, the noise insulation standard is DNL 45 dB in any habitable room and requires an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than DNL 60 dB.

Local

City of Azusa General Plan

The City's General Plan is primarily a policy document that sets goals concerning the community and gives direction to growth and development. In addition, it outlines the programs that were developed to accomplish the goals and policies of the General Plan. City policies pertaining to noise sources are included in The Built Environment, and The Natural Environment Chapters of the City's General Plan. Noise policies relevant to the project include:

Chapter 3: The Built Environment

Policy 10.1	Require the consideration and mitigation of noise, light, vehicular, and other impacts on residential properties in the design of commercial and industrial development.
Policy 11.2	Front new buildings directly on thoroughfares and respect the presence of neighborhoods immediately behind them by protecting the privacy of residential uses, and minimizing intrusions such as noise, and light and glare.

Chapter 5: Natural Environment

Policy 1.1	Integrate noise considerations in the City's land use planning and project approval process.
Policy 1.2	Protect those areas of the City where the existing noise environments are considered unacceptable or "noise sensitive."
Policy 1.3	Maintain or reduce noise levels within acceptable levels adjacent to existing or planned major transportation facilities such as freeways, major highways, railroads, and light rail transit

City of Azusa Municipal Code

The City's Municipal Code includes interior and exterior noise standards and establishes standards for noise mitigation to protect residents' health, safety, and general welfare, by limiting exposure to

unhealthful effects of noise. As discussed in Section 46-404, the City has created four designated noise zones based on the type of property. They include:

Zone 1	Residential Properties
Zone 2	Professional Office and Public Institution Properties
Zone 3	Commercial Properties (Excluding Professional Office Properties)
Zone 4	Industrial Properties

The City has established a maximum noise level for individual land uses. **Table 4.10-7, Maximum Allowable Noise Level by Receiving Land Use,** includes the permitted noise levels for existing land uses located throughout the City. Construction activities are permitted within the City Monday through Saturday from 7:00 AM to 6:00 PM and are prohibited on Sunday and major holidays.

Table 4.10-7
Maximum Allowable Noise Level by Receiving Land Use

Noise Sensitive Land Use	Outdoor Activity Areas[1, 2] dBA Ldn	Interior Spaces dBA Ldn	Interior Spaces dBA Leq
Residential	65	45	N.A.
Transient lodging	65	45	N.A.
Hospitals, extended care	65	45	N.A.
Theater, auditorium	(3)	45	35
Meeting facility, public, or private	65	45	40
Offices	65	45	45
School, library, museum	65	45	45
Playground, park	70	N.A.	N.A.

Source: City of Azusa Municipal Code Table 3-3

[1] = Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use

[2] = Where it is not possible to reduce noise in outdoor activity areas to 65 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 70 dB Ldn/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

4.10.3 ENVIRONMENTAL IMPACTS

Methodology

The primary noise issues associated with buildout of the Specific Plan are the exposure of existing and proposed noise-sensitive land uses to noise from (1) short-term construction activities; (2) noise from project-related traffic; (3) noise associated with daily activities within the specific plan area, such as noise

from landscaping maintenance, mechanical equipment, recreational activities, use of parking lots, and from special events; and (4) noise from the Gold Line light rail trains and station activities. Buildout of the Specific Plan would have a significant noise impact if it causes exposure of persons to or generation of noise levels in excess of the City's General Plan noise policies or noise ordinance, or applicable standards of other agencies. The City of Azusa's General Plan Noise Element sets forth general policies regarding ambient noise environments. The California Office of Noise Control, Department of Health Services Land Use Compatibility for Community Noise Environments thresholds (**Table 4.10-6**) are included in the General Plan and serve as the City's land use noise thresholds. According to these thresholds, noise levels up to 65 dB(A) CNEL are compatible with residential uses, noise levels up to 63 dB(A) CNEL are compatible with multi-family residential uses, noise levels up to 70 dB(A) CNEL are compatible with other sensitive receptors, such as schools, libraries, places of worship, hospitals, and assisted living facilities.

CEQA does not define the noise level increase that is considered substantial. Typically, an increase in the Ldn of 3 dB(A) or greater at noise-sensitive receptors would be considered significant when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dB(A) or greater would be considered significant when projected noise levels would continue to meet those considered acceptable for the affected land use.

With respect to groundborne vibration generated by project construction, the groundborne vibration levels would be considered excessive if they exceeded 80 VdB at the nearest residential receptor (vibration at this level would be distinctly perceptible to residents and could generate a complaint). Groundborne vibrations that exceed 0.2 in/sec PPV at the nearest building structure and other structures such as carports would be considered excessive as they could result in structural damage.

Thresholds of Significance

The following thresholds for determining the significance of impacts related to noise and vibration are contained in the environmental checklist form contained in Appendix G of the most recent update of the *State CEQA Statues and Guidelines.* Adoption and/or implementation of the Azusa TOD Specific Plan could result in significant adverse impacts related to noise, if any of the following could occur:

Threshold NOISE-1 **Would the project expose people to or generate noise levels in excess of standards established in any applicable plan or noise ordinance, or applicable standards of other agencies?**

Threshold NOISE-2 **Would the project expose people to or generate excessive groundborne vibration or groundborne noise levels?**

Threshold NOISE-3 **Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?**

Threshold NOISE-4 **Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?**

Threshold NOISE-5 **Is the project located within an airport land use plan area or, where such a plan has not been adopted, within two miles of a public airport or a public use airport, would the project expose people residing or working in the project area to excessive noise levels?**

Threshold NOISE-6 **Would the project result in exposure of people residing or working in the project area to excessive noise levels if the project is located in the vicinity of a private airstrip?**

Environmental Effects Found Not To Be Significant

As to **Thresholds NOISE-5** and **NOISE-6**, a less than significant impact or no impact was determined in the Initial Study (**Appendix 1.0**) and therefore this threshold is not evaluated in this section. See **Section 7.0, Effects Found Not To Be Significant**, for a discussion of this environmental effect, as well as others, that were found not to be significant and are, therefore, not evaluated in detail in this EIR. The remaining thresholds are evaluated below.

Impact Analysis

Threshold NOISE-1: Would the project expose people to or generate noise levels in excess of standards established in the City's General Plan or noise ordinance (City of Azusa Code, Article IX, Division 2, Section 46-405) or applicable standards of other agencies?

Construction

Buildout of the Specific Plan would occur over an approximately 20-year period. Grading and construction activities associated with development of future projects could intermittently and temporarily generate noise levels above ambient background levels including noise levels above those permissible by the City's General Plan, Municipal Code, and other applicable standards. **Table 4.10-4**; includes the associated noise levels from typical types of construction equipment. As shown, the use of pile drivers, scrapers/graders, jackhammers, and construction trucks would result in the highest noise levels.

On-site construction activities would generate noise primarily from off-road equipment, with internal combustion engines, mechanical functions, and contact with ground surfaces. The Federal Railroad Administration (FRA) has compiled data on the noise-generating characteristics of specific types of construction equipment (**Table 4.10-4**). Noise levels can range from approximately 74 dB(A) to noise levels in excess of 99 dB(A) when measured at 50 feet. However, these noise levels diminish rapidly with distance at a rate of approximately 6.0 to 7.5 dB(A) per doubling of distance. For example, assuming an acoustically "hard" site, a noise level of 74 dB(A) measured at 50 feet from the noise source to the receptor would reduce to 68 dB(A) at 100 feet from the source, and further reduce by another 6.0 dB(A) to 62 dB(A) at 200 feet from the source. Thus, use of the equipment listed in **Table 4.10-4** would increase noise levels in the immediate vicinity of the construction sites, sometimes for extended durations.

In addition to on-site construction noise, there would be vendor deliveries, haul trucks, and construction worker trips over the course of the 20-year buildout period. Although it is beyond the scope of this EIR to project-specific on- and off-site traffic-related noise impacts associated with construction activities, construction worker related commute trips, vendor delivery trips, and heavy duty on-road truck trips could result in significant noise impacts.

A number of noise sensitive land uses, including Veteran's Freedom Park and Edwards Park, the City Library, the Senior Center, and residential units (located in the Transition District, Route 66 District, the Downtown Expansion District, and the Downtown District) are located in the specific plan area. In addition, several schools (including St. Francis of Rome School, Azusa Pacific University, Lee Elementary,

and Dalton Elementary), and residential units, are located within the Specific Plan's no change area or directly adjacent to one of the Specific Plan's districts. Generally, construction-related noise impacts would be short-term and localized in nature. Further, during construction, ground clearing, grading, structural, and other noise-generating activities would occur at project sites between the hours designated in accordance with the City's Municipal Code Noise Ordinance and any additional applicable plans or standards. Thus, construction related impacts would be less than significant.

Operation

As the specific plan area is generally built out, on- and off-site noise impacts would result from future project-generated traffic, operation of the Gold Line light rail, as well as from human activity on individual project sites. Each of these potential noise impacts is discussed separately below.

On-Site Point Noise

As future projects become operational, on-site uses would result in the generation of noise from point sources including building mechanical equipment, parking and on-site vehicle operations, daily human activities, and landscaping equipment. In addition, the Specific Plan's objectives, such as encouraging the establishment of outdoor dining areas, increasing pedestrian activity throughout the specific plan area, and expanding the number of community events could further increase the number of noise point sources and result in an escalation of ambient noise level throughout the specific plan area. However, the projected increase in ambient noise would be incremental and the regular and intermittent noise from these sources would not exceed the duration-based noise standards for the existing and proposed land uses codified in the City's Municipal Code (Chapter 88.31 Operational Standards). Therefore, composite noise from project operations would be considered a less-than-significant impact.

Motor Vehicle Traffic

As stated in **Section 4.14, Transportation/Circulation**, of this Draft EIR, buildout of the Specific Plan is projected to generate approximately 16,314 vehicle trips per day (1,050 inbound trips and 997 outbound trips) within the specific plan area. These trips would occur throughout the specific plan area on local roadways and add to the existing vehicle trips.

According to the General Plan Draft EIR future noise contours (based on associated project-related traffic from buildout of the General Plan) for the City's primary and secondary arterials and collector streets range from less than 60 dB(A) to 75 dB(A). Within the specific plan area, with the exception of Foothill Boulevard, Azusa Avenue, San Gabriel Avenue, and the BNSF Railway, the future roadway noise levels were projected to be 65 dB(A) or less, and in most residential areas the projected noise level was

calculated to be less than 60 dB(A). The projected dB(A) for Foothill Boulevard, Azusa Avenue, San Gabriel Avenue, and the BNSF Railway is 75 dB(A).

Project-related traffic which causes the existing noise levels to exceed that of the thresholds included in **Table 4.10-6** would be subject to abatement measures. In general, an increase of 3 dB(A) is perceptible to the average human ear. Although intervening structures or other noise-attenuating obstacles between the roadway and sensitive receptors may reduce roadway noise levels at the receiving receptor, there would almost certainly be receptors that would experience roadway noise levels very similar to those indicated by the noise contours. However, it should be noted that the proposed changes to the roadway networks include traffic calming measures that would reduce vehicle speeds and could minimally help to reduce noise on the project area roadways. However, as the overall number of trips on the project area roadways would increase, noise is expected to increase overall. Thus, traffic noise impacts related to the development of an individual development project could result in a significant impact. With implementation of **Mitigation Measure NOISE-1** impacts would be reduced to a less than significant level.

Railway Traffic

Future development within the project area could be exposed to noise generated from operation of the Gold Line light rail trains. Rail activities produce two sources of noise: (1) operational noise from the engine, wheels, and the rail; and (2) signaling at a rail crossing and/or rail station. The BNSF Railway (in which travels through the northern portion of the specific plan area) is currently used for freight trains but would also be used for light rail passenger trains once the Gold Line light rail system is operational in 2016. Although light rail train cars produce less noise than freight train operations (because light rail trains are lighter and powered by smaller engines), warning devices (e.g., horns and train whistles), would be used by both freight train and light rail operators at the grade level crossings and by Gold Line operators as pulling into and departing from the two Gold Line stations. This would result in an average sound level of 110 dB(A) CNEL for surrounding land uses with one-quarter-mile. (See **Table 4.10-3**) As discussed in **Section 3.0 Project Description**, the Specific Plan encourages the location of multi-family uses within 0.25 miles of the Gold Line stations. Future light rail operations (e.g., operation of train cars) would result in a community noise level of 82 dB(A) CNEL when rail cars travel through the area and 110 dB(A) CNEL when warning horns and or bells are used, which would be greater than the City's thresholds for sensitive receptors, including the City's 60 dB(A) CNEL for low density residential uses and 65 dB(A) for multi-family uses (See **Table 4.10-6**). It is expected that noise levels near the Gold Line could intermittently exceed the City's standard and impacts could be potentially significant.

The Gold Line Foothill Extension – Pasadena to Montclair Final EIR (Final EIR) concluded that construction and operational noise impacts associated with the Gold Line, in the City of Azusa, would be

less than significant with mitigation. As described in the Final EIR the Construction Authority would be responsible for employing noise mitigation measures such as noise barriers, modification of at-grade audible warning devices and operations (subject to CPUC approval), and employment of building sound insulation.[8] Therefore, implantation of the mitigation measures included as part of the construction of the Gold Line would ensure impacts would be less than significant. .

Level of Significance Before Mitigation

Motor vehicle impacts would be potentially significant.

Mitigation Measures

NOISE-1 Individual development projects under the Azusa TOD Specific Plan shall be evaluated for sensitive receptors exposure to potential related noise impacts according to the City's noise thresholds. If it is determined that operation of a project has the potential to result in a noise increase above 60 dB(A), a project-specific acoustical analysis shall be prepared by a qualified acoustical consultant. If necessary, the projects' design shall be refined to determine specific improvements (e.g., Sound Transmission Class ratings, exterior wall construction, treatment of façade openings) to reduce interior noise levels to meet the requirement of an Ldn of 60 dB(A) CNEL or less for low density residential properties, 65 dB(A) or less for multi-family properties, and 70 dB(A) or less for schools and libraries, as required by the City and the state Building Code particularly for properties along Foothill Boulevard, San Gabriel Avenue, Azusa Avenue, and the BNSF Railway. The results of the analysis and recommended ratings for windows and doors shall be submitted to the City Building Official for approval and approved prior to issuance of building permits. The approved windows and doors, and forced air mechanical ventilation shall be incorporated where windows must remain closed in order to achieve the interior noise criteria.

Level of Significance After Mitigation

With implementation of **Mitigation Measure NOISE-1,** project related traffic and railway impacts would be less than significant.

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8 Gold Line Foothill Extension – Pasadena to Montclair Final EIR, February 2007, pg. ES-95

Threshold NOISE-2 Would the project expose people to or generate excessive groundborne vibration or groundborne noise levels?

Construction

Construction activities can generate varying degrees of ground vibration, depending on the construction procedures and the construction equipment used. The operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receptor buildings. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibration from construction activities rarely reach the levels that damage structures.

Table 4.10-8, **Construction Vibration Levels (PPV),** presents typical vibration levels estimated in peak particle velocity (PPV) from construction equipment that could be used to construct development within the specific plan area at distances of 25 and 50 feet. Construction activities such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Again, vibration levels would vary depending on soil conditions, construction methods, and equipment used. Erection of the building structure is not anticipated to be a source of substantial vibration with the exception of sporadic events such as dropping of heavy objects, which should be avoided to the extent possible. Construction activities of any one building may extend over a couple construction seasons, but substantial construction vibration during most of this time is not expected except during certain vibration generating activities.

Table 4.10-8
Construction Vibration Levels (in PPV)

Equipment		PPV at 25 feet (in/sec)
Pile Driver (impact)*	Upper range	1.518
	Typical	0.644
Pile Driver (sonic)*	Upper range	0.734
	Typical	0.170
Vibratory Roller		0.210
Hoe Ram		0.089
Large Bulldozer		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

Source: Federal Railroad Administration. Transit Noise and Vibration Impact Assessment, 2006.

** Pile driving is not anticipated to occur during most development.*

As shown in **Table 4.10-8**, at a distance of 50 feet, most construction activities would generate vibration levels that would be well below 0.20 in/sec PPV threshold for buildings that are found to be structurally sound, but where structural damage is a major concern, and even below the conservative 0.08 in/sec PPV level that is used to ensure that historic buildings are not adversely affected. Pile driving would exceed the 0.20 in/sec PPV threshold at a distance of 50 feet.[9] However, if sensitive structures are located within 25 feet of construction activities, there is the potential for exceedances of the conservative 0.08 in/sec PPV threshold and the moderate 0.20 in/sec PPV. At 25 and 50 feet, the 0.5 in/sec PPV threshold would not be exceeding and consequently buildings designed and built to modern engineering standards would not be damaged. The impact from construction vibration would be potentially significant to historic buildings. **Mitigation Measure NOISE-2** would be implemented to reduce the construction vibration impact.

For human perception, the FRA uses a threshold of 80 VdB at residences and buildings where people normally sleep (e.g., nearby residences).[10] **Table 4.10-9**, **Construction Vibration Levels (VdB),** presents typical vibration levels measured in VdB from construction equipment that could be used to construct development within the specific plan area at distances of 25, 50, 75, and 100 feet.

9 CalTrans. 2014. Addendum Vibration Report South Coast 101 High Occupancy Vehicle (HOV) Lanes. July.

10 US Department of Transportation, Federal Highway Administration, Office of Planning and Environment. 2006. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06.

Table 4.10-9
Typical Construction Vibration Levels (in VdB)

Equipment	Approximate VdB			
	25 Feet	50 Feet	75 Feet	100 Feet
Pile Driver (Impact)*	112	103	94	85
Pile Driver (Sonic)*	105	96	87	78
Large Bulldozer	87	81	77	75
Loaded Truck	86	80	76	74
Jackhammer	79	73	69	67
Small Bulldozer	58	52	48	46

Source: Federal Railroad Administration. Transit Noise and Vibration Impact Assessment, 2006.
** Pile driving is not anticipated to occur during most development.*

Based on the information presented in **Table 4.10-10**, vibration levels from demolition and construction activities could be as high as 112 VdB within 25 feet of construction sites if pile driving is occurring, which is substantially above the threshold of 80 VdB for residential uses. If pile driving is not occurring, then vibration levels from demolition and construction activities could be as high as 87 VdB within 25 feet of construction sites. However, the vibrations would be of limited duration and would be experienced only at buildings within 50 feet to 100 feet of the site under construction. The exceedance of the VdB threshold for human annoyance to sensitive receptors directly adjacent to construction sites represents a potentially significant impact. Implementation of **Mitigation Measure NOISE-3** would reduce impacts to a less than significant level.

Level of Significance Before Mitigation

Impacts would be potentially significant.

Mitigation Measures

NOISE-2 For construction that occurs within 50 feet of buildings more than 50 years old, project applicants shall be responsible for monitoring the designated buildings for damage. In the event that the monitored properties are damaged, the project applicant/developer shall be responsible for the cost of any building repairs.

NOISE-3 The City shall require construction contractors to notify all residential units located within 1,600 feet of any construction site of the construction schedule. All notices shall indicate the dates and duration of construction activities, as well as provide a telephone number where residents can inquire about the construction process and register complaints.

Level of Significance After Mitigation

With implementation of **Mitigation Measures NOISE-2** and **NOISE-3**, impacts would be less than significant.

Threshold NOISE-3 **Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?**

Threshold NOISE-4 **Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?**

Construction

Construction activities would include use of heavy equipment for grading and other activities. Heavy trucks would travel to, from, and within the specific plan area to move earthwork, equipment, and building materials. Smaller equipment, such as jack hammers, pneumatic tools, and saws would also be used throughout the construction phases.

Existing residences and other sensitive receptors located within and adjacent to the specific plan area with direct line-of-sight to construction activities and construction traffic could be affected by the construction noise. Construction of utility improvements (e.g., water, gas, electrical, etc.) within the specific plan area could also affect neighboring properties. Potential construction noise impacts would vary with distance and shielding provided by existing buildings.

Table 4.10-4, summarizes noise levels produced by construction equipment that is likely to be used to construct the development within the specific plan area. Based on the construction phases and equipment shown in **Table 4.10-4**, noise levels generated during construction are expected to be up to 85 dB(A) at a distance of 50 feet, which is the assumed distance between potential adjacent residential properties to construction of development within the specific plan area.

Because most construction equipment causes intermittent noise levels up to 85 dB(A) at a distance of 50 feet (under normal circumstances pile driving is not anticipated to occur), nearby noise-sensitive locations such as schools and residences could experience construction noise that is louder than the ambient traffic noise. This represents a potentially significant impact. **Mitigation Measure NOISE-4** would be implemented to reduce this construction noise impact.

Occasionally pile driving may be necessary for specific development within the plan area. The use of pile driving would result in intermittent noise levels up to 101 dB(A) at a distance of 50 feet which would have a potentially significant impact on sensitive receptors. **Mitigation Measure NOISE-5** would be implemented to reduce this pile driving noise impact.

Operation

It is anticipated that the buildings constructed could have rooftop equipment such as heating, ventilating, and air-conditioning (HVAC) units, exterior mechanical equipment, and/or exhaust air openings that could be located in areas exposed to adjacent property lines. Additionally some proposed land uses may use generators or boilers. Sensitive land uses, such as residential uses, throughout the plan area could be within 100 feet or less and therefore could be affected by stationary source noise. At close distances, rooftop equipment and other stationary sources could produce noise that could exceed the outdoor activity areas or indoor space noise thresholds of the City of Azusa's Noise Ordinance. The impact on sensitive receptors within or adjacent to the specific plan area would be potentially significant. **Mitigation Measure NOISE-5**, which would require selection of equipment that produces lower noise levels and/or installation of enclosures and other noise reduction measures would reduce this impact.

Level of Significance Before Mitigation

Impacts would be potentially significant.

Mitigation Measures

NOISE-4 The City shall require individual development projects to adhere to the following construction specifications. The specifications shall be included in the plan submittals to the City for review and approval during the plan check stage:

- During construction, mufflers shall be provided for all heavy construction equipment and all stationary noise sources in accordance with the manufacturers' recommendations.
- Unnecessary idling of internal combustion engines shall be limited to five minutes or less.
- Stationary noise sources and staging areas shall be located as far as is feasible from existing residences and schools, and other sensitive receptors (e.g., the Senior Center and City Library) or contractors shall be required to provide additional noise-reducing engine enclosures (with the goal of achieving approximately 10 dB(A) of reduction compared to uncontrolled engines). Locating stationary noise sources near existing roadways away from adjacent properties is recommended (i.e., at the southwest corner of the project site).
- Air compressors and pneumatic equipment shall be equipped with mufflers, and impact tools shall be equipped with shrouds or shields.
- If for construction purposes, locating stationary construction equipment near existing residential uses is required, an 8 feet tall sound-rated fence should be erected between the equipment and the sensitive receptors. The fence should be located as close to the equipment as is feasible.

- A "construction liaison" shall be designated to ensure coordination between construction staff and neighbors to minimize disruptions due to construction noise. Occupants and property owners of residences within 400 feet of construction activity shall be notified in writing of the construction schedule and the contact information for the construction liaison.

- A qualified acoustical engineer shall be retained as needed to address neighbor complaints as they occur. If complaints occur, noise measurements could be conducted to determine if construction noise levels at adjacent property lines are within the standards. Short-term or long-term construction noise monitoring could also be utilized to diagnose complaints and determine if additional mitigation is required for certain phases of construction.

NOISE-5 Prior to operation of a project, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's Noise Ordinance requirements. A qualified acoustical consultant shall be retained to review mechanical noise as these systems (e.g., HVAC) are developed to determine specific noise reduction measures necessary to reduce noise to comply with the City's Noise Ordinance.

Level of Significance After Mitigation

With implementation of **Mitigation Measures NOISE-4** and **NOISE-5** impacts would be less than significant.

4.10.4 CUMULATIVE IMPACTS

The Specific Plan includes objectives that would shape the portion of the City over the next 20 years. Although the City is approximately 60 percent built out with a limited number of vacant parcels, the Specific Plan does identify vacant opportunity sites. It is anticipated that existing developed sites would be redeveloped, in addition to proposed infill projects which would be located on vacant parcels. As future projects would not be approved simultaneously, it is unlikely that the City would experience intensive construction activity during implementation of the Specific Plan. Noise from construction of development projects is typically localized and has the potential to affect areas immediately within 500 feet from the construction site. Therefore, noise from construction activities from projects within 1,000 feet of each other could contribute to a cumulative noise impact for receptors located between the two construction sites. However, construction noise would be short-term and would affect only surrounding land uses for a short duration of time.

Implementation of the Specific Plan would produce operational noise impacts. Specifically, on-site operation of mechanical equipment associated with residential uses, overall project operations, and car parking and operations would increase the surrounding noise level. Cumulative traffic generated from the Specific Plan and other potential projects could result in significant impacts, specifically along heavily travelled roadways, including Foothill Boulevard, Azusa Avenue, and San Gabriel Avenue. The reconfiguration of Azusa Avenue and San Gabriel Avenue would result in two-way traffic permitted on

each roadway.[11] In addition, San Gabriel Avenue would include a median left hand turn lane and northbound and southbound bicycle lanes. These modifications are projected to reduce vehicle speeds on both roadways and could help reduce the traffic related noise levels on both streets. Further, individual projects' noise impacts would be evaluated on a cases-by-case basis. Therefore cumulative impacts from noise and/or vibration would be less than significant.

Level of Significance Before Mitigation

Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Impacts would be less than significant.

11 Under the Specific Plan the Azusa Avenue and San Gabriel Avenue one-way couplet would be reconfigured to allow northbound and southbound vehicle traffic on each roadway. For a more detailed discussion on this topic see **Section 4.14, Traffic and Circulation.**