4.12 NOISE AND VIBRATION

This section evaluates the noise and vibration impacts of the proposed Plan. The information presented was compiled from multiple sources, including SANDAG and other transportation sponsors, Caltrans, the County of San Diego, cities, and other local jurisdictions.

4.12.1 EXISTING CONDITIONS

NOISE FUNDAMENTALS

Sound is the mechanical energy of a vibrating object transmitted as pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is unwanted sound (i.e., loud, unexpected, and annoying) which interferes with everyday activities or otherwise diminishes the quality of the ambient noise environment. Noise levels are measured as decibels (dB) 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, does not double the noise level, but instead increases the resultant noise level by 3 dB; a halving of the energy would result in a 3 dB decrease (FHWA 2011).

Human Perception and Response to Changes in Noise Levels

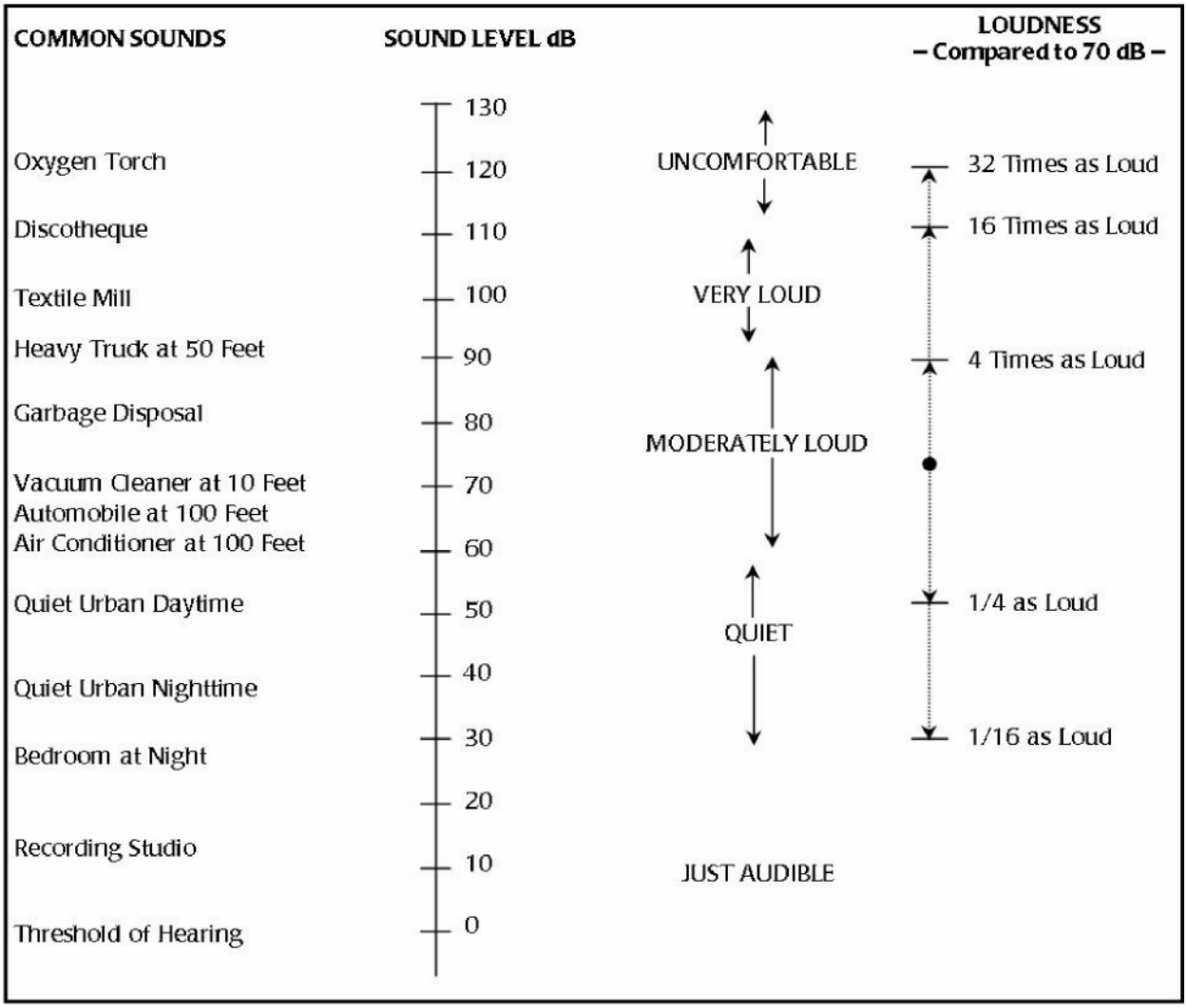
Human perception of noise has no direct correlation with acoustical energy. The perception of noise is not linear in terms of dB or acoustical energy (i.e., two noise sources do not sound "twice as loud" as one source). Because of the logarithmic scale of the decibel unit, sound levels are not added or subtracted arithmetically. If a sound's physical intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example, 60 dB plus 60 dB equals 63 dB, 80 dB plus 80 dB equals 83 dB. However, where ambient noise levels are high in comparison to a new noise source, there will be a small change in noise levels. For example, when 70 dB ambient noise levels are combined with a 60 dB noise source the resulting noise level equals 70.4 dB.

It is widely published that the average healthy ear can barely perceive changes of 3 dB, increase or decrease; that a change of 5 dB is readily perceptible; and that an increase of 10 dB sounds twice as loud (a decrease of 10 dB sounds half as loud) (Caltrans 2009). Normal conversational speech has a sound pressure level of approximately 60 dB. Sound pressure levels above 120 dB begin to be felt inside the human ear as discomfort, and eventually pain. Typical sound pressure levels and human perception of noise level changes are illustrated in Table 4.12-1.

In addition to the level or loudness of noise (dB), the human ear is not equally sensitive to all frequencies within the sound spectrum. Sound can be characterized as the "A weighted" sound level (dBA), which gives greater weight to the frequencies audible to the human ear by filtering out noise frequencies not audible to the human ear. Human judgments of the relative loudness or annoyance of a sound correlate well with dBA levels; therefore, the dBA scale is used for measurements and standards involving the human perception of noise.

There is wide diversity in human responses to noise that varies not only according to the type of noise and the characteristics of the sound source, but also to the sensitivity and expectations of the receptor, the time of day, and the distance and barriers between the noise source and the receptor. The effects of noise on humans can include general annoyance; speech and communication interference; sleep disturbance; and, at extreme levels, hearing impairment.

Table 4.12-1. Typical Sound Levels and Human Perception



Source: *Handbook of Noise Control*, C.M. Harris, Editor, McGraw-Hill Book Co., 1979, and FICAN 1992.

Averaging Noise Levels

In addition to instantaneous noise levels (dBA), the occurrence or magnitude of noise over time is also important for noise assessment. Average noise levels over a period of time are usually expressed as dBA $L_{eq(x)}$, the equivalent noise level for that period (x). For example, $L_{eq(3)}$ would be a 3-hour average; i.e., when no period is specified, L_{eq}, a 1-hour average ($L_{eq(1)}$) is assumed.

The time of day is also an important factor in noise assessment, as noise levels that may be acceptable during the day may interfere with evening activities (between 7:00 p.m. and 10:00 p.m.) or sleep activities during night hours (between 10:00 p.m. and 7:00 a.m.). Therefore, there are 24-hour average noise level descriptors that add noise "penalties" to noise levels during the evening and night periods. The community noise equivalent level (CNEL) is a descriptor of the cumulative 24-hour community noise exposure, with 5 and 10 dBA penalties added to evening and night sound levels, respectively.

The day/night average sound level (DNL or L_{dn}) is similar to CNEL, except the evening period is considered as part of the daytime period (i.e., no 5 dBA penalty is added to sound levels during the evening period [7:00 p.m. and 10:00 p.m.]).

Sound Propagation

Noise levels naturally attenuate or reduce with distance from the source at different rates due to the effects of interference from the ground and atmosphere. Assuming no intervening topography or structures (i.e., breaking the line-of-sight) exist between a noise source and receiver, the ground surface alone will attenuate noise levels over distance. Noise sources are either stationary or mobile, which attenuate at different rates. Stationary sources have a fixed location or limited area of movement and are considered point sources, which attenuate at a rate of 6 dBA per doubling of distance over acoustically hard surfaces. Mobile sources generally occur on linear paths, such as roadways and railways, which attenuate at a rate of 3 dBA per doubling of distance (FHWA 2011). Additional attenuation of 1.5 dBA is provided over acoustically soft surfaces (i.e., vegetated open space). As this EIR is programmatic in nature for a developed region, no additional attenuation is considered for acoustically soft intervening terrain, and surface attenuation is calculated conservatively assuming an acoustically hard surface throughout.

Natural terrain features (such as hills and dense woods) and human-made features (such as buildings and walls) in the path between a noise source and a receiver can substantially reduce noise levels at the receiver. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction and can achieve an approximate 1 dB additional noise level reduction for each 2 feet of height after it breaks the line of sight (with a maximum theoretical total reduction of 20 dBA, though nearly impossible to obtain (FHWA 2011). As a general rule, the barrier should extend 4 times as far in each direction as the distance from the receiver to the barrier. Openings in noise barriers for driveway connections or intersecting streets reduce the effectiveness of barriers.

Noise barriers can be quite effective in reducing highway traffic noise for receivers within approximately 200 feet of a highway. Noise walls are often constructed between a source and a receiver specifically to reduce noise, such as a highway and the housing along the highway. Effective noise barriers typically reduce noise levels by 5 to 10 dB, cutting the loudness of traffic noise by as much as one-half. Barriers can be formed from earth mounds or "berms" along the road; from high, vertical walls; or from a combination of earth berms and walls. Earth berms reduce noise by approximately 3 dB more than vertical walls of the same height. However, earth berms require more land to construct, especially as height increases. Walls require less space, but they are usually limited to 25 feet in height for structural and aesthetic reasons (FHWA 2011).

Noise-Sensitive Land Uses

Sensitive noise receptors are generally considered persons who occupy land uses where noise is an important attribute of the environment for activities that require quiet, including sleeping, convalescing, and studying. These land uses typically include residential dwellings, hotels/motels, hospitals, nursing homes, educational facilities, and libraries. Each city or county typically provides a list of noise-sensitive receptors to consider in their general plan noise element and/or noise ordinance. Protected wildlife (special status species) and their habitat may also be considered noise-sensitive receptors, especially during the species breeding season, such as protected nesting birds.

VIBRATION FUNDAMENTALS

Similar to noise, groundborne vibration and groundborne noise can be generated from construction and operational sources. If vibration levels are high enough, groundborne vibration has the potential to damage structures, cause cosmetic damage (e.g., crack plaster), or disrupt the operation of vibration-sensitive equipment. Groundborne vibration and groundborne noise can also be a source of annoyance to individuals who live or work close to vibration-generating activities.

Ground-borne noise is noise generated by the indoor movement of room surfaces, such as walls, resulting from ground borne vibration. Ground-borne noise criteria are primarily applied to light rail operations in a tunnel where airborne noise is not a factor. For above-grade transit systems, ground-borne noise criteria are applied to buildings that have sensitive interior spaces that are well insulated from exterior noise.

Vibration Sources

Heavy construction operations can cause substantial groundborne vibration in proximity to the source. High impact or heavy equipment, such as pile drivers or large bulldozers, can generate high vibration levels. The primary vibration sources associated with transportation system operations include heavy truck and bus traffic along roadways and train traffic along rail lines.

Vehicle traffic, including heavy trucks traveling on a highway, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage. In some cases, however, heavy trucks traveling over potholes or other discontinuities in the pavement have caused vibration high enough to result in complaints from nearby residents; these complaints typically can be resolved by smoothing the roadway surface. Freight trains, commuter trains, and light-rail trains can also be sources of ground vibration.

Vibration Descriptors

Vibration levels are usually expressed as a 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 experienced by buildings, ppv is often used in monitoring of blasting vibration.

Although ppv is appropriate for evaluating the potential of building damage, it is not suitable for evaluating human response (FTA 2006), as it takes some time for the human body to respond to vibrations. In a sense, the human body responds to the average vibration. Decibel notation (expressed as VdB) is used to compress the range of numbers required to describe vibration.

Effects of Vibration

Vibrations transmitted through the ground during construction operations may annoy people and detrimentally affect structures and sensitive devices. Where construction vibration does cause structural damage, it is through direct damage and/or vibration-induced settlement. Structural damage depends on the frequency of the vibration at the structure, as well as the condition of the structure and its foundation. 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 will be to humans.

Heavy construction operations can cause substantial groundborne vibration in proximity to the source. The highest vibration levels are generated by impact equipment or heavy equipment, such as pile drivers or large bulldozers, respectively. Table 4.12-2 provides vibration levels at 25 feet for impact and heavy construction equipment, in terms of PPV (for structural damage) and VdB (for human annoyance).

Table 4.12-2
Vibration Levels for Impact and Heavy Construction Equipment

Equipment		PPV at 25 Feet (in/sec)	Approximate VdB at 25 Feet
Pile driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile driver (sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydro mill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: FTA 2006

As shown in Table 4.12-2, pile drivers or large bulldozers can generate vibration levels at 25 feet of 1.518 and 0.089 in/sec ppv (or approximately 112 and 87 VdB), respectively. These vibration levels would dissipate greatly with further distance from the equipment.

AMBIENT NOISE LEVELS AND EXISTING NOISE SOURCES

Ambient noise is the background noise level of any location or environment, normally specified to compare it to a new intrusive noise source. Ambient noise includes all sounds present in an environment and can be measured at any moment in time, but it typically varies over time. Ambient noise levels are generally considered low when ambient levels are below 45 dBA CNEL, moderate in the 45 to 65 dBA CNEL range, and high above 65 dBA CNEL. Typical CNEL values may be 35 dBA for a desert wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown, and 80 to 85 dBA near a freeway or airport.

The existing noise environment in the San Diego region is composed of transportation and non-transportation sources. Transportation sources include roadway vehicle traffic; railroad train operations, including light rail, commuter, and freight trains; and aircraft operations. Generally, transportation-related noise sources (e.g., vehicle traffic noise) characterize the ambient noise environment of an area.

Non-transportation, or localized stationary/fixed sources include commercial/industrial equipment, construction equipment, and any other sources not associated with the transportation of people or goods. Existing noise exposure associated with these primary noise sources in the San Diego region is presented below.

Vehicle Traffic Noise

The ambient noise environment in the San Diego region is primarily defined by roadway vehicle traffic. The traffic noise level generated on a roadway is dependent on traffic speed, traffic volume, and the percentage of truck volume. In general, the greater the traffic volume is on a roadway, the higher the noise levels that are generated on that roadway. This holds true until the traffic volume is so great (i.e., approaching capacity) that traffic flow degrades and traffic speeds decrease, which lowers traffic noise levels. Roadways with large percentages of heavy trucks will generate higher noise levels. A heavy truck traveling 50 mph generates approximately 85 dBA, whereas an automobile traveling the same speed generates only 71 dBA. An increase of 10 dBA is usually perceived as a "doubling" of sound (FHWA 2011).

Roadways that generate the highest noise levels in the San Diego region are the interstate and state highways as they have the highest speed limits, the largest traffic volumes, and the highest percentage of trucks. Figure 2.0-1, Regional Setting, shows the interstate and state highway network and significant arterials in the San Diego region. Traffic typically generates 70 to 80 dBA CNEL at 50 to 100 feet from major highways. Heavily used roadways, such as arterials and major streets, also generate significant levels of noise, typically 65 to 75 dBA CNEL at similar distances (FTA 2006). Mobile sources, such as roadways, attenuate at a rate of 3 dBA per doubling of distance (FHWA 2011).

Traffic noise exposure is primarily a function of the noise levels generated, the distribution of those vehicles during daytime and nighttime hours, and the proximity of noise-sensitive receivers to the roadway. Existing traffic noise exposure is expected to be as low as 50 dBA CNEL for receptors in the most isolated and less frequented locations of the San Diego region, while receptors neighboring area interstates are likely to experience levels as high as 75 dBA CNEL (FTA 2006).

In the San Diego region, there is a wide range of land uses located adjacent to highways and major streets, including residences, schools, churches, hospitals, shopping centers, industrial parks, agriculture, parks, and open space. Of these, residences, schools, churches, and hospitals are typically considered noise sensitive by cities and the County, as defined in the noise elements of their respective general plans. In populated areas, a general rule for estimating noise reductions due to intervening structures is to assume one row of buildings every 100 feet from the roadway and apply a -4.5 dBA reduction in traffic noise levels for the first row and -1.5 dBA for every subsequent row, up to a maximum of -10 dBA attenuation (FTA 2006). Thus, in populated areas, traffic noise is substantially reduced for residences located more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 1992).

Rail Noise

Ambient noise levels in the San Diego region are also characterized by noise from freight and passenger rail operations, which generate substantial noise levels in the immediate vicinity of the railways, though train operations are intermittent and, in general, area railways are widely dispersed except, for example, at transit centers where various railways converge (e.g., at the Santa Fe Depot in downtown San Diego). The two basic types of railroad operations are freight and passenger train operations, the latter consisting of commuter and intercity passenger trains and steel-wheel urban railway transit. Generally, freight train operations can occur at all hours of the day and night, while passenger train operations are concentrated within the daytime and evening periods.

The contribution of railway operation noise to the overall ambient noise environment in the San Diego region is relatively minor compared to other sources such as vehicle traffic. Trains can generate high, relatively brief, intermittent noise events, which can be perceptible to sensitive receptors located along railway lines and in the vicinities of switching yards. Locomotive engines and the interaction of steel wheels and rails generate the primary source of railway 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 railway vehicles, air turbulence can also be a significant source of noise. Mobile sources, such as railways, attenuate at a rate of 3 dBA per doubling of distance (FHWA 2011). Average railway noise levels (L_{dn}) at distances from mainline railway corridors can be estimated based on an average train traffic volume of 5 to 10 trains per day at speeds of 30 to 40 mph from the center of the railway, as shown in Table 4.12-3 (FTA 2006).

Table 4.12-3
Estimating Railway Noise Exposure for General Assessment

Distance from Railway (feet)	Noise Exposure Estimates (Ldn)
10–30	75
30–60	70
60–120	65
120–240	60
240–500	55
500–800	50
800 and up	45

Source: FTA 2006

The sounding of train air horns and crossing gate bells also contributes to higher noise levels near railway/roadway grade crossings, resulting in higher noise levels within 1,200 feet of the crossing (FTA 2006). In the San Diego region, there is a wide range of land uses (some noise-sensitive) located adjacent to railway crossings, including but not limited to residences, schools, churches, hospitals, shopping centers, industrial parks, agriculture, parks, and open space. The same FTA general rule for estimating noise reductions due to intervening structures in populated areas is applicable to railway noise as well (FTA 2006). Based on these concepts, commuter railway noise levels in populated areas attenuate with distance to acceptable levels typically beyond approximately 375 feet and light rail noise levels beyond approximately 175 feet (i.e., FTA screening procedure requires additional analysis for noise-sensitive land uses within 375 feet of a commuter railway mainline, and 175 feet for light railway transit) (FTA 2006).

Aircraft Noise

The San Diego region is also affected by noise from aircraft operations, which generate substantial noise levels in the immediate vicinity of airport runways and flight path approaches and departures (ranging from 75 dBA to 60 dBA CNEL. The San Diego region includes the following airports, as shown in Figure 2.0-23:

- **International and domestic airports**: San Diego International Airport (SDIA), Tijuana International (directly across U.S. border with Mexico), and McClellan-Palomar (Carlsbad) Regional Airport;
- **Military airfields**: Naval Air Station (NAS) North Island, Marine Corps Air Station (MCAS) Miramar, MCAS Camp Pendleton, Naval Outlying Landing Field (NOLF) Imperial Beach, and Coast Guard Air Station San Diego;
- **Towered General Aviation airports**: Brown Field, Gillespie Field, Montgomery Field, and Ramona Airport
- **Non-towered General Aviation airports**: Oceanside Municipal Airport, Fallbrook Community Airfield, Borrego Valley Airport, Agua Caliente Airport, Jacumba Airport, Ocotillo Airport, and Pauma Valley Airport.

In addition to the numerous daily aircraft operations originating and terminating at these facilities, aircraft not utilizing these airports frequently fly over the San Diego region at various altitudes, and contribute to the overall ambient noise environment. The proximity of the noise receptor to the airport and aircraft flight path determines the noise exposure. Other contributing factors include the type of aircraft operated, aircraft operations (e.g., takeoffs, landings, flyovers), altitude of the aircraft, and atmospheric conditions, which may contribute to the direction of aircraft operations (flow) and affect aircraft noise propagation.

Aircraft noise is sometimes perceived to be the most important environmental concern generated by aircraft operations, which can be audible for miles from an airport. The challenge of determining appropriate land use compatibility policies regarding aircraft noise is that not everyone responds to noise the same way. Furthermore, one community may deem a land use acceptable within a certain noise level, while another does not (e.g., urban environments may have less restrictive residential noise standards than suburban or rural ones). With regard to noise and overflight, the goal of airport compatibility planning is to reduce annoyance and to minimize the number of people exposed to excessive levels of aircraft noise (Caltrans 2011a).

In addition to the public-use or military airports, there are numerous private and special-use airstrips and helipads in the region, many which are located in the eastern areas of the region or remote vacation destinations. Several private helipads are located on the roofs of hospitals and buildings owned by large corporations or used by police stations. Private airstrips/helipads located within the San Diego region are not required to prepare noise contours, such as for public-use and military airports, as their noise levels are substantially less than airports due to lower activity levels and their use restrictions are much less defined than with public-use airports (SDCRAA 2014). Caltrans' Division of Aeronautics controls private airstrips and special-use airports through a permitting process, and is also responsible for regulating operational activities at these facilities.

Construction Noise

Construction activities generate temporary, short-term noise levels (vibration levels during construction activities were described previously). Construction noise is of more concern when it takes place near noise-sensitive land uses, or occurs at night or in early morning hours. Construction noise can also affect nearby noise–sensitive special status wildlife species and habitat by interfering with the ability to establish territory, vocalize, or successfully reproduce. Additional discussion of noise-sensitive special status wildlife is provided in Section 4.4 Biological Resources. Local governments typically regulate noise associated with construction equipment and activities through enforcement of noise ordinance standards, implementation of general plan policies, and imposition of conditions of approval for building or grading permits.

New development and transportation improvements require construction activities that generate relatively temporary, short-term noise. Noise generated from construction equipment varies greatly depending on the construction activity being performed, equipment type, model, age, condition, and usage. Heavy equipment operation (e.g., earthmoving) typically dominates the noise generated at construction sites. Stationary sources such as generators, pumps, and compressors may also produce substantial continuous noise. Impact equipment operations (e.g., pile driving, pavement breaking) will generally produce the highest noise levels, and may also produce substantial vibration in the immediate vicinity.

The magnitude of construction noise levels depends on the type of construction activity, the combined noise level generated by various pieces of construction equipment operating together in proximity, the duration of the activity, the distance between the activity and noise-sensitive receptors, and the presence of absence of any noise attenuating features. Table 4.12-4 provides a list of typical construction equipment and their operational noise level at 50 feet, and their typical duty cycles (i.e., percentage operated within a period of time).

Table 4.12-4
Construction Equipment Noise Levels

Equipment	Noise Level at 50 Feet	Typical Duty Cycle
Auger Drill Rig	85	20%
Backhoe	80	40%
Blasting	94	1%
Chain Saw	85	20%
Clam Shovel	93	20%
Compactor (ground)	80	20%
Compressor (air)	80	40%
Concrete Mixer Truck	85	40%
Concrete Pump	82	20%
Concrete Saw	90	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%
Hydra Break Ram	90	10%
Impact Pile Driver (diesel or drop)	95	20%
In situ Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%
Paver	85	50%

Equipment	Noise Level at 50 Feet	Typical Duty Cycle
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Rock Crusher	95	50%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%
Vibratory Pile Driver	95	20%

KVA = kilovolt amps
Source: FTA 2006

As shown in Table 4.12-4, maximum noise levels generated from typical construction equipment range from approximately 70 dBA to 90 dBA measured at 50 feet (assuming no attenuation from intervening features such as buildings or topography); impact equipment (pile drivers, pavement preachers, and concrete saws) generate higher levels of 90 to 95 dBA at 50 feet (FTA 2006). The noise levels vary for each type of equipment, as equipment may come in different sizes and with different engines. Construction equipment noise levels also vary as a function of the activity level or duty cycle. In a typical construction project, the loudest short-term noise levels are typically those of earth-moving equipment under full load, which typically range from 85 to 90 dBA at 50 feet from the source.

Typical construction projects, with equipment moving from one point to another, work breaks, and idle time, generate average noise levels over time that are lower levels than louder short-term noise events. Additionally, due to the dynamic nature of a construction site, noise levels are calculated from the approximate center of the activity. Project construction, with several pieces of heavy equipment operating, typically generates average noise levels of 84 to 89 dBA L_{eq} at 50 feet from the center of the activity during construction.

Noise impacts to sensitive receptors resulting from construction projects would depend on several factors, such as the type of project for the given area, land use of the given area, and duration of construction activities. Additionally, construction noise levels would fluctuate depending on construction phase, and equipment type and duration of use; distance between noise source and receptor; and presence or absence of barriers between noise source and receptor.

Noise levels from construction activities are typically considered as point sources, and drop off (or attenuate) at a rate of -6 dBA per doubling of distance over hard site surfaces, such as streets and parking lots. For acoustically soft site surfaces, such as grass fields and open terrain with vegetation, the drop-off rate is greater, at approximately -7.5 dBA per doubling of distance (FTA 2006). Typically, construction projects involve surfaces in between acoustically soft and hard; therefore, the 6 dBA dropoff rate is conservatively assumed and used for construction noise impact analyses.

Commercial and Industrial Noise

Noise sources associated with commercial and industrial land uses include mechanical equipment, public address systems, parking lot noise (e.g., opening and closing of vehicle doors, people talking, car alarms), delivery activities (e.g., use of forklifts, hydraulic lifts), trash compactors, and air compressors. Noise from such equipment can reach intermittent levels of approximately 90 dBA, 50 feet from the source (USEPA 1974).

4.12.2 REGULATORY SETTING

Federal noise standards include transportation-related noise sources related to interstate commerce (i.e., aircraft, trains, and trucks) for which there are no, more stringent, state standards. State noise standards are set for the operation of automobiles, light trucks, and motorcycles. Local noise elements and ordinances set local noise policies and standards.

FEDERAL LAWS, REGULATIONS, PLANS, AND POLICIES

The U.S. Department of Transportation (USDOT) provides established noise and vibration criteria through its agencies of the FHWA, the Federal Transit Administration (FTA), the Federal Aviation Administration (FAA), and the Federal Railroad Administration (FRA). The Department of Defense (DoD) provides noise criteria for military airfields.

Federal Highway Administration

Title 40, Part 205 of the CFR (40 CFR 205), Subpart B establishes noise limits for medium and heavy trucks (more than 10,000 pounds, gross vehicle weight rating). The federal truck pass-by noise standard is 80 dBA at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

Title 23, Part 772 of the CFR (23 CFR 772) is the federal regulation governing traffic noise impacts. A federal or federally funded project would have a traffic noise impact if the project involved the construction of a new highway, or the significant modification of an existing freeway, where the project would result in a substantial operational noise increase, or when the predicted operational noise levels approach or exceed the FHWA Noise Abatement Criteria (NAC). A "substantial increase" is not defined by FHWA, but rather is defined by the state transportation agency. FHWA has developed NAC for activity categories at various noise-sensitive land uses (Federal Register 2010). Table 4.12-5 summarizes the 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.

As shown in Table 4.12-5, the FHWA NAC for Activity Category B, which includes residences, is 67 dBA L_{eq} (Exterior). For identifying noise impacts, the primary consideration is given to exterior areas of frequent human use. In situations where there are no exterior activities, or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion (Activity Category E) is used as the basis for determining a noise impact. Noise levels that approach the NAC are defined as 1 dBA less than the criterion level, i.e., 66 dBA L_{eq} for Category B (Federal Register 2010).

Table 4.12-5
FHWA Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level (dBA-L_{eq}[h])	Description of Activities
A	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
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 Exterior	Developed lands, properties, or activities not included in categories A or B above
D	--	Undeveloped lands
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: 23 CFR Part 772

FHWA regulations establish a "substantial noise increase criterion" of between 5 dBA and 15 dBA for Type I projects in the design year over existing noise levels (23 CFR 772.11(f).). Type I projects include:

1. The construction of a highway on new location; or
2. The physical alteration of an existing highway where there is either:
   i. Substantial Horizontal Alteration.; or
   ii. Substantial Vertical Alteration; or
3. The addition of a through-traffic lane(s) including the addition of a through-traffic lane that functions as a HOV lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or
4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or
5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or
6. Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or
7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

Federal Aviation Administration

Aircraft Noise Regulations

Title 14, Part 36 of the CFR (14 CFR 36) is the federal aviation regulation governing aircraft noise. Aircraft operated in the United States are subject to federal requirements under 14 CFR 36 for aircraft noise levels, which establish maximum acceptable noise levels for specific aircraft types, taking into account the model year, aircraft weight, and number of engines.

Airport Noise Compatibility Planning

Title 14, Part 150 of the CFR (14 CFR 150) encourages airports to prepare noise exposure maps that show land uses that are incompatible with high noise levels (FICON 1992). The Part 150 program (Airport Noise Compatibility Planning) proposes measures to reduce the land use incompatibility. Under the Part 150 program, airport projects such as land acquisition and acoustic treatment of residences, become eligible for federal funding. The Part 150 program establishes a voluntary program that airports can utilize to conduct airport noise compatibility planning, and the program also prescribes a system for measuring airport noise impacts and presents guidelines for identifying incompatible land uses.

Part 150 noise exposure maps are depicted with annual average DNL contours around an airport. DNL is equivalent to L_{dn}, and similar to CNEL, as discussed in Section 4.12.1; FAA accepts California's use of CNEL. Part 150 considers all land uses with noise levels less than 65 DNL to be compatible with aircraft operations. At higher noise exposures, selected land uses are also deemed acceptable, depending upon the nature of the use and the degree of structural noise attenuation provided. However, these designations do not constitute a federal determination that any use of land covered by the Part 150 program is acceptable or unacceptable under federal, state, or local law; the responsibility for determining the acceptable and permissible land uses and the relationship with specific noise contours rests with the local authorities.

Federal Transit Administration and Federal Railroad Administration

FTA has established criteria for assessment of noise and vibration impacts for high-speed ground transportation projects (FTA 2006). FRA has adopted the FTA methodologies and significance criteria for the evaluation of noise impacts from surface transportation modes including noise from motor vehicle traffic and trains, and how the noise might be judged in relation to the existing and future background noise. FTA and FRA incremental noise impact criteria are summarized in Table 4.12-6.

Table 4.12-6
Noise Impact Criteria for Noise-Sensitive Uses (dBA)

	For Land Use Categories 1 and 2			For Land Use Category 3		
Existing Noise Level	Project Impact Threshold	Combined Noise Level	Allowable Noise Increment	Project Impact Threshold	Combined Noise Level	Allowable Noise Increment
55	55	58	3	60	61	6
60	58	62	2	63	65	5
65	61	66	1	66	68	3
70	64	71	1	69	73	3
75	65	75	0	70	76	1

Notes:
Land Use Category 1: Tracts of land where quiet is an essential element in their intended purposes. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor uses. Also included are recording studios and concert halls. The noise metric for Category 1 is the outdoor 1-hour L_{eq} during the noisiest hour of activity.
Land Use Category 2: Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed of utmost importance. The noise metric for Category 2 is the outdoor L_{eq} or CNEL.
Land Use Category 3: Institutional land uses with primarily daytime and evening uses. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities can also be considered in this category. Certain historical sites and parks are also included. The noise metric for Category 3 is the outdoor 1-hour L_{eq} during the noisiest hour of activity.
Source: FTA 2006

Title 49, Part 210 of the CFR (14 CFR 210), the Federal Railroad Noise Emission Compliance Regulation, prescribes minimum compliance regulations for enforcement of the railroad noise emission standards adopted by USEPA (40 CFR Part 201).

Construction Noise

FTA also provides guidance for evaluating construction noise. According to FTA, "[p]roject construction noise criteria should take into account the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use" (FTA 2006). While FTA does not specify standardized criteria for construction noise impacts, the guidelines presented in Table 4.12-7 are considered reasonable criteria for construction noise when little project-level information is available. Additionally, FTA considers a 10 dBA increase in high ambient noise levels a substantial temporary increase in noise levels. FTA does not provide guidance for a temporary substantial increase in noise levels in rural or quiet areas.

Table 4.12-7
FTA Construction Noise Criteria (Guidelines)

Land Use	1-hour L_{eq} (dBA)		8-hour L_{eq} (dBA)	
	Day	Night	Day	Night
Residential	90	80	80	70
Commercial	100	100	85	85
Industrial	100	100	90	90

Note: In urban areas with very high ambient noise levels, construction operations should not exceed existing ambient + 10 dB.
Source: FTA 2006

FTA has published guidance relative to noise and vibration impacts including:

- *Fundamentals and Abatement of Highway Traffic Noise* (1973)
- *Transit Noise and Vibration Impact Assessment*. Washington, D.C. (2006)

Groundborne Noise and Vibration

FTA provides construction vibration impact criteria for the analysis of groundborne vibration relating to construction-induced vibration for impacts due to structural damage and human annoyance. FTA has established the vibration threshold of 0.1 in/sec PPV for structural damage the vibration threshold of human annoyance as 80 VdB (FTA 2006).

Predicted levels of operational groundborne vibration (GBV) and groundborne noise (GBN) are evaluated using FTA vibration criteria for GBV and GBN (FTA 2006), according to the land use categories, which indicate the criteria to be used in a detailed analysis, for example, infrequent vibration events, as follows:

- Category 1- Buildings where vibrations would interfere with interior operations, GBV - 65 VdB, GBN – n/a.
- Category 2- Residences and buildings where people normally sleep, GBV - 80 VdB, GBN - 43 VdB
- Category 3 – Institutional land uses with primarily daily use, GBV – 83 VdB, GBN – 48 VdB.

Department of Defense – Air Installations Compatible Use Zones Program

DoD requires military airfields (fixed- and rotary-winged) to adopt Air Installation Compatible Use Zone (AICUZ) plans to encourage compatible uses of public and private lands in the vicinity of military air installations through the local communities' comprehensive planning process. DOD creates AICUZ plans for all major military air installations. The plans recommend land uses that may be compatible with air installations noise levels. The current noise compatibility criteria (as set forth in CFR, Title 32, Part 256) are basically the same as those indicated in FAA's FAR Part 150 program. As a result, AICUZ compatibility standards for residential use suggest consideration of acoustical treatments above 65 dB DNL.

AICUZ studies include noise contour maps, which are included in the noise element of general plans of each jurisdiction affected by public use and military airports, and is considered in the development of land use plans at the local level. Because military installations often lack land use authority over the extent of an AICUZ, it is the responsibility of the relevant jurisdictions to ensure incompatible uses are either not permitted or properly regulated.

STATE LAWS, REGULATIONS, PLANS, AND POLICIES

California State Aeronautics Act

The California State Aeronautics Act (SAA), pursuant to Public Utilities Code (PUC), Section 21001 et seq., was established "to protect the public interest in aeronautics and aeronautical progress." Airport land use compatibility planning, as required by the SAA, outlines the statutory requirements for Airport Land Use Commissions (ALUCs) including the preparation of ALUCPs for each public use airport in California. The California Department of Transportation (Caltrans) Division of Aeronautics administers much of the SAA and provides guidance for meeting the baseline safety and compatibility requirements.

Airport Land Use Compatibility Plans

The state requires that the SDCRAA, as the ALUC, prepare ALUCPs for each public-use and military airport in San Diego County, as directed in Public Utilities Code Section 21675. An ALUCP contains policies and criteria that address compatibility between airports and future land uses that surround them by addressing noise, overflight, safety, and airspace protection concerns to minimize the public's exposure to excessive noise and safety hazards within the airport influence area for each airport over a 20-year horizon.

ALUCPs provide guidance on appropriate land uses surrounding airports to protect the health and safety of people and property within the vicinity of an airport, as well as the public in general. While, the ALUC has no jurisdiction over the operation of airports or over existing land uses, local agencies with land located within the AIA boundary for any of the airports must amend their planning documents to conform to the applicable ALUCP, unless they follow certain procedures to overrule the ALUCP. (Government Code Section 65302.3).

The noise compatibility factor is considered in an ALUCP to "avoid introducing new noise-sensitive land uses in the vicinity of an airport that would be exposed to significant levels of aircraft noise, taking into account the characteristics of the airport and the communities surrounding the airport." While airport noise may be addressed by altering runway use through flight routing changes, aircraft operational procedure changes, and engine run-up restrictions, these actions generally are subject to approval by FAA, which has the authority and responsibility to control aircraft noise sources, implement and enforce flight operational procedures, and manage the air traffic control system.

ALUCPs include airport runway noise level contours typically in 75 dBA, 70 dBA, 65 dBA, and 60 dBA CNEL increments. These noise contours reflect the existing and anticipated growth of the airport for at least the next 20 years and include potential development planning. ALUCPs and CLUPs differentiate allowed and prohibited land uses according to a noise and land use compatibility guideline similar to that in shown in Table 4.12-1.

Noise and safety are the two primary airport impact concerns that have the potential to affect the health, safety, and welfare of people within the vicinity of an airport. The related issues of overflight (noise) and airspace protection (safety) are also to be considered when preparing the ALUCP. Human reaction to aircraft noise varies widely with some people reacting vigorously to very low levels of aircraft noise, while other people have no reaction to very high levels of aircraft noise. The objective of compatible land use planning is to prevent people from being exposed to the most intensive and disruptive cumulative aircraft noise exposure levels. Aircraft noise exposure is depicted with airport cumulative noise exposure contours. However, aircraft noise exposure in areas beyond the outermost CNEL contours can also be annoying to some people. For more detail regarding the scope of issues addressed by ALUCPs, please refer to section 4.9 Hazards.

California Noise Regulations

Title 24, Noise Insulation Standards

The California Noise Insulation Standards in the California Code of Regulations (CCR), Title 24, set requirements for new residential units, hotels, and motels that may be subject to relatively high levels of transportation-related noise. For areas with exterior noise levels greater than 60 dBA, the noise insulation standard is 45 dBA in any habitable room; an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard is required where such units are proposed in such areas. CCR, Title 24, Part 2, Section 1207.11.2 states, “The noise metric must be either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.”

Title 21, Section 5000 et seq., Airport Noise Standards

The California Airport Noise Standards apply to any airport that is determined to have a noise problem by the local County Board of Supervisors. At this time, SDIA is the only airport within the San Diego region that has been determined to have a noise problem (Caltrans 2011a). Title 21 CCR Section 5006, states “[t]he level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a community noise equivalent level (CNEL) value of 65 dB for purposes of these regulations.” Section 5012 sets 65 dBA CNEL as the acceptable level standard.

California Department of Motor Vehicles

California Vehicle Code, Sections 27201–27206

Sections 27201–27206, The California Vehicle Code, sets noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state standard is consistent with the federal limit of 80 dBA. The state passby standard for motorcycles, passenger cars, and light trucks is also a maximum of 80 dBA at 50 feet from the centerline. Additionally, construction noise from a contractor’s operations, between the hours of 9:00 p.m. and 6:00 a.m., must not exceed 86 dBA at a distance of 50 feet.

California Department of Transportation

Caltrans manages California's highways and freeways, provides intercity rail services, and permits public-use airports and special-use hospital heliports. Caltrans has programs and divisions with policies or regulations including Aeronautics, Highway Transportation, Rail, and Mass Transportation. Caltrans Division of Rail uses FRA and FTA noise criteria and methodologies for assessing rail-related noise or vibration impacts. The Caltrans Division of Aeronautics is responsible for licensing and permitting programs for airports and heliports. Assistance for the development and maintenance of aviation facilities through engineering and aviation experience is also provided, as well as systems planning and environmental and community service programs (Caltrans 2002). Caltrans provides the following noise and vibration impact guidance documents for traffic noise, rail noise, airport noise, construction noise, and vibration:

- Technical Noise Supplement (TeNS Manual) (2011c).
- Traffic Noise Analysis Protocol (Protocol) for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (2011b).
- California Airport Land Use Planning Handbook. Caltrans, Division of Aeronautics (2011a).
- Transportation and Construction Vibration Guidance Manual (2013).
- Transportation Related Earthborne Vibrations (Caltrans Experiences)(2002).

Traffic Noise Guidance

The Protocol establishes the policies and procedures to be used in the assessment of traffic noise exposure and impact for new construction and reconstruction projects. The NAC in the Protocol are the same NAC as presented in 23 CFR 772 (see California Code of Federal Regulations section above). 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). In California, substantial noise increase is considered to occur when the project’s predicted worst-hour design-year traffic noise level exceeds the existing worst-hour traffic noise level by 12 dBA or more. The use of 12 dB was established in California many years ago and is based on the concept that a 10 dB increase generally is perceived as a doubling of loudness. A collective decision by Caltrans staff, which was approved by FHWA, was made to use 12 dB (Caltrans 2011b).

According to the Protocol, significance of noise impacts for Caltrans’ CEQA documents is based on the project-related increase in noise and other project-specific conditions. No single numerical threshold is used on all projects. The Caltrans definition for a *substantial* increase in noise (i.e., a 12 dB increase between existing and design-year with-project conditions) has been used. This 12 dB increase should not necessarily be used for all projects. There would be cases where an increase less than 12 dB would approach significance (such as a quiet rural environment) or where a 12 dB increase would not necessarily be deemed significant (noisy urban environment) (Caltrans 2011b).

Railway Noise Guidance

Caltrans endorses the use of the FTA noise criteria and methodologies for assessing project-related rail noise and vibration impacts.

Airport Noise Guidance

Caltrans Division of Aeronautics prepared the California Airport Land Use Planning Handbook (Handbook), which provides guidance for conducting airport land use compatibility planning, most notably for the preparation, adoption, and amendment of an ALUCP (Caltrans 2011a). The Handbook provides a checklist of typical ALUCP contents, which includes scope of the ALUCP, airport information, compatibility policies and criteria, compatibility zone maps (including CNEL contours), review policies, preliminary review of plans and projects, land use information, compatibility issues, local government implementation, and supporting materials (Caltrans 2011a).

Construction Noise

As presented in the Protocol, Section 14-8.2, Noise Control of Caltrans Standard Specifications establishes a construction noise exposure/production limit of 86 dB (L_{max}) at 50 feet from job site activities from 9 p.m. to 6 a.m. Additionally, this specification establishes that all internal combustion engines should be equipped with manufacturer recommended mufflers, and that no internal combustion engines may be operated without mufflers.

Vibration

Caltrans provides guidelines for the analysis of groundborne vibration relating to transportation and construction-induced vibration. Caltrans provides vibration level thresholds for architectural and structural damage and human perception and annoyance thresholds, shown in Table 4.12-8.

Table 4.12-8
General Human and Structural Response to Vibration

Effects on Structures and People	Peak Vibration Threshold (ppv) (in/sec)
Structural damage to commercial structures	6
Structural damage to residential buildings	2
Architectural damage	1.0
General threshold of human annoyance	0.1
General threshold of human perception	0.01

Source: Caltrans 2013

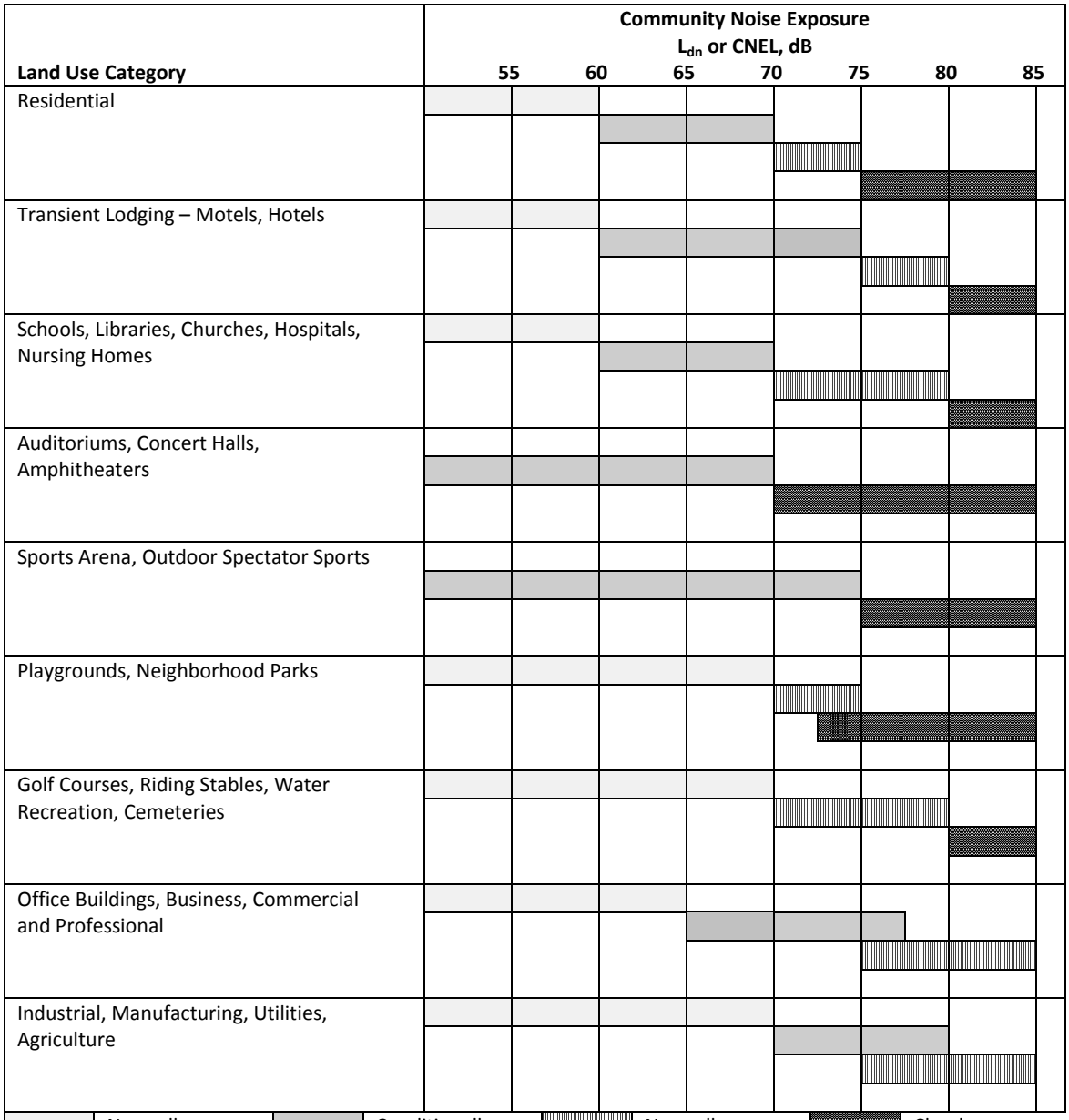
As shown in Table 4.12-8, structural damage occurs when vibration levels reach 2 to 6 in/sec ppv at residential and commercial structures, respectively. One-half of the minimum of this threshold range (i.e., 1 in/sec ppv) is considered a safe criterion that would protect against structural damage. For its construction projects, Caltrans uses a vibration threshold of 0.2 in/sec ppv for structural damage. The Caltrans general threshold of human perception and annoyance is 0.01 and 0.1 PPV in/sec, respectively (Caltrans 2013).

Governor's Office of Planning and Research

The Governor's Office of Planning and Research (OPR) is required to adopt and periodically revise guidelines for the preparation and content of local general plans. The 2003 OPR General Plan Guidelines established noise/land use compatibility guidelines, shown in Table 4.12-9.

Table 4.12-9 indicates "normally acceptable" noise levels for noise-sensitive land uses of up to 60 dBA CNEL, "conditionally acceptable" from 60 to 70/75 dBA CNEL, and "normally unacceptable" above 70/75 dBA CNEL.

Table 4.12-9
Noise/Land Use Compatibility Guidelines



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.

Source: OPR 2003

REGIONAL AND LOCAL LAWS, REGULATIONS, PLANS, AND POLICIES

General Plan Noise Elements

Cities within the San Diego region and the County of San Diego adopt a noise element as part of their General Plan to identify, appraise, and remedy noise problems in local communities. Noise elements analyze and quantify current and projected noise levels associated with local noise sources, including, but not limited to, highways and freeways, primary arterials and major local streets, rail operations, air traffic associated with the airports, local industrial plants, and other ground stationary sources that contribute to the community noise environment. Beyond statutory federal standards, local jurisdictions may adopt their own noise goals and policies in their noise elements, or adopt noise/land use compatibility guidelines similar to, or the same as, those recommended by the State of California (OPR) in Table 4.12-9. With the exception of two cities, Del Mar and Oceanside, all other jurisdictions in the region have adopted the OPR land use and noise compatibility guidelines (Table 4.12-9) or goals similar to OPR, which consider 60 dBA CNEL as the "normally acceptable" noise levels for noise-sensitive land uses. The cities of Del Mar and Oceanside, however, consider 65 dB CNEL as the maximum noise level compatible with residential land uses (City of Del Mar 1985; City of Oceanside 2002).

Local Noise Ordinances

In addition to noise element policies of general plans, local jurisdictions regulate noise sources (e.g., construction noise and stationary noise sources such as industrial facilities) through enforcement of their noise standards, which also typically set operational sound level limits and construction noise level limits and allowable hours. Table 4.12-10 and Table 4.12-11 summarize the property line noise level limits and the construction noise regulations, respectively, for each jurisdiction within the San Diego region.

In addition, noise ordinances often contain additional requirements, such as defining a significant impact resulting from a substantial permanent increase in ambient noise levels. For example, the County of San Diego Noise Ordinance defines a substantial noise increase as an increase of 10 CNEL above existing conditions (County of San Diego 2013).

Table 4.12-10
Summary of Applicable Property Line Noise Level Limits

Jurisdiction	General Land Use Zone								
		Residential			Commercial			Industrial	
	Daytime	Evening	Nighttime	Daytime	Evening	Nighttime	Daytime	Evening	Nighttime
Carlsbad	--	--	--	--	--	--	--	--	--
Chula Vista	55	55	45	65	65	60	70/80[1]	70/80[1]	70/80[1]
Coronado	50-55	45-50	40-45	60	60	50	--		--
Del Mar	50	50	40	60	60	50	60[2]	-60[2]	50[2]
El Cajon	60	55	50	65	60	55	75	75	75
Encinitas	50-55	50-55	45-50	60	60	55	60	60	55
Escondido	50-55	50-55	45-50	60	60	55	70-75[1]	70-75[1]	70-75[1]
Imperial Beach[3]	--		--	--		--	--		--
La Mesa	60	55-60	50-55	65	65	60	70	70	70
Lemon Grove	50-60	45-55	40-50	60	55	55	70	70	70
National City	55-60	55-60	45-50	65	65	60	70-80[1]	70-80[1]	70-80[1]
Oceanside	50-55	50-55	45-50	65	65	60	70	70	65
Poway	50-55	50	40-45	60	55	55	70	70	70
San Diego, City	50-60	45-55	40-50	65	60	60	75	75	75
San Diego, County	50-55	50-55	45-50	60	60	55	70-75	70-75	70-75
San Marcos	--	--	--	--	--	--	--	--	--
Santee	50-55	45-50	40-45	60	55	50	70-75	70-75	70-75
Solana Beach	50-55	50-55	45	60	60	55	70	70	60
Vista	50-55	50-55	45-50	60	60	55	70	70	70

--no sound level limits

[1] Light industry/heavy industry

[2] Railroad right-of-way zone

[3] The City of Imperial Beach noise ordinance does not contain quantifiable noise level limits at property lines but regulates noise based on disturbance of "the peace, quiet and comfort of the community by creating unreasonably loud or disturbing unnecessary noises."

Source: Data compiled by AECOM 2015

City of Carlsbad 2013; City of Chula Vista 2014; City of Coronado 2014; City of Del Mar 1997; City of El Cajon 2014; City of Encinitas 2010; City of Escondido 2010; City of Imperial Beach 2011; City of La Mesa 2015; City of Lemon Grove 2015; City of National City 2015; City of Oceanside 2014; City of Poway 2014; City of San Diego 2010; County of San Diego 2013; City of San Marcos 2015; City of Santee 2014; City of Solana Beach 2014; City of Vista 2014.

Table 4.12-11
Summary of Construction Noise Standards

Jurisdiction	Municipal Code	Construction Hours Prohibited	Construction Noise Level Limits
Carlsbad	8.48	After 6 p.m. any day; before 7:00 a.m. weekdays; before 8:00 a.m. Saturday; Sundays; federal holidays,	None
Chula Vista	17.24	10:00 p.m. - 7:00 a.m., Monday through Friday, and 10:00 p.m. and 8:00 a.m. Saturday and Sunday.	None
Coronado	41.10	7:00 p.m. – 7:00 a.m. Monday through Saturday; Sundays legal holidays	75 dBA L_{eq}
Del Mar	9.20	7:00 p.m. - 7:00 a.m., Monday through Friday, and before 9:00 a.m. or after 7:00 p.m. Saturdays; Sundays; City holidays	75 dBA L_{eq} at residential properties
El Cajon	17.115	7:00 p.m. – 7:00 a.m., within 500 feet of residential uses	None
Encinitas	9.32	7:00 p.m. – 7:00 a.m. Monday through Saturdays; Sundays; federal holidays	75 dBA $L_{eq(8)}$ at residential properties
Escondido	9.32	6:00 p.m. - 7:00 a.m., Monday through Friday, before 9:00 a.m. or after 5:00 p.m. Saturdays, Sundays, legal holidays	75 dBA L_{eq} at residential properties
Imperial Beach	9.32	10:00 p.m.-7:00 a.m.	noises disturbing to the comfort and repose of any person residing or working in the vicinity, or 75 dBA 10 p.m. - 7 a.m.
La Mesa	10.80	10:00 p.m.-7:00 a.m. Monday through Saturday; Sundays	None
Lemon Grove	9.24	7:00 p.m. – 7:00 a.m. Monday through Saturday; Sundays, legal holidays	75 dBA $L_{eq(8)}$ at residential properties
National City	12.10	7:00 p.m.-7:00 a.m. weekdays; weekends; holidays	60-75 dBA at residential properties, 70-85 dBA at semi-residential/commercial properties
Oceanside	38.15	6:00 p.m.-7:00 a.m. Monday through Saturday; Sundays Federal holidays	85 dB at 100 feet
Poway	8.08	5:00 p.m.- 7:00 a.m. Monday through Saturday; Sundays; federal holidays	75 dBA $L_{eq(8)}$ at residential properties
San Diego, City	59.5	7:00 p.m. – 7:00 a.m. Monday through Saturday; Sundays; certain legal holidays	75 dBA L_{eq} at residential properties
San Diego, County	36.40	7:00 p.m. – 7:00 a.m. Monday through Saturday; Sundays; legal holidays	75 dBA $L_{eq(8)}$ at residential properties
San Marcos	10.24	6:00 p.m. - 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 5:00 p.m. Saturdays, Sundays	None
Santee	8.12	7:00 p.m. – 7:00 a.m. Monday through Saturday, Sunday, holidays	75 dBA $L_{eq(8)}$ at residential properties
Solana Beach	7.34	7:00 p.m.-7:00 a.m. weekdays; 7:00 p.m.-8:00 a.m. Saturday; Sundays; nine holidays	75 dBA $L_{eq(8)}$ at residential properties
Vista	NA	None	None

Source: Data compiled by AECOM 2015; City of Carlsbad 2013; City of Chula Vista 2014; City of Coronado 2014; City of Del Mar 1997; City of El Cajon 2014; City of Encinitas 2010; City of Escondido 2010; City of Imperial Beach 2011; City of La Mesa 2015; City of Lemon Grove 2015; City of National City 2015; City of Oceanside 2014; City of Poway 2014; City of San Diego 2010; County of San Diego 2013; City of San Marcos 2015; City of Santee 2014; City of Solana Beach 2014; City of Vista 2014.

San Diego County Regional Airport Authority

In the San Diego region, the relationships of transportation, transit, and mobility, and of population growth to noise associated with aircraft in flight are the responsibility of the San Diego County Regional Airport Authority (SDCRAA), established under state law to protect the safety and welfare of the general public and the ability of airports to operate now and in the future (SDCRAA 2014). One of SDCRAA's responsibilities is to serve as the ALUC for San Diego County. The SDCRAA is charged with creating, adopting, or updating ALUCPs for the region's 16 public-use and military airports in accordance with applicable state and federal laws. SDCRAA has adopted ALUCPs for 14 of the 16 public-use or military airports in the San Diego region (SDCRAA 2014), including (with year of latest update):

- Agua Caliente Airport (2011)
- Borrego Valley Airport (2011)
- Brown Field (2010)
- Fallbrook Community Airpark (2011)
- Gillespie Field (2010)
- Jacumba Airport (2011)
- MCAS Camp Pendleton (2011)
- MCAS Miramar (2011)
- McClellan-Palomar Airport (2011)
- Montgomery Field (2010)
- Oceanside Municipal Airport (2010)
- Ocotillo Airport (2011)
- Ramona Airport (2011)
- SDIA – Lindbergh Field (2014)

The two remaining airports in the San Diego region, NOLF Imperial Beach and NAS North Island, do not have ALUCPs. However, DoD requires military airfields to adopt AICUZ studies, which assess compatible land uses in the vicinity of a military air station in a way equivalent to ALUCPs. The AICUZ study update for NOLF Imperial Beach and NAS North Island was adopted in 2011 (U.S. Navy 2011). ALUCPs for NOLF Imperial Beach and NAS North Island will be completed in the future (SDCRAA 2014). The other remaining airports in the San Diego region include Tijuana International Airport (under the authority of Mexico), Coast Guard Air Station San Diego (military airfield), and Pauma Valley Airport (private airfield), which are not required to prepare an ALUCP.

The adopted ALUCPs of public-use airports in the San Diego region include an analysis of the existing and future aircraft noise level contours to assist local agencies in developing land use plans for areas surrounding the airports. ALUCPs differentiate allowed and prohibited land uses according to noise and land use compatibility guidelines. AICUZ studies also include contour maps, which are included in the noise element of general plans of each jurisdiction affected by public use and military airports, and are considered in the development of land use plans at the local level.

In addition to the public-use or military airports, there are numerous private airstrips and helipads in the region. Many of these private airstrips and helipads are located in the eastern areas of the region or remote vacation destinations. Several private helipads are located on the roofs of hospitals and buildings owned by large corporations or used by police stations.

4.12.3 SIGNIFICANCE CRITERIA

Appendix G of the CEQA Guidelines provides criteria for evaluating the significance of a project's environmental impacts on noise, in the form of Initial Study checklist questions. Unless otherwise noted, the significance criteria specifically developed for this EIR are based on the checklist questions in Appendix G. In some cases, SANDAG has combined checklist questions, edited their wording, or changed their location in the document in an effort to develop significance criteria that reflect the programmatic level of analysis in this EIR and the unique nature of the proposed Plan. The criteria below address all checklist questions listed in CEQA Appendix G (XI). Questions (e) and (f) addressing public and private airport noise levels have been combined into N-5. For the purposes of this EIR, the proposed Plan would have a significant noise impact if it would:

N-1 Expose persons to or generation of noise levels in excess of standards established in local general plans or noise ordinances, or applicable standards of other agencies.

N-2 Cause a substantial temporary or periodic increase in ambient noise levels

N-3 Cause a substantial permanent increase in ambient noise levels.

N-4 Expose persons to or generation of excessive groundborne vibration or groundborne noise levels.

N-5 Expose people residing or working near airports, private airstrips, or helipads to excessive noise levels.

4.12.4 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

N-1 EXPOSE PERSONS TO OR GENERATION OF NOISE LEVELS IN EXCESS OF STANDARDS ESTABLISHED IN LOCAL GENERAL PLANS OR NOISE ORDINANCES, OR APPLICABLE STANDARDS OF OTHER AGENCIES.

ANALYSIS METHODOLOGY

This section qualitatively discusses the construction and operation noise impacts of regional growth and land use change, and transportation network improvements in comparison to applicable noise standards from city and county general plans [i.e., noise elements] include noise land use compatibility guidelines, and standards from noise ordinances [i.e., sound level limits at property lines, and allowable construction hours and noise level limits]; and where applicable, standards from agencies include FTA and Caltrans. Noise impacts (N-1) are considered significant if they exceed applicable established noise standards of local cities and the County (i.e., noise elements of general plans and noise ordinances, or if not provided locally or required based on the type of project (e.g., highway projects), standards of applicable federal, state, or local agencies (e.g., FTA and Caltrans). Detailed quantitative analysis of construction and operational noise is provided in Impacts N-2 and N-3, respectively.

Applicable local construction and operational standards, determined at the project level, may apply to regional growth and land use change, as well as transportation network improvements, as standards are set to protect noise-sensitive land uses (e.g., sound level limits at the residential property line, or allowable construction hours and noise level limits). However, specific Caltrans requirements for construction and operational noise based on FHWA standards may be required for certain transportation network improvements based on federal projects or federal funding (e.g., interstate projects).

For noise and land use compatibility, the County of San Diego and all cities in the San Diego region, except for Del Mar and Oceanside, have adopted the OPR 2003 noise/land use compatibility guidelines as their land use compatibility noise standards including 60 dBA CNEL established as the "normally acceptable" noise level for residential uses. The cities of Del Mar and Oceanside have adopted 65 dB CNEL is considered the applicable established noise standard for residential as the maximum noise level compatible with residential land uses (City of Del Mar 1985; City of Oceanside 2002).

IMPACT ANALYSIS

2020

Regional Growth and Land Use Change

In some locations, such as densely developed areas (e.g., Downtown San Diego), some development projects implementing regional growth and land use change by 2020 under the proposed Plan would expose persons to, or generate noise levels in excess of, standards established in the local general plan or noise ordinance. In the absence of a local standard (e.g., no construction noise level limit), applicable standard of other agencies, such as identified in Section 4.12-2, are available for consideration as thresholds or guidelines at the project-level analysis.

For some development projects, construction of housing would generate temporary short-term noise impacts by exceeding local jurisdictions' allowable construction days and hours (non-highway and emergency work) of Monday through Saturday during daytime hours, as during the evening and night, ambient levels are lower and more sensitive (e.g., sleeping at residences) to construction noise. In addition, for development projects where rock drilling and blasting, pile driving, or pavement breaking is required, high-rise housing construction for some projects would generate temporary short-term noise impacts by exceeding local jurisdictions' construction noise level limit, if provided, during allowable construction periods, typically, 75 dBA L_{eq} averaged over a 1- or 8-hour (L_{eq}) period. Where jurisdictions do not provide noise level limits for construction, federal agencies and state agencies also provide guidance for evaluating construction noise at noise-sensitive land uses. While FTA does not specify standardized criteria for construction noise impacts, the guidelines presented in Table 4.12-7 are considered reasonable criteria for construction noise level limits when a project-level standard is not provided, i.e., a daytime limit of 80 dBA $L_{eq}(8)$ for residential land uses (FTA 2006).

In some locations, operational impacts of regional growth and land use change would expose persons to noise levels in excess of applicable standards by locating different types of land uses in proximity, such as locating residential, commercial, or industrial uses in proximity to noise-sensitive receptors, or residential uses in areas with noise levels are in excess of local standards (e.g., residential development in proximity to noise sources like freeways). Stationary noise sources associated with some future development projects would generate noise levels in excess of applicable standards at adjacent land uses, and some noise-sensitive land uses would be located in incompatible noise environments.

Development projects and other noise sources would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards during construction and operations. Thus, while adherence to regulations discussed in Section 4.12.2 would reduce noise impacts there is no assurance that impacts would be reduced to a less than significant level for all projects. This is a significant impact.

Transportation Network Improvements and Programs

Planned transportation network improvements by 2020 include two new managed lanes along segments of I-5 and I-805, new SR 11 toll lanes, two new general purpose lanes on SR 76 from Mission Avenue to I-15; improvements to regional arterials including new vehicle lanes; and double-tracking along the LOSSAN railway corridor. These improvements would increase noise during construction and operation of the improvements, for example by increasing traffic and train volumes and placing vehicles and locomotives closer to receivers. Local or Caltrans standards include, but are not limited to:

- FHWA Noise Abatement Criteria (NAC) (Table 4.12-5) for federal or federally funded projects that involved the construction of a new highway, or the significant modification of an existing freeway, or when the predicted operational noise levels approach or exceed the FHWA NAC.
- FTA Noise Impact Criterion for Noise-sensitive Users (Table 4.12-6) for assessment of noise and vibration impacts for high-speed ground transportation projects (FTA 2006), including vehicle traffic and trains; and
- OPR Noise/Land Use Compatibility Guidelines (Table 4.12-9) for acceptable noise levels for land uses exposed to transportation noise sources.

The noise impacts of the operation of transportation network improvements related to roadways (e.g., adding lanes and extending roadways) planned by 2020 would increase capacity on these roadways and thereby increase traffic volumes and associated noise levels adjacent to transportation network improvements within the San Diego region. However, the addition of lanes on these existing roadways would not double traffic volumes, which would result in an increase of less than 3 dBA, typically approximately 2 dBA, which would be a less than perceptible increase in noise levels. Primarily, the noise increase would be the result of increases in the number of trucks, buses, and trains operating under the proposed Plan, which generate greater noise per vehicle than automobiles (Caltrans 2009).

Noise levels from freeways and major arterials already exceed local standards in most locations in the San Diego region (SANDAG 2007). Standard reference noise levels for freeways and highways at 100 feet are approximately 70 to 80 dBA L_{eq} and 65 to 75 dBA L_{eq}, respectively (FTA 2006); actual noise levels would vary depending on actual volumes, speeds, vehicle models, and other day-to-day variances. Transportation network improvements on well-traveled freeways and major arterials would generally allow vehicle traffic to move faster, and increase traffic noise along a given corridor. Conversely, increasing traffic volumes on congested freeways and major arterials (i.e., LOS E or F) would have little effect on the loudest-hour noise level, which occurs when a roadway or freeway is operating at a maximum LOS C condition. Adding more vehicles to the maximum LOS C condition will cause traffic to slow down, lowering traffic noise levels.

Total vehicle miles traveled (VMT) would increase by 2020 under the proposed Plan. However, an increase in overall VMT would not likely result in a noise level increase exceeding standards from the freeways or major arterials planned for improvements by 2020. As indicated, increases in traffic volumes proposed for addition of lanes would not double and therefore would result in less than perceptible increases in noise levels along heavily traveled corridors, such as I-5 and I-805 (Caltrans 2009).

Thus, planned 2020 improvements are unlikely to result in an increase in ambient noise levels that would exceed standards from increases in traffic volumes or changes in traffic speeds. However, in some locations the proposed transportation network improvements would move traffic closer to local receptors or change existing shielding, or there would be an increase in truck traffic, which would result in an increase in noise levels exceeding standards at noise-sensitive receptors.

Improvements and extension of some transit corridors (such as LOSSAN rail corridor double tracking), would expose existing and future noise-sensitive land uses to the higher levels of noise generated by high-volume transit corridors. The standard reference noise level for commuter railways at 100 feet is approximately 60 to 65 dBA L_{eq} (FTA 2006); actual noise levels would vary depending on actual volumes, speeds, vehicle models, and other day-to-day variances. Noise levels would increase along rail corridors where speeds are increased, a second track is constructed, or in new railway corridors where there were previously no trains. Increases in COASTER and AMTRAK service on the LOSSAN rail corridor would likely result in exceeding noise standards. In many areas the noise levels along the LOSSAN corridor are already close to, or exceeding, noise standards. Noise levels would increase along the portion of the Mid-Coast Trolley Extension through UTC, where train service is not currently provided. Railway crossings also use audible warning signals that would impact nearby residents. Increases in railway traffic would also lead to more train horns or whistles at crossings near residential areas, which can be a source of annoyance, especially at night or in early morning or evening.

The proposed Plan includes proposed railway capacity improvements to reduce current passenger/freight rail bottlenecks and increase capacity for freight. Increases in rail transit tonnage would increase the number of freight trains. Specific 2020 improvements call for double-tracking of segments along the LOSSAN rail corridor. The double-tracking improvements would increase the capacity of the corridor and allow for increased operation of passenger and freight trains, which would increase noise levels in adjacent areas. However, even if train operations were doubled, noise levels would increase by 3 dBA, an increase barely perceptible to the human ear (Caltrans 2009). Thus, the proposed transportation improvements related to rail freight operations in the proposed Plan are not anticipated to result in noise levels in excess of local standards.

The proposed Plan includes the Mid-Coast Trolley Extension from Old Town to University City. The standard reference noise level for light railway/Trolley service at 100 feet is approximately 60 to 63 dBA L_{eq} (FTA 2006). Even doubling of light railway/Trolley service would increase noise levels (day-night average) by 3 dBA CNEL (i.e., barely perceptible levels), however, it is likely that, in many areas, the light rail system is already close to, or exceeding noise standards.

The proposed Plan includes increased and expanded *Rapid* services, including transit-only lanes on SR 15 from I-805 to I-8. The standard reference noise level for *Rapid* service at 100 feet is approximately 60 dBA L_{eq} (FTA 2006); actual noise levels would vary depending on actual volumes, speeds, vehicle models, and other day-to-day variances. The increase of *Rapid* service or the development of new services would increase noise levels along any new or proposed *Rapid* routes. However, because *Rapid* routes would be along existing roadways, it is unlikely that doubling *Rapid* traffic would result in a substantial increase in traffic levels. For example, doubling the *Rapid* levels on I-5 would not double the overall traffic levels on I-5, nor substantially alter the overall vehicle mix. It is therefore unlikely that an increase in traffic noise levels would occur from increasing *Rapid* service. Thus, the proposed *Rapid* bus service improvements in the proposed Plan are not anticipated to result in noise levels in excess of local standards.

The proposed Plan includes increased local bus service and using higher capacity passenger buses. The standard reference noise level for local bus service at 100 feet are approximately 50 dBA L_{eq} (FTA 2006); actual noise levels would vary depending on actual volumes, speeds, vehicle models, and other day-to-day variances. The increase in local bus service would increase ambient noise along any new or proposed routes from more frequent passbys, braking, and engine acceleration events. However, this would unlikely substantially increase the overall traffic level on surface roadways or substantially alter the traffic mix. It is therefore unlikely that noise levels would exceed standards from increasing local bus service.

Construction noise from transportation network improvements, analyzed in further detail in Impact N-2, is usually regulated by local noise ordinances as to allowable construction hours (typically, daytime on Monday through Saturdays) and, if applicable to the ordinances, also limits construction noise levels, typically averaged over a 1- or 8-hour period. Where jurisdictions do not provide noise level limits for construction, federal and state agencies such as FTA also provide guidance for evaluating construction noise at noise-sensitive land uses. FTA guidelines presented in Table 4.12-7 are considered reasonable criteria for construction noise level limits, i.e., a daytime limit of 80 dBA $L_{eq(8)}$ for residential land uses (FTA 2006). FHWA and the Caltrans Protocol establish the policies and procedures (i.e., NAC) to assess traffic noise exposure and impact for new construction and reconstruction projects. In some locations, construction of transportation network improvements in the proposed Plan would occur outside standard allowable construction times in local ordinances and /or exceed construction noise level limits of local noise ordinances, or in their absence, FTA guidelines.

Transportation network improvements would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards. Thus, while adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to less than significant at the project-level for all projects. This is a significant impact.

2020 Conclusion

Implementation of the regional growth and land use change as well as transportation network improvements associated with the proposed Plan would expose sensitive receptors to noise levels in excess of applicable standards. While adherence to regulations discussed above and in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. Therefore, this impact (N-1) in the year 2020 is significant.

2035

Regional Growth and Land Use Change

The increase in population, housing, and employment forecasted by 2035 under the proposed Plan would expose persons to, or generate noise levels in excess of, standards established in the local general plan or noise ordinance, or in their absence, applicable standards of other agencies (as listed for impacts in 2020).

For some development projects, construction of housing would generate temporary short-term noise impacts by exceeding allowable construction days and hours (non-highway and emergency work) for local jurisdictions, typically Monday through Saturday during daytime hours. In addition, for development projects where rock drilling and blasting, pile driving, or pavement breaking is required, high-rise housing construction would generate temporary short-term noise impacts by exceeding local jurisdictions' construction noise level limit, if provided, during allowable construction periods, typically, 75 dBA L_{eq} averaged over a 1- or 8-hour (L_{eq}) period. Where jurisdictions do not provide noise level limits for construction, federal agencies such as FTA and state agencies also provide guidance for evaluating construction noise at noise-sensitive land uses (Table 4.12-7), which are considered reasonable criteria for construction noise level limits when a project-level standard is not provided (FTA 2006).

In some locations, where new residential is located in proximity to other land uses, operational impacts of regional growth and land use change would expose persons to noise levels in excess of applicable standards, such as next to commercial or industrial uses, or in areas with noise levels in excess of local standards (e.g., residential development in proximity to noise sources like freeways). Stationary noise sources associated with some future development projects would generate noise levels in excess of applicable standards at adjacent land uses, and some noise-sensitive land uses would be located in incompatible noise environments.

However, as discussed under the 2020 analysis, the pattern of denser land uses and the development along existing transportation corridors would expose noise-sensitive land uses to noise levels in excess of local standards. Development projects and other noise sources would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards during construction and operations. Thus, while adherence to the existing laws, regulations, and programs discussed in Section 4.12.2 would reduce noise impacts upon implementation of the proposed Plan, there is no assurance that adherence would reduce these impacts to less than significant at the project-level for all projects. This is a significant impact.

Transportation Network Improvements and Programs

In some locations, transportation network improvements in 2035, including additional Managed Lanes along certain portions of I-5 between SR 905 and SR 78, and portions of SR 15 and I-15, SR 78, SR 94, and I-805*;* general purposes lanes along I-5 from SR 54 to SR 15, and portions of SR 52 and SR 67, would expose adjacent land uses to noise levels in excess of local or Caltrans standards due to construction of the improvements, and movement of traffic closer to receivers (as identified for 2020 impacts).

Operation of these transportation network improvements would increase capacity on these roadways and thereby increase traffic volumes and associated noise levels. However, these improvements would not double traffic volumes, which would result in an increase of less than 3 dBA, typically approximately 2 dBA, which would be a less than perceptible increase in noise levels. The primary noise increase would be the result of increases in the number of trucks, buses, and trains operating under the proposed Plan, which generate greater noise per vehicle than automobiles (Caltrans 2009).

Noise levels from freeways and major arterials already exceed local standards in most locations in the San Diego region (SANDAG 2007). Standard reference noise levels for freeways and highways at 100 feet are approximately 70 to 80 dBA L_{eq} and 65 to 75 dBA L_{eq}, respectively (FTA 2006); actual noise levels would vary depending on actual volumes, speeds, vehicle models, and other day-to-day variances. Transportation network improvements on well-traveled freeways and major arterials would generally allow vehicle traffic to move faster and increase traffic noise along a given corridor. Conversely, increasing traffic volumes on congested freeways and major arterials (i.e., LOS E or F) would have little effect on the loudest-hour noise level, which occurs when a roadway or freeway is operating at a maximum LOS C condition. Adding more vehicles to the maximum LOS C condition will cause traffic to slow down, lowering traffic noise levels. Overall VMT under the proposed Plan would increase by 2035. However, an increase in overall VMT would not likely result in a noise level increase exceeding standards from the freeways or major arterials planned for improvements by 2035. While reductions in traffic congestion would lead to slight increases in noise as peak-hour traffic speeds increase, these generally would be barely perceivable, i.e., 3 dBA or less. Thus, the planned 2035 improvements are unlikely to result in exceeding noise standards from increases in traffic volumes or changes in traffic speeds. However, in some locations, the proposed transportation network improvements would move traffic closer to local receptors or change existing shielding, or there would be in increase in truck traffic, which would result in an increase in noise levels exceeding standards at noise-sensitive receptors.

By 2035, improvements and extension of some transit corridors (e.g., double-tracking along the LOSSAN rail corridor, increased COASTER and Sprinter service frequencies and COASTER service extension into MCB Camp Pendleton), would expose existing and future noise-sensitive land uses to the higher levels of noise generated by high-volume transit corridors. The standard reference noise level for commuter railways at 100 feet is approximately 60 to 65 dBA L_{eq} (FTA 2006). Noise levels would increase along rail corridors where a second track is constructed, or in new railway corridors where there were previously no trains. Increases in railway traffic would also lead to more train horns or whistles at crossings near residential areas, which can be a source of annoyance, especially at night or in early morning or evening.

The transit improvements planned for 2035 under the proposed Plan would affect the region's noise environment through the expansion of the transit system to areas currently not being served, increased travel speeds and frequency of bus and rail services, and new rail and *Rapid* lines. Since it takes a doubling or more of traffic or train trips to cause a noticeable increase in ambient noise levels, it is less likely that increases in service along existing routes (e.g., expanded *Rapid*, local, shuttle service) would expose local noise receptors to levels in excess of local and Caltrans standards. Noise level increases would occur along railway corridors as speeds are increased, where trains are double-tracked along the LOSSAN rail corridor, and in corridors where new railways are developed where there were previously no transit facilities i.e., COASTER service extension into MCB Camp Pendleton The increase in railway crossings with audible warning signals, more train horns or whistles at crossings would also increase noise levels in proximity to nearby residents.

As in 2020, the railway capacity improvements of the proposed Plan in 2035 would continue actions that encourage more efficient intermodal transportation of goods. Increases in rail transit tonnage would increase the number of freight trains. However, these trains would likely operate on an as-needed basis and would not have a fixed schedule. Therefore, noise levels and frequency of passbys would continue to vary greatly from day to day. On some days, there may be no increase in freight train activity. Specific 2035 improvements call for further increases in COASTER operations and other extensions of commuter rail service that would be affected by intermodal rail operations. Overall, however, an increase in train traffic would yield a consequent increase in noise in areas adjacent to rail corridors.

The proposed Plan would increase light railway/Trolley service, including an extension of the Trolley from UTC to Mira Mesa via Sorrento Mesa/Carroll Canyon, and from San Ysidro to Kearny Mesa via Mission Valley, Mid-City, Southeast San Diego, National City, and Chula Vista. The standard reference noise level for light railway/Trolley service at 100 feet is approximately 60 to 63 dBA L_{eq} (FTA 2006). Any doubling of light railway/Trolley service would likely result in a noise increase exceeding standards. In addition, it is likely that, in many areas, the light rail system is already close to, or exceeding, noise standards.

The proposed Plan includes increased and expanded *Rapid* and local bus services. Standard reference noise levels for *Rapid* and local bus service at 100 feet are approximately 60 dBA L_{eq} and 50 dBA L_{eq}, respectively (FTA 2006). The increase of *Rapid* service or the development of new services would increase noise levels along any new or proposed *Rapid* routes, however, since along existing roadways, it is unlikely that increasing *Rapid* traffic would substantially increase traffic levels. Thus, the proposed increased and expanded *Rapid* services are not anticipated to result in noise levels in excess of local standards.

Construction noise, analyzed in detail in Impact N-2, is regulated by local noise ordinances for allowable periods and, if applicable, noise level limits. In some locations, construction of transportation network improvements in the proposed Plan would occur outside standard allowable construction times in local ordinances, and /or exceed construction noise level limits of local noise ordinances.

Transportation network improvements would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards. Thus, while adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. This is a significant impact

2035 Conclusion

Implementation of the regional growth and land use change as well as transportation network improvements associated with the proposed Plan would expose sensitive receptors to noise levels in excess of applicable standards. While adherence to regulations discussed above and in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. Therefore, this impact (N-1) in the year 2035 is significant.

2050

Regional Growth and Land Use Change

The increase in population, housing, and employment development forecasted by 2050 under the proposed Plan would expose persons to, or generate noise levels in excess of, standards established in the local general plan or noise ordinance, or in their absence, applicable standards of other agencies (as described in the 2020 analysis).

For some development projects, construction of housing would generate temporary short-term noise impacts by exceeding allowable construction days and hours (non-highway and emergency work) for local jurisdictions, typically of Monday through Saturday during daytime hours. In addition, for development projects where rock drilling and blasting, pile driving, or pavement breaking is required, high-rise housing construction would generate temporary short-term noise impacts by exceeding local jurisdictions' construction noise level limit, if provided, during allowable construction periods, typically, 75 dBA L_{eq} averaged over a 1- or 8-hour (L_{eq}) period. Where jurisdictions do not provide noise level limits for construction, federal and state agencies such as FTA also provide guidance for evaluating construction noise at noise-sensitive land uses (Table 4.12-7) (FTA 2006).

In some locations, where new residential is located in proximity to other land uses, operational impacts of regional growth and land use change would expose persons to noise levels in excess of applicable standards, such as next to commercial or industrial uses, or in areas with noise levels in excess of local standards (e.g., residential development in proximity to noise sources like freeways). Stationary noise sources associated with some future development projects would generate noise levels in excess of applicable standards at adjacent land uses, and some noise-sensitive land uses would be located in incompatible noise environments.

However, as discussed under the 2020 analysis, the pattern of denser land uses and the development along existing transportation corridors, along with the proposed improvements, would expose noise-sensitive land uses to noise levels in excess of local standards. Development projects and other noise sources would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards during construction and operations. Thus, while adherence to the existing laws, regulations, and programs discussed above and in Section 4.12.2 would reduce noise impacts upon implementation of the proposed Plan, there is no assurance that adherence would reduce these impacts to a less than significant level for each project. This is a significant impact.

Transportation Network Improvements and Programs

As with the 2020 and 2035 analyses, the proposed transportation network improvements in 2050 would expose more people to the higher levels of noise generated by high-traffic or train volumes. At the regional scale, the noise impacts of adding new general purpose lanes and managed lanes to existing freeways and highways, new transit corridors, and increased frequency along existing transit corridors are generally expected when they occur in proximity to noise-sensitive receptors.

In some locations, transportation network improvements in 2050, including additional managed lanes or general purpose lanes along portions of I-5, SR 15, I-15, I-805, SR 52, SR 54, SR 56, SR 67, SR 76, SR 94, and SR 125 would expose adjacent land uses along these highways and freeways to noise levels in excess of local or Caltrans standards (as identified for 2020 and 2035) due to construction of the improvements, and movement of traffic closer to receivers.

The noise impacts of the operation of new managed lanes and new general purpose lanes planned by 2050 would increase capacity on these roadways and thereby increase traffic volumes and associated noise levels. However, traffic volumes would less than double, which would result in an increase of less than 3 dBA, typically approximately 2 dBA, which would be a less than perceptible increase in noise levels. The primary noise increase would be the result of increases in the number of trucks, buses, and trains, which generate greater noise per vehicle than automobiles (Caltrans 2009).

Noise levels from interstates and major arterials already exceed local standards in most locations in the San Diego region (SANDAG 2007). Standard reference noise levels for freeways and highways at 100 feet are approximately 70 to 80 dBA L_{eq} and 65 to 75 dBA L_{eq}, respectively (FTA 2006). Transportation network improvements on well-traveled freeways and major arterials would generally allow vehicle traffic to move faster, and increase traffic noise along a given corridor. Conversely, increasing traffic volumes on congested freeways and major arterials (i.e., LOS E or F) would have little effect on the loudest-hour noise level, which occurs when a roadway or freeway is operating at a maximum LOS C condition. Adding more vehicles to the maximum LOS C condition will cause traffic to slow down, lowering traffic noise levels. Overall VMT would increase under the proposed Plan; however, this would not likely result in a noise level increase exceeding standards. While reductions in traffic congestion would lead to slight increases in noise as peak-hour traffic speeds increase, these generally would be barely perceivable, i.e., 3 dBA or less. Thus, planned 2050 improvements are unlikely to result in a substantial increase in ambient noise levels from increases in traffic volumes or changes in traffic speeds. However, in some locations, the proposed transportation network improvements would move traffic closer to local receptors or change existing shielding, or result in higher truck percentages, which would result in an increase in noise levels exceeding standards at noise-sensitive receptors.

By 2050, improvements and extension of some transit corridors (i.e., completion of the double-tracking along the LOSSAN rail corridor, and extension of SPRINTER service to Westfield North County) would expose existing and future noise-sensitive land uses to the higher levels of noise generated by high-volume transit corridors. The standard reference noise level for commuter railways at 100 feet is approximately 60 to 65 dBA L_{eq} (FTA 2006). Noise levels would increase along rail corridors where a second track is constructed, or in new railway corridors where there were previously no trains. Increases in railway traffic would also lead to more train horns or whistles at crossings near residential areas, which can be a source of annoyance, especially at night or in early morning or evening.

The proposed Plan would increase light railway/Trolley service including an extension of the Trolley from Pacific Beach to Balboa, Balboa to Kearny Mesa, Kearny Mesa to El Cajon Transit Center, and Kearny Mesa to Carmel Valley. The standard reference noise level for light railway/Trolley service at 100 feet is approximately 60 to 63 dBA L_{eq} (FTA 2006). Any doubling of light railway/Trolley service would result in a 3 dBA noise increase, which would likely exceed standards. In addition, it is likely that, in many areas, the light rail system is already close to, or exceeding, noise standards.

The proposed Plan includes increased and expanded *Rapid* and local bus services, including substantial increases in *Rapid* bus services. Standard reference noise levels for *Rapid* Transit Bus and local bus service at 100 feet are approximately 60 dBA L_{eq} and 50 dBA L_{eq}, respectively (FTA 2006). The increase of *Rapid* service or the development of new services would increase noise levels along any new or proposed *Rapid* routes, however, since along existing roadways, it is unlikely that increasing *Rapid* traffic would substantially increase traffic levels. Thus, the proposed increased and expanded *Rapid* services are not anticipated to result in noise levels in excess of local standards.

Construction noise, analyzed in detail in Impact N-2, is regulated by local noise ordinances. Therefore, construction of transportation network improvements in the proposed Plan would occur outside standard allowable construction times in local ordinances, and /or exceed noise level limits of local noise ordinances. Thus, construction noise from transportation network improvements is considered a significant impact.

Transportation network improvements would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards. Thus, while adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. This is a significant impact.

2050 Conclusion

Implementation of the regional growth and land use change as well as transportation network improvements associated with the proposed Plan would expose sensitive receptors to noise levels in excess of applicable standards. While adherence to regulations discussed above and in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. Therefore, this impact (N-1) in the year 2050 is significant.

MITIGATION MEASURES

N-1 Exceedance of Noise Standards

2020, 2035, 2050

N-1A Implement Construction Noise Reduction Measures. SANDAG shall, and other transportation project sponsors can and should, implement construction noise reduction measures to substantially lessen the exposure of noise sensitive receptors to construction noise levels that exceed applicable standards in the planning, design, project-level CEQA review, and construction of transportation network improvements. These measures include, but are not limited to:

- Maintain construction equipment and vehicles per manufacturers' specifications and fit equipment with noise suppression devices (e.g., improved mufflers, equipment redesign, intake silencers, wraps, ducts, engine enclosures).
- Minimize construction equipment idling when equipment is not in use.
- Provide buffer zones or other techniques between stationary equipment (such as generators, compressors, rock crushers, and cement mixers) and the noise receptor.
- For impact tools (e.g., jack hammers, pavement breakers, rock drills), use hydraulically or electrically powered tools; where use of pneumatic tools is unavoidable, use an exhaust muffler on the compressed air exhaust. Use external jackets on the tools themselves. Use quieter procedures such as drills rather than impact equipment.
- For rock-crushing or screening operations, place material stockpiles as a noise barrier blocking line-of-sight between the operations and receptors.

In addition, for pile driving or other activities generating greater than 90 dBA during construction of transportation network improvements or development projects, SANDAG shall, and other transportation project sponsors, the County of San Diego, cities, and other local jurisdictions can and should, implement noise reduction measures, including but not limited to:

- Erect temporary noise barriers around the noise generating activities, particularly adjacent to residential buildings;
- Implement "quiet" pile driving technology (such as pre-drilling of piles, the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions;
- Monitor the effectiveness of noise attenuation measures by performing compliance noise monitoring at noise-sensitive receptors during construction.

In addition, during planning, design, and project-level CEQA review of development projects, the County of San Diego, cities, and other local jurisdictions can and should avoid or reduce impacts associated with construction noise consistent with the above noise reduction measures.

N-1B Implement Operational Noise Reduction Measures. SANDAG shall, and other transportation project sponsors can and should, implement noise reduction measures to substantially lessen the exposure of noise sensitive receptors to operational noise levels that exceed applicable standards during the planning, design, project-level CEQA review, operation, and maintenance of transportation network improvements. These measures include, but are not limited to:

- Utilize techniques such as grade separation, buffer zones, landscaped berms, dense plantings, sound walls, reduced-noise paving materials, and traffic calming measures; and

In addition, for railway projects, SANDAG shall, and other transportation project sponsors can and should, implement measures to substantially lessen noise levels that exceed FTA/FRA railway noise exposure thresholds during planning, design, and project-level CEQA review. These measures include, but are not limited to:

- Use wheel treatments such as damped wheels and resilient wheels;
- Use vehicle treatments such as vehicle skirts and under car acoustically absorptive material
- Establish sufficient buffer zones between railroad and receptors;
- Use sound reduction barriers such as landscaped berms and dense plantings;
- Install sound insulation treatments for impacted structures;
- Implement FRA "quiet zone" requirements in cooperation with local jurisdictions (i.e., reducing or eliminating the requirement for train locomotives to blast their horns) for Plan improvements at new and existing at-grade rail crossings; and
- New and expanded rail corridors and features such as new rail tracks and double-tracking will receive project-level noise analysis to ensure that measures are implemented to substantially lessen noise levels that exceed applicable standards.

In addition, for development projects, the County of San Diego, cities, and other local jurisdictions can and should implement noise reduction measures to meet local noise standards during the planning, design, and project-level CEQA review of development projects, including but not limited to:

- Use land use measures such as zoning, site design, and buffers to ensure that future development is noise compatible with adjacent transportation facilities and land uses; and
- Site noise-sensitive land uses away from noise-generating facilities. Once sited, orient outdoor use areas of land uses (e.g., backyards) away from adjacent noise sources to shield area with buildings, or construct noise barriers to reduce exterior noise levels.

SIGNIFICANCE AFTER MITIGATION

2020, 2035, and 2050

Mitigation Measures N-1A and N-1B would substantially reduce significant noise impacts caused by exceedances of noise standards. However, it cannot be guaranteed that all future project-level impacts would be mitigated to a less than significant level. Therefore, this impact (N-1) would remain significant and unavoidable.

N-2 CAUSE A SUBSTANTIAL TEMPORARY OR PERIODIC INCREASE IN AMBIENT NOISE LEVELS.

ANALYSIS METHODOLOGY

Construction activities associated with the proposed Plan would result in temporary or periodic increases in ambient noise levels at nearby sensitive receptors. The increase in ambient noise levels is considered substantial when the difference between the existing local ambient noise level compared to the resultant ambient level with construction noise exceeds the applicable regulatory standard. Substantial temporary increase [i.e., during construction] is defined by FTA as an ambient increase of 10 dBA L_{eq} or more during construction [FTA 2006], based on being perceived as twice as loud by the human ear [Caltrans 2009]).

FTA considers a noise level increase of 10 dBA L_{eq} above ambient noise levels due to construction a substantial temporary increase in noise levels (FTA 2006). Where jurisdictions do not provide noise level limits for construction, federal and state agencies such as FTA also provide guidance for evaluating construction noise at noise-sensitive land uses. FTA guidelines present reasonable criteria for construction noise level limits, i.e., a daytime limit of 80 dBA $L_{eq(8)}$ for residential land uses (FTA 2006). This standard is applicable to both development construction and transportation construction. This FTA standard is suitable for use where there is no such standard established by a local noise ordinance.

IMPACT ANALYSIS

2020

Regional Growth and Land Use Change

Construction activities associated with growth and land use change would generate noise during construction and thereby result in temporary increases in ambient noise levels at nearby sensitive receptors. Impacts to sensitive receptors resulting from construction of development projects would depend on several factors, such as the type of development, surrounding land uses in a given area, and duration of proposed construction activities. Additionally, construction noise levels would fluctuate depending on equipment type and duration of use; distance between noise source and receptor; and presence or absence of barriers between noise source and receptor. Typically, without intervening topography or structures, typical average construction noise levels of approximately 85 dBA L_{eq} at 50 feet would attenuate by 6 dBA per doubling of distance (i.e., 79 dBA L_{eq} at 100 feet, 73 dBA at 200 feet, etc.) to approximately 75 dBA L_{eq} or less at distances of 160 feet or greater, and would further attenuate to less than 60 dBA L_{eq} at distances of 500 feet or greater. While construction noise levels would generally range from 60 to 75 dBA depending on proximity to construction activity, construction noise at some locations would still result in a substantial temporary increase in ambient noise levels (at or above above 10 dBA) at receptors in areas with low ambient noise levels.

Additionally, temporary ambient noise level increases of 10 dBA or more in areas with low existing activity or new development would occur in some locations, and would be considered a substantial increase. Development projects would be required to comply with applicable construction noise regulations. While adherence to regulations discussed in Section 4.12.2 would substantially reduce construction noise levels, there is no assurance that noise would be reduced to less than significant levels for all projects. This is a significant impact.

Transportation Network Improvements and Programs

Construction of the planned transportation network improvements by 2020 would generate similar noise levels from similar construction equipment (i.e., heavy equipment such as trucks, graders, and backhoes, etc.) resulting in temporary increases in ambient noise levels in proximity to noise-sensitive receptors, as similarly identified under the regional growth and land use change discussion. However, improvements to existing transportation corridors would generate construction noise levels within existing transportation corridors, which typically have high existing ambient noise levels. Construction noise levels associated with some proposed improvement locations would substantially increase ambient noise levels at or above 10 dBA L_{eq}. Thus, while typical construction noise levels of approximately 85 dBA L_{eq} would attenuate to approximately 75 dBA L_{eq} or less at distances of approximately 160 feet or greater, and would further attenuate to less than approximately 60 dBA L_{eq} at distances of approximately 500 feet or greater, construction noise in some locations would still result in a substantial temporary increase in ambient noise levels of 10 dBA or greater at nearby receptors.

Transportation network improvements would be required to comply with applicable construction noise regulations. While adherence to regulations discussed in Section 4.12.2 would substantially reduce construction noise levels, there is no assurance that noise would be reduced to less than significant levels for all projects. This is a significant impact

2020 Conclusion

Implementation of the regional growth and land use change as well as transportation network improvements and programs would result temporary increases in noise levels at 10 dBA or above. Some noise-sensitive land uses would be located in areas where ambient noise levels would temporarily increase substantially, at or greater than 10 dBA above existing ambient levels during construction, and construction of some transportation improvements would substantially increase ambient noise levels at or greater than 10 dBA at noise-sensitive land uses. While adherence to construction noise regulations discussed in Section 4.12.2 would substantially reduce noise impacts, there is no assurance that noise levels would be reduced to less than significant levels for all projects. Therefore, this impact (N-2) in the year 2020 is significant.

2035

Regional Growth and Land Use Change

As with the 2020 analysis, construction activities by 2035 associated with forecasted regional growth and land use change under the proposed Plan would result in temporary ambient noise level increases at nearby sensitive receptors. Impacts to sensitive receptors resulting from these proposed improvements would depend on several factors, such as the type of improvement, surrounding land uses in a given area, and duration of proposed construction activities. Additionally, construction noise levels would fluctuate depending on equipment type and duration of use; distance between noise source and receptor; and presence or absence of barriers between noise source and receptor. Typically, without intervening topography or structures, typical average construction noise levels of approximately 85 dBA L_{eq} at 50 feet would attenuate by 6 dBA per doubling of distance (i.e., 79 dBA L_{eq} at 100 feet, 73 dBA L_{eq} at 200 feet), would attenuate to 75 dBA L_{eq} or less at distances of 160 feet or greater, and would further attenuate to less than 60 dBA L_{eq} at distances of 500 feet or greater. While construction noise levels generally range from 60 to 75 dBA depending on proximity to construction activities, construction noise would still result in a substantial temporary increase in ambient noise levels at these receptors (at or above 10 dBA). Additionally, ambient noise level increases at or exceeding 10 dBA above existing ambient noise levels in areas with low existing activity or new areas would be considered a substantial increase. Development projects would be required to comply with applicable construction noise regulations. While adherence to regulations discussed in Section 4.12.2 would substantially reduce construction noise impacts, there is no assurance that noise would be reduced to less than significant levels for all projects. This is a significant impact.

Transportation Network Improvements and Programs

Construction of the transportation network improvements in 2035 would result in similar noise level impacts as identified under the regional growth/land use change and transportation network improvements discussions in 2020. Transportation network improvements would be required to comply with applicable construction noise regulations. While adherence to regulations discussed in Section 4.12.2 would substantially reduce construction noise impacts, there is no assurance that noise would be reduced to less than significant levels for all projects. This is a significant impact.

2035 Conclusion

Implementation of the regional growth and land use change as well as transportation network improvements and programs would result temporary increases in noise levels at 10 dBA or above. Noise-sensitive land uses would be located in areas where ambient noise levels would temporarily increase substantially, at or greater than 10 dBA above existing ambient levels during construction, and construction of transportation improvements would substantially increase ambient noise levels at or greater than 10 dBA at noise-sensitive land uses. Therefore, this impact (N-2) in the year 2035 is significant.

2050

Regional Growth and Land Use Change

As with the 2020 and 2035 analyses, construction activities by 2050 associated regional growth and land use change under the proposed Plan would result in temporary ambient noise level increases at nearby sensitive receptors. Impacts to sensitive receptors resulting from these proposed improvements would depend on several factors, such as the type of improvement, surrounding land uses in a given area, and duration of proposed construction activities. Additionally, construction noise levels would fluctuate depending on equipment type and duration of use; distance between noise source and receptor; and presence or absence of barriers between noise source and receptor. Typically, without intervening topography or structures, typical average construction noise levels of approximately 85 dBA L_{eq} at 50 feet would attenuate by 6 dBA per doubling of distance (i.e., 79 dBA L_{eq} at 100 feet, 73 L_{eq} dBA at 200 feet); therefore, construction noise would attenuate to approximately 75 dBA L_{eq} or less at distances of 160 feet or greater and less than 60 dBA L_{eq} at distances of 500 feet or greater. While construction noise levels would generally range from 60 to 75 dBA depending on proximity, construction would still result in a substantial temporary increase at these receptors (at or above 10 dBA). Additionally, ambient noise level increases at or exceeding 10 dBA above ambient noise levels in areas with low existing activity or in new areas would be considered a substantial increase. Development projects would be required to comply with applicable construction noise regulations. While adherence to regulations discussed in Section 4.12.2 would substantially reduce construction noise impacts, there is no assurance that noise would be reduced to less than significant levels for all projects. This is a significant impact.

Transportation Network Improvements and Programs

Construction of the transportation network improvements in 2050 would result in similar noise level impacts as identified under the regional growth and land use change and transportation network improvements discussions in 2020 and 2035. Transportation network improvements would be required to comply with applicable construction noise regulations. While adherence to regulations discussed in Section 4.12.2 would substantially reduce construction noise impacts, there is no assurance that noise would be reduced to less than significant levels for all projects. This is a significant impact.

2050 Conclusion

Implementation of the regional growth and land use change as well as transportation network improvements and programs would result temporary increases in noise levels at 10 dBA or above. Noise--sensitive land uses would be located in areas where ambient noise levels would temporarily increase substantially, at or greater than 10 dBA above existing ambient levels during construction, and construction of transportation improvements would increase ambient noise levels by greater than 10 dBA at noise-sensitive land uses. Therefore, this impact (N-2) in the year 2050 is significant.

MITIGATION MEASURES

N-1 Exceedance of Noise Standards

2020, 2035, and 2050

Mitigation Measure N-1A above is applicable to and reduces this impact.

SIGNIFICANCE AFTER MITIGATION

2020, 2035, 2050

Significant and Unavoidable

Mitigation Measure N-1A would substantially reduce significant temporary construction noise impacts. However, it cannot be guaranteed that all future project-level construction noise levels would be mitigated to less than significant. Therefore, this impact (N-1) would remain significant and unavoidable.

N-3 CAUSE A SUBSTANTIAL PERMANENT INCREASE IN AMBIENT NOISE LEVELS.

ANALYSIS METHODOLOGY

A permanent increase in ambient noise levels is typically due to the operation, not construction, of development projects associated with forecasted regional growth and land use change, and planned transportation network improvements. Whether the impact is significant is based on whether the increase is substantially higher than the existing ambient levels in proximity to noise-sensitive land uses, and whether the increase occurs during the more sensitive hours of the evening and night when ambient levels are lower and noise-sensitive activities of the land use are occurring (e.g., sleeping at residences). For purposes of this impact criterion (N-3), a substantial permanent increase, and thus a significant impact, is defined as an increase of 5 dBA CNEL in ambient noise levels (FTA 2006), for both development projects and transportation network improvements.

The forecasted increase in population, housing, and employment development would result in permanent increases in ambient noise levels, for example through mixed-use development, such as placing residential, commercial, or industrial uses in proximity to existing noise-sensitive land uses; and expansion of existing development or transportation corridors. Development projects would be required to comply with all applicable noise regulations, which would limit noise incompatibilities among land uses.

Operational noise impacts of transportation network improvements are evaluated as follows. Based on noise attenuation with distance, traffic noise would not exceed standards at residences more than 500 feet from heavily traveled freeways, or more than 100 to 200 feet from lightly traveled roads (FHWA 1992). In general, along existing transportation routes, the proposed transportation network improvements (e.g., additional lanes) would increase roadway capacity, increasing traffic volumes and traffic noise. However, a doubling existing traffic volumes would only result in a 3 dBA increase, which is barely perceptible. However, improvements to existing freeways that improve peak hour traffic flow, such as new general purpose lanes or new Managed Lanes, would increase noise levels at adjacent sensitive receivers by creating new lanes closer to the receivers, or by increasing traffic speeds due to the capacity added by additional lanes.

According to FHWA, substantial noise impacts occur when predicted noise levels increase substantially when compared to existing levels, or when noise levels approach or exceed FHWA's NAC. For the purposes of this analysis, a substantial permanent increase is defined as an increase of 5 dBA CNEL (FTA 2006).

IMPACT ANALYSIS

2020

Regional Growth and Land Use Change

As stated in Impact N-1, the increase in population, housing, and employment development expected by 2020 such as densely developed areas (e.g., Downtown San Diego), would result in increases in ambient noise levels through conflicts in land use, such as placing residential, commercial, or industrial uses next to noise-sensitive receptors (i.e., residential uses) and expansion of development near transportation corridors. In some locations, this would result in a substantial permanent increase in ambient noise levels by 5 dBA CNEL over existing conditions. Development projects would be required to comply with all applicable noise regulations, which would limit noise impacts on sensitive receptors. However, the potential exists that noise level increases, even if in compliance with applicable regulations, would result in a substantial permanent increase in ambient noise levels.

Under the proposed Plan, development intensity is anticipated to be greater, which, in some locations, would place development with more or potentially louder noise sources in proximity to noise-sensitive receptors. This would likely result in a substantial ambient noise level increases of 5 dBA CNEL over existing ambient conditions. While compliance with the existing regulations included in Section 4.12.2 would limit noise impacts on sensitive receptors, compliance cannot guarantee that all future project-level impacts would be less than significant. Thus, this is a significant impact.

Transportation Network Improvements and Programs

Planned transportation network improvements by 2020 would generally increase ambient noise levels due to increases in the number of trucks, buses, and trains, which generate greater noise per vehicle than automobiles (Caltrans 2009). Planned transportation network improvements by 2020 include two new managed lanes along segments of I-5 and I-805, new SR 11 toll lanes, two new general purpose lanes on SR 76 from Mission Avenue to I-15; improvements to regional arterials including new vehicle lanes; and double-tracking along the LOSSAN railway corridor.

The operation of transportation network improvements related to roadways (e.g., adding lanes and extending roadways) planned by 2020 would increase capacity on these roadways and thereby increase traffic volumes and associated noise levels adjacent to transportation network improvements within the San Diego region. However, a doubling of traffic volumes would increase noise levels by 3 dBA CNEL, which would be a less than perceptible increase.

Transportation network improvements on well-traveled freeways and major arterials would generally allow vehicle traffic to move faster, and increase traffic noise along a given corridor. Conversely, increasing traffic volumes on congested freeways and major arterials (i.e., LOS E or F) would have little effect on the loudest-hour noise level, which occurs when a roadway or freeway is operating at a maximum LOS C condition. Adding more vehicles to the maximum LOS C condition would cause traffic to slow down, thereby lowering traffic noise levels.

At the regional scale, the noise impacts of new general purpose lanes and new managed lanes would increase noise levels when they occur in proximity to noise-sensitive receptors. Noise associated with highway traffic is dependent on traffic volume, speed, fleet mix (cars, trucks, etc.), and the proximity of noise-sensitive receptors. The additional lanes would increase capacity; however, even doubling traffic volumes would result in a only a 3 dBA CNEL increase (Caltrans 2009). Therefore, increased vehicle volumes would not substantially increase noise levels (i.e., an increase of 5 dBA CNEL). However, in some locations, the movement of traffic closer to receivers, or development of new facilities where none currently exist, would substantially increase ambient noise levels, as some improvements would increase ambient noise levels by 5 dBA CNEL or higher.

Noise levels would increase along rail corridors where speeds are increased, a second track is constructed, or in new railway corridors where there were previously no trains. In some locations, improvements and extension of transit corridors (i.e., COASTER and Sprinter double-tracking and extensions into Downtown and North County, respectively), would increase ambient noise levels in proximity to noise-sensitive land uses to the higher levels of noise generated by high-volume transit corridors. Increases in public transit would also increase noise levels along railway corridors where speeds are increased, trains are double-tracked, or in new rail corridors where there were previously no trains. Railway crossings also utilize audible warning signals that would impact nearby residents; therefore, increases in railway traffic would also lead to more train horns or whistles at crossings near residential areas, which can be a source of annoyance, especially at night or in early morning or evening. Even doubling of train volumes would only result in a 3 dBA CNEL increase (Caltrans 2009), which would not substantially increase noise levels (i.e., an increase of 5 dBA CNEL). However, in some locations, the movement of railway traffic closer to receivers, or development of new facilities where none currently exist, would substantially increase ambient noise levels, as some improvements would increase ambient noise levels by 5 dBA CNEL or higher.

The proposed Plan also includes actions that encourage more efficient intermodal transportation of goods. The number of freight trains would increase, resulting in increased train traffic that would increase noise levels adjacent to railway corridors. Even doubling of train volumes would only result in a 3 dBA CNEL increase (Caltrans 2009), which would not substantially increase noise levels (i.e., an increase of 5 dBA CNEL).

The proposed Plan includes the Mid-Coast Trolley Extension from Old Town to University City. A doubling of light railway/Trolley service would only increase noise levels by 3 dBA CNEL (Caltrans 2009). In some locations, sensitive receptors would be located in areas of new transit noise (from/expanded increased service or new service) where ambient noise levels would increase substantially, 5 dBA CNEL or greater. The majority of these impacts would likely be in areas where new corridors (extended or realigned roadways/tracks) have been constructed. Since it takes a doubling or more of traffic or rail trips to cause a noticeable increase in ambient noise levels, it is less likely that increases in service along existing routes (e.g., expanded *Rapid*, local, shuttle service) would cause noise impacts.

Overall, VMT would increase under the proposed Plan. However, an increase in overall VMT would not likely result in a substantial increase in ambient noise level from the freeways or major arterials planned for improvements by 2020. As indicated, even doubling traffic volumes would result in less than perceptible increases in noise levels along heavily traveled corridors proposed for new general purpose lanes or managed lanes, such as I-5, and I-805, as a doubling of vehicle volumes would be required to generate a 3 dBA CNEL increase on existing alignments (Caltrans 2009).

In addition, reductions in traffic congestion associated with transportation network improvements would slightly increase traffic noise as traffic speeds increase with reduced congestion. While reductions in traffic congestion would lead to slight increases in noise as peak-hour traffic speeds increase, these generally would be barely perceivable, i.e., 3 dBA. Thus, the planned 2020 improvements are unlikely to result in a substantial increase in ambient noise levels from increases in traffic volumes or changes in traffic speeds. However, in some locations, the proposed transportation network improvements would move traffic closer to local receptors or change existing shielding, which would result in a substantial increase in noise levels at local noise-sensitive receptors at or above 5 dBA CNEL.

The proposed Plan includes increased and expanded *Rapid* services, adding bus-only interstate ramps and bus-only lanes along key downtown corridors. The standard reference noise level for *Rapid* service at 100 feet is approximately 60 dBA L_{eq} (FTA 2006). The increase of *Rapid* service or the development of new services would increase noise levels along any new or proposed *Rapid* routes. However, because *Rapid* routes would be along existing roadways, it is unlikely that increased *Rapid* traffic would result in a substantial increase in overall traffic levels. For example, doubling the *Rapid* levels on I-5 would not double the overall traffic levels on I-5, nor substantially alter the overall vehicle mix. It is therefore unlikely that an increase in traffic noise levels would occur from increasing *Rapid* service. Thus, the proposed *Rapid* service improvements in the proposed Plan are not anticipated to result in a substantial increase in ambient noise levels.

The proposed Plan includes increased local bus service and using higher-capacity passenger buses. The standard reference noise level for local bus service at 100 feet is approximately 50 dBA L_{eq} (FTA 2006). The increase in local bus service would result in a substantial increase in ambient noise along any new or proposed routes from more frequent passbys, braking, and engine acceleration events. However, increasing local bus service would be unlikely to substantially increase the overall traffic level on surface roadways or substantially alter the traffic mix. It is therefore unlikely that a substantial increase in ambient noise levels would occur from increasing local bus service.

In some locations, permanent increases in ambient noise levels at noise-sensitive receptors in proximity to major transportation corridors would be significant, because they increase by 5 dBA CNEL or greater. While compliance with the existing regulations included in Section 4.12.2 would limit noise impacts on sensitive receptors, compliance cannot guarantee that all future project-level impacts would be less than significant. This is a significant impact.

2020 Conclusion

Implementation of regional growth and land use change as well as transportation network improvements and programs associated with the proposed Plan would result in a substantial permanent increase in ambient noise levels. Land use changes in some locations would locate development in areas of noise-sensitive land uses, where noise levels could increase substantially (5 dBA CNEL or greater) above existing conditions. Transportation network improvements would generally not substantially increase noise levels over the existing condition, but some improvements would increase ambient noise levels by 5 dBA CNEL or more from the movement of traffic closer to receivers or development of new facilities where none currently exist. While adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. Therefore, this impact (N-3) in the year 2020 is significant.

2035

Regional Growth and Land Use Change

The increase in population, housing, and employment development expected by 2035 would result in a permanent increase in noise levels due to operation of stationary noise sources and operations associated with commercial and industrial land uses. Under the proposed Plan land use development, intensity is anticipated to be greater, which would place more or potentially louder noise sources in proximity to noise-sensitive receptors. In some locations, this would result in potentially substantial noise level increases of 5 dBA CNEL or more.

Based on the preceding analysis of regional growth and land use change, potential noise impacts would occur due to proposed intensification of development. As the proposed development would expose noise-sensitive land uses to substantial noise level increases, operation of these improvements would result in a significant noise impact. While compliance with the existing policies and regulations included in Section 4.12.2 would limit noise levels between land uses in the San Diego region, compliance cannot guarantee that all future project-level impacts would be avoided or reduced to below a significant level. Thus, this is considered a significant impact.

Transportation Network Improvements and Programs

In some locations, transportation network improvements in 2035, including additional Managed Lanes along certain portions of I-5 between SR 905 and SR 78, and portions of SR 15 and I-15, SR 78, SR 94, and I-805; general purpose lanes along I-5 from SR 54 to SR 15, and portions of SR 52 and SR 67; six connectors along portions of the I-5, SR 15, I-15, and I-805; and five freeway connectors along portions of I-5, SR 94, and SR 11/SR 905, would increase ambient noise levels at adjacent land uses.

The noise impacts of the operation of new managed lanes and new general purpose lanes planned by 2035 would increase capacity on these roadways and thereby increase traffic volumes and associated noise levels adjacent to transportation network improvements within the San Diego region. However, even if the addition of lanes on these existing roadways doubled traffic volumes, the increase would be only 3 dBA CNEL, which is a barely perceptible increase in noise levels. The primary noise increase would be the result of increases in the number of trucks, buses, and trains operating under the proposed Plan, which generate greater noise per vehicle than automobiles (Caltrans 2009).

Transportation network improvements for decreasing traffic congestion on well-traveled freeways and major arterials would generally allow vehicle traffic to move faster, and increase traffic noise along a given corridor. Conversely, increasing traffic volumes on congested freeways and major arterials (i.e., LOS E or F) would have little effect on the loudest-hour noise level, which occurs when a roadway or freeway is operating at a maximum LOS C condition. Adding more vehicles to the maximum LOS C condition will cause traffic to slow down, lowering traffic noise levels. Overall VMT would increase by 2035 under the proposed Plan. However, an increase in overall VMT would not likely result in a substantial increase in ambient noise level from the freeways or major arterials planned for improvements by 2035. While reductions in traffic congestion would lead to slight increases in noise as peak-hour traffic speeds increase, these generally would be barely perceivable, i.e., 3 dBA CNEL. Thus, the forecasted 2035 improvements are unlikely to result in a substantial increase in ambient noise levels from increases in traffic volumes or changes in traffic speeds. However, in some locations, the proposed transportation network improvements would move traffic closer to local receptors or change existing shielding, or result in higher truck percentages, which would result in an increase in noise levels exceeding standards at noise-sensitive receptors.

The proposed Plan includes major transit improvements designed to improve and expand services and increase ridership. The transit improvements forecasted for 2035 under the proposed Plan would affect the region's noise environment through the expansion of the transit system to areas currently not being served, increased travel speeds and frequency of bus and rail services, and new rail and *Rapid* lines. Noise would impact those sensitive receptors located in areas that are exposed to new transportation noise (from increased service or new service). The majority of these impacts would likely be in areas where new corridors (extended or realigned roadways/tracks) have been constructed. Doubling vehicle or rail traffic is needed to cause a perceivable increase in ambient noise levels; therefore, it is less likely that increases in transit service along existing routes (e.g., expanded *Rapid*, local, shuttle service) would result in substantial noise impacts (i.e., increase of 5 dBA CNEL).

By 2035, improvements and extension of some transit corridors (e.g., double-tracking along the LOSSAN rail corridor, increased COASTER and SPRINTER service frequencies, and COASTER service extension into MCB Camp Pendleton), would expose existing and future noise-sensitive land uses to the higher levels of noise generated by high-volume transit corridors. Noise levels would increase along rail corridors where a second track is constructed, or in new railway corridors where there were previously no trains. Increases in railway traffic would also lead to more train horns or whistles at crossings near residential areas, which can be a source of annoyance, especially at night or in early morning or evening.

Even doubling of train volumes would only result in a 3 dBA CNEL increase (Caltrans 2009), which would not substantially increase ambient noise levels (i.e., an increase of 5 dBA CNEL). However, in some locations, the movement of railway traffic closer to receivers, or development of new facilities where none currently exist, would substantially increase ambient noise levels, as some improvements would increase ambient noise levels by 5 dBA CNEL or higher.

The transit improvements planned for 2035 under the proposed Plan would affect the region's noise environment through the expansion of the transit system to areas currently not being served, increased travel speeds and frequency of bus and rail services, and new rail and *Rapid* lines. The majority of the impacts from these improvements would likely be in areas where new corridors (extended or realigned roadways/tracks) have been constructed. Since it takes a doubling or more of bus or rail traffic to cause a barely perceivable increase in ambient noise levels (i.e., 3 dBA CNEL increase), it is unlikely that increases in service along existing routes (e.g., expanded *Rapid*, local, shuttle service) would result in substantial noise increases.

Noise level increases would occur along railway corridors as speeds are increased, where trains are double-tracked along the LOSSAN rail corridor, and in corridors where new rails are developed where there were previously no transit facilities. The increase in rail crossings with audible warning signals and more train horns or whistles at crossings would also potentially impact nearby residents. Even a doubling of train volumes would only result in a 3 dBA CNEL increase (Caltrans 2009), which would not substantially increase noise levels (i.e., an increase of 5 dBA CNEL). However, in some locations, the movement of railway traffic closer to receivers, or development of new facilities where none currently exist, would substantially increase ambient noise levels, as some improvements would increase ambient noise levels by 5 dBA CNEL or higher.

As in 2020, the railway capacity improvements of the proposed Plan would continue actions that encourage more efficient intermodal transportation of goods. Increases in rail transit tonnage would increase the number of freight trains.

Specific 2035 improvements call for further increases in COASTER operations and other extensions of commuter rail service that would be affected by intermodal rail operations. Overall, however, an increase in train traffic would yield a consequent increase in noise in areas adjacent to rail corridors. A doubling of train volumes would only results in a 3 dBA CNEL increase (Caltrans 2009), which would not substantially increase noise levels (i.e., an increase of 5 dBA CNEL).

The proposed Plan would increase light railway/Trolley service, including an extension of the Trolley from UTC to Mira Mesa via Sorrento Mesa/Carroll Canyon, and from San Ysidro to Kearny Mesa via Mission Valley, Mid-City, Southeast San Diego, National City, and Chula Vista. In some locations, sensitive receptors would be located in areas of new transit noise (from/expanded increased service or new service) where ambient noise levels would increase substantially, exceeding 5 dBA CNEL. The majority of these impacts would likely be in areas where new corridors (extended or realigned roadways/tracks) have been constructed. Since it takes a doubling or more of rail traffic volumes to cause a perceptible increase in ambient noise levels (i.e., 3 dBA CNEL), it is less likely that increases in service along existing routes (e.g., expanded *Rapid*, local, shuttle service) would cause noise impacts.

The proposed Plan includes increased and expanded *Rapid* and local bus services. The increase of *Rapid* service or the development of new services would increase noise levels along any new or proposed *Rapid* routes, however, since along existing roadways, it is unlikely that increasing *Rapid* traffic would substantially increase traffic levels. Thus, the proposed increased and expanded *Rapid* services are not anticipated to result in noise levels in excess of local standards.

Transportation network improvements would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards. Thus, while adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. This is a significant impact

2035 Conclusion

Implementation of regional growth and land use change as well as transportation network improvements and programs associated with the proposed Plan would result in a substantial permanent increase in ambient noise levels. Land use changes in some locations would locate development in areas of noise-sensitive land uses, where noise levels could increase substantially (greater than 5 dBA CNEL) above existing conditions. Transportation network improvements would generally not substantially increase noise levels over the existing condition, but some improvements would increase ambient noise levels by 5 dBA CNEL or more from the movement of traffic closer to receivers or development of new facilities where none currently exist. While adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. Therefore, this impact (N-3) in the year 2035 is significant.

2050

Regional Growth and Land Use Change

Forecasted growth (by 2050 would result in more development near noise-sensitive receptors. This growth would result in a permanent increase in ambient noise levels by 5 dBA CNEL or more. This is considered a significant impact. As the development would expose noise-sensitive land uses to substantial noise level increases, operation of these improvements would result in a significant noise impact. While compliance with the existing policies and regulations included in Section 4.12.2 would limit noise levels between land uses in the San Diego region, compliance cannot guarantee that all future project-level impacts would be avoided or reduced to below a significant level. Thus, this is a significant impact.

Transportation Network Improvements and Programs

In some locations, transportation network improvements in 2050, including additional Managed Lanes along portions of I-5, SR 15 and I-15, I-805, SR 52, SR 54, SR 94, and SR 125; new general purpose lanes along portions of I-8, SR 15, SR 52, SR 56, SR 67, SR 76, SR 94, and SR 125; and highway operational improvements along portions of I-5, I-8, and SR 76, would result in a substantial increase in ambient noise levels due to movement of traffic closer to receivers.

Noise-sensitive receptors would be impacted by new transportation noise (from expanded/increased service or new service) that would result in a substantial increase (5 dBA CNEL or greater). The majority of these impacts would likely be in areas where new corridors (extended or realigned roadways/tracks) have been constructed. A doubling traffic volumes would result in a barely perceptible increase in ambient noise levels (3 dBA CNEL); therefore, it is unlikely that increases in service along existing routes (e.g., expanded *Rapid*, local, shuttle service) would cause noise impacts.

The noise impacts of the operation of transportation network improvements related to roadways (e.g., adding lanes) planned by 2035 would increase capacity on these roadways and thereby increase traffic volumes and associated noise levels adjacent to transportation network improvements within the San Diego region. However, even doubling of traffic volumes would only increase ambient noise levels 3 dBA CNEL, which is a barely perceptible increase in noise levels. The primary noise increase would be the result of increases in the number of trucks, buses, and trains operating under the proposed Plan, which generate greater noise per vehicle than automobiles (Caltrans 2009).

Noise levels from interstates and major arterials already result in elevated ambient noise levels in most locations in the San Diego region (SANDAG 2007). Transportation network improvements for decreasing traffic congestion on well-traveled freeways and major arterials would generally allow vehicle traffic to move faster, and increase traffic noise along a given corridor. Conversely, increasing traffic volumes on congested freeways and major arterials (i.e., LOS E or F) would have little effect on the loudest-hour noise level, which occurs when a roadway or freeway is operating at a maximum LOS C condition. Adding more vehicles to the maximum LOS C condition will cause traffic to slow down, lowering traffic noise levels. Overall VMT would increase by 2050 under the proposed Plan; however, this would not likely result in a substantial increase in ambient noise levels. While reductions in traffic congestion would lead to slight increases in noise as peak-hour traffic speeds increase, these generally would be less than barely perceivable, i.e., less than 3 dBA CNEL. Thus, the forecasted 2050 improvements are unlikely to result in a substantial increase in ambient noise levels from increases in traffic volumes or changes in traffic speeds. However, in some locations, the proposed transportation network improvements would move traffic closer to local receptors or change existing shielding, or result in higher truck percentages, which would result in a substantial increase in ambient noise levels.

By 2050, improvements and extension of some transit corridors (i.e., completion of the double-tracking along the LOSSAN rail corridor, and extension of the SPRINTER to Westfield North County) would subject existing and future noise-sensitive land uses to the higher ambient noise levels of noise generated by high-volume transit corridors. Noise levels would increase along rail corridors where a second track is constructed, or in new railway corridors where there were previously no trains. In addition, it is likely that, in many areas, the COASTER is already close to, or exceeding, noise standards. Increases in railway traffic would also lead to more train horns or whistles at crossings near residential areas, which can be a source of annoyance, especially at night or in early morning or evening.

The proposed Plan includes increased and expanded *Rapid* and local bus services, substantial increases in *Rapid* services, and a streetcar from Mission Beach to La Jolla. The increase of *Rapid* service or the development of new services would increase noise levels along any new or proposed *Rapid* routes, however, since along existing roadways, it is unlikely that increasing *Rapid* traffic would substantially increase traffic levels. Thus, the proposed increased and expanded *Rapid* services are not anticipated to result in a substantial increase in ambient noise levels.

Transportation network improvements would be required to comply with applicable noise regulations, which would limit exceedances of noise levels specified in noise standards. Thus, while adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. This is a significant impact

2050 Conclusion

Implementation of regional growth and land use change as well as transportation network improvements and programs associated with the proposed Plan would result in a substantial permanent increase in ambient noise levels. Land use changes in some locations would locate development in areas of noise-sensitive land uses, where noise levels could increase substantially (greater than 5 dBA CNEL) above existing conditions. Transportation network improvements would generally not substantially increase noise levels over the existing condition, but some improvements would increase ambient noise levels by 5 dBA CNEL or more from the movement of traffic closer to receivers or development of new facilities where none currently exist. While adherence to regulations discussed in Section 4.12.2 would reduce noise impacts, there is no assurance that impacts would be reduced to a less than significant level for all projects. Therefore, this impact (N-3) in the year 2050 is significant.

MITIGATION MEASURES

Permanent Increase in Noise Levels

Mitigation Measure N-1B above is applicable to and reduces this impact.

SIGNIFICANCE AFTER MITIGATION

2020, 2035, 2050

However, it cannot be guaranteed that all future project-level impacts can be mitigated to a less than significant level. Therefore, this impact (N-1) would remain significant and unavoidable.

N-4 EXPOSE PERSONS TO OR GENERATION OF EXCESSIVE GROUNDBORNE VIBRATION OR GROUNDBORNE NOISE LEVELS.

ANALYSIS METHODOLOGY

Similar to noise, groundborne vibration and groundborne noise are generated from project construction and operation. Groundborne vibration is the movement of the ground experienced either outdoors or indoors. Excessive groundborne vibration has the potential to damage structures, cause cosmetic damage (e.g., crack plaster), or disrupt the operation of vibration-sensitive equipment and can also be a source of annoyance to individuals who live or work close to vibration-generating activities. Ground-borne noise is noise generated by the indoor movement of room surfaces, such as walls, resulting from ground borne vibration of the building. Groundborne noise can be a source of annoyance.

Excessive is defined as exceeding vibration criteria guidelines for structural damage or human annoyance. Over the years, numerous vibration criteria and standards have been suggested by researchers, organizations, and governmental agencies. There are no Caltrans or FTA standards for vibration; Caltrans and FTA criteria are used to evaluate the potential for damage and annoyance from vibration-generating activities (Caltrans 2013).

This analysis of vibration impacts identifies vibration levels generated by construction equipment and vehicles, and the operation of development projects and transportation network improvements. Vibration dissipates greatly with distance; therefore, the proximity of structures and humans to the proposed development and improvements are considered. Typically, local jurisdictions have not developed any quantitative vibration standards. Construction and operational vibration levels from sources are attenuated with distance to the receptors, and are typically compared to FTA and Caltrans vibration impact criteria guidance for structural damage and human annoyance, as stated in Section 4.12.2. FTA and Caltrans vibration criteria are used for various projects (i.e., development, highways, and railways) to define "excessive" vibration levels, which are considered significant.

FTA vibration threshold for structural damage is 0.1 in/sec PPV, and the threshold of human perception and annoyance is 65 and 80 VdB, respectively (FTA 2006). Caltrans vibration threshold for structures is 0.2 in/sec ppv (as shown in Table 4.12-5), and for human perception and annoyance is 0.01 and 0.1 PPV in/sec, respectively (Caltrans 2002).

Based on Caltrans vibration analyses of vibration from vehicle and railway traffic, and roadway construction (Caltrans 2002a), traffic rarely generates vibration amplitudes high enough to cause structural or cosmetic damage (Caltrans 2013), and worst-case traffic vibrations would drop below the threshold of perception at distances of 150 feet or greater. Caltrans is not usually involved in railway projects, however, Caltrans measured a peak vibration level of 0.36 in/sec ppv at 10 feet from train activity, which would drop below the threshold of perception at distances greater than 250 feet (Caltrans 2013).

FTA provides a vibration screening procedure is designed to identify railway projects that have little possibility of creating significant adverse vibration impact for human annoyance, to eliminate them from further vibration analysis. The FTA vibration threshold of human annoyance is 80 VdB (FTA 2006). Vibration-sensitive receivers within 100 feet of light railway operations may be adversely affected (i.e., human annoyance) by vibration exposure during train events (FTA 2006). Predicted groundborne noise levels are compared to FTA criteria to determine construction and operation impacts. FTA provides groundborne noise criterion (Category 2) for residential receivers of 43 dBA for infrequent events.

IMPACT ANALYSIS

2020

Regional Growth and Land Use Change

In some locations, such as densely developed areas (e.g., Downtown San Diego), the increase in population, housing, and employment development forecasted by 2020 under the proposed Plan would expose persons to or generate vibration levels in excess of applicable vibration thresholds for structural damage and human annoyance. As the proposed Plan envisions much of the new development and redevelopment through 2020 would be located in existing developed area, new development would generally occur adjacent to existing structures.

In some locations, development projects implemented under the proposed Plan would locate sensitive receptors in proximity to transportation vibration sources such as major arterial roadways and rail transit alignments, and would exceed applicable vibration thresholds for structural damage and human annoyance.

Construction activities regardless of location would be similar and may include demolition of existing buildings/structures, site preparation work, excavation, foundation work, building construction, and paving. Demolition for an individual site may last several weeks to months and may produce substantial vibration. Additionally, piles or drilled caissons may also be used to support building or bridge foundations.

Heavy construction operations can cause substantial groundborne vibration in proximity to the source. The highest vibration levels are generated by impact equipment or heavy equipment, such as pile drivers or large bulldozers, respectively. Table 4.12-2 provides vibration levels at 25 feet for impact and heavy construction equipment, in terms of PPV (for structural damage) and VdB (for human annoyance). As shown in Table 4.12-2, pile drivers or large bulldozers can generate vibration levels at 25 feet of 1.518 and 0.089 in/sec PPV (or approximately 112 and 87 VdB), respectively. Vibration levels dissipate greatly beyond 25 feet from the source (FTA 2006).

Typical project construction activities, such as the use of jackhammers, other high-power or vibratory tools, compactors, and tracked equipment, would generate substantial vibration (i.e., greater than 0.2 in/sec ppv) in the immediate vicinity, typically within 15 feet of the equipment. However, typical building construction does not typically require the use of these larger sources of vibration-generating equipment, and therefore, is not anticipated to be a source of substantial vibration levels. Locating proposed development at sufficient distances where construction vibration would dissipate to vibration levels below vibration thresholds for structural damage and human annoyance. By use of administrative controls, such as scheduling, typical construction activities would be restricted to hours with least potential to affect nearby properties. Thus, perceptible vibration can be kept to a minimum and not result in human annoyance or structural damage. However, at some locations, applicable vibration thresholds for structural damage and human annoyance (FTA 2006) would be exceeded.

Construction activities with the potential for resulting in significant vibration impacts would be those for which pile driving would be required. Generally, these types of construction activities are associated with high-rise development. Pile driving from new development projects has the potential to generate the highest groundborne construction vibration levels, and is the primary concern for structural damage, when it occurs within 50 feet of structures. FTA and Caltrans vibration guidelines include thresholds for structural damage as well as for human annoyance. Pile driving within approximately 50 feet of a historic building would exceed FTA and Caltrans vibration standards for structural damage. Pile driving within approximately 300 feet would exceed FTA and Caltrans vibration standards for human annoyance. However, vibration levels generated by pile driving activities and attenuated by distance at the receiver would vary depending on project site conditions, such as soil conditions, construction methods, and equipment used. Distribution of materials to and from industrial and commercial land uses from new development can have the potential to generate more substantial levels of groundborne vibration than those of the mechanical equipment. Heavy trucks used for delivery and distribution of materials to and from industrial and commercial sites generally operate at very low speeds while on the industrial or commercial site (Caltrans 2013). Therefore, the groundborne vibration induced by heavy truck traffic at industrial or commercial land uses is not anticipated to be perceptible at distances greater than 25 feet (typical distance from roadway centerline to edge of roadway right-of-way for a single-lane road), and therefore would not exceed vibration thresholds at this distance.

Groundborne noise may be substantial when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz). Predicted groundborne noise levels are compared to applicable criteria to determine construction impacts at the project level. For example, FTA provides groundborne noise criterion (Category 2) for residential receivers of 43 dBA for infrequent vibration events. In some cases, applicable groundborne noise thresholds would be exceeded.

Based on the above analysis, in some locations, groundborne vibration and noise impacts associated with the construction of new development under the proposed Plan would exceed the applicable groundborne vibration significance thresholds for structural damage, and human annoyance, and applicable groundborne noise thresholds due to location of sensitive receptors near transportation vibration sources and due to pile-driving needed for some projects, e.g., high-rises. This is a significant impact.

Transportation Network Improvements and Programs

Construction vibration impacts resulting from the proposed transportation network improvements by 2020, including new managed lanes along I-5 and I-805, new SR 11 toll lanes, and general purpose lanes on SR 76; new travel lanes and extensions of regional arterials; and double-tracking the LOSSAN railway corridor, would be similar to impacts described under the regional growth and land use change analysis resulting in a less than significant impact for highway projects, except for pile driving, which would represent a significant impact on local vibration-sensitive receptors.

Development of new or expanded transportation systems, such as roadways and railways, would potentially locate vibration sources in proximity to vibration-sensitive receptors (e.g., LOSSAN rail corridor double-tracking). In some locations, vibration impacts would result from new transit lines (e.g., Mid-Coast Trolley extension from Old Town to UTC) or increased frequency of service on existing lines, which brings vibration sources closer to sensitive land uses. Applicable groundborne vibration thresholds for structural damage and human annoyance, and groundborne noise thresholds are used to assess the potential for rail-related vibration exposure at sensitive receivers. In some locations, applicable vibration thresholds would be exceeded.

The primary vibration sources associated with transportation system operations include heavy truck and bus traffic along roadways and train traffic along rail lines. However, vehicle traffic, including heavy trucks traveling on a highway, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage. In some cases, heavy trucks traveling over potholes or other discontinuities in the pavement have caused vibration high enough to result in complaints from nearby residents, which typically can be resolved by smoothing the roadway surface (Caltrans 2013). Freight trains, mass-transit trains, and light-rail trains can also be sources of groundborne vibration.

The proposed Plan includes the development of additional tracks along existing railways by 2020. Thus, the number of daily vibration events would increase along these railways, and the highest peak vibration level would be increased relative to the existing vibration level. In general, additional trains passing at the same point would show up as higher peaks that may expose local sensitive receptors to vibration levels that would exceed annoyance thresholds. Based on the above analysis, in some locations, groundborne vibration associated with some roadway or rail projects under the proposed Plan would exceed applicable groundborne vibration thresholds for structural damage and human annoyance, and groundborne noise thresholds. This is a significant impact.

2020 Conclusion

Implementation of regional growth and land use change as well as transportation network improvements and programs associated with the proposed Plan would expose persons to or generate excessive groundborne vibration and noise exceeding applicable quantitative thresholds. In some locations, vibration impacts associated with new development under the proposed would exceed significance thresholds for structural damage and human annoyance due to location of sensitive receptors near transportation vibration sources and due to pile-driving needed for some projects, e.g., high-rises. Similarly, transportation network improvements using pile driving would expose sensitive receptors to excessive groundborne vibration and noise levels. Also, vibration from increased train activity would be significant at distances of less than 250 feet. Therefore, this impact (N-4) in the year 2020 is significant.

2035

Regional Growth and Land Use Change

As in 2020, construction associated with development and redevelopment by 2035 forecasted in the proposed Plan would be located adjacent to existing structures. Construction activities would likely include demolition of existing structures, site preparation work, excavation, foundation work, building construction, and paving. Piles or drilled caissons would be used to support building foundations for high-rise development. Vibration levels caused by pile driving or other foundation work with a substantial impact component such as blasting, rock or caisson drilling, and site excavation or compaction may be high enough to be perceptible within 100 feet and high enough to damage existing structures within 50 feet.

As with the 2020 analysis, typical non-impact building construction is not anticipated to be a source of substantial vibration. By use of administrative controls, such as scheduling, typical construction activities would be restricted to hours with least potential to affect nearby properties. Thus, perceptible vibration can be kept to a minimum.

In addition, land use development projects implemented under the proposed Plan would locate sensitive receptors in proximity to transportation vibration sources such as major arterial roadways and rail transit alignments.

Based on the operational characteristics of mechanical equipment and distribution methods used for general light industrial and commercial land uses, it is not anticipated that light industrial or commercial operations would result in groundborne vibration levels that approach or exceed applicable vibration-level standards.

Predicted groundborne noise levels are compared to applicable criteria to determine construction impacts at the project level. For example, FTA provides groundborne noise criterion (Category 2) for residential receivers of 43 dBA for infrequent vibration events. In some cases, applicable groundborne noise thresholds would be exceeded.

Based on the above analysis, in some locations, groundborne vibration and noise impacts associated with the construction of new development under the proposed Plan would exceed the applicable vibration significance thresholds for structural damage and human annoyance due to location of sensitive receptors near transportation vibration sources and due to pile-driving needed for some projects, e.g., high-rises. This is a significant impact.

Transportation Network Improvements and Programs

Construction vibration levels generated from the proposed transportation network improvements, including additional managed lanes or general purpose lanes along I-5, between SR 905 and SR 78, SR 54 to SR 15; portions of SR 15 and I-15, SR 78, SR 94, and I-805; and portions of SR 52 and SR 67, would be similar to those described under the regional growth and land use change analysis, based on similar types of construction equipment used.

As identified in the previous analysis, at distances greater than 250 feet train vibrations would drop below the level of human perception. As the proposed Plan includes the development of additional railways along existing railways, the number of daily train events would increase, and the highest peak vibration level would be higher than the existing vibration levels. In general, the increase in train events will result in higher peak levels (Caltrans 2002a). Thus, proposed rail improvements in 2035 would expose local sensitive receptors to vibration levels in excess of 80 VdB, the FTA vibration threshold of human annoyance (FTA 2006).

Light rail traffic would generate audible groundborne noise which would not be excessive; however in some locations would physically connect to off-site sources of low-frequency noise via foundations or utilities, would be considered excessive as human annoyance to inhabited residences.

Based on the above analysis, in some locations, groundborne vibration and noise levels associated with some roadway or railway projects under the proposed Plan would exceed applicable vibration thresholds for structural damage, and human annoyance, and applicable groundborne noise threshold of human annoyance. This is a significant impact.

2035 Conclusion

Implementation of regional growth and land use change as well as transportation network improvements and programs associated with the proposed Plan would expose persons to or generate excessive groundborne vibration and noise exceeding applicable quantitative thresholds. In some locations, vibration impacts associated with new development under the proposed Plan would exceed the applicable groundborne vibration significance threshold for structural damage and human annoyance, and the applicable groundborne noise threshold for annoyance due to location of sensitive receptors near transportation vibration sources and due to pile-driving needed for some projects, e.g., high-rises. Similarly, transportation network improvements using pile driving would expose receptors to excessive groundborne vibration and noise levels, and from increased train activity at distances less than 250 feet. Therefore, this impact (N-4) in the year 2035 is significant.

2050

Regional Growth and Land Use Change

As with the 2020 and 2035, land use pattern changes by 2050 (i.e., cities of National City and Chula Vista, the City of San Diego, north county cities of San Marcos and Vista, the unincorporated County, and the City of La Mesa), on a regionwide basis, would include new development or redevelopment adjacent to or in proximity to existing land uses increasing the likelihood of groundborne vibration impacts from construction and operation of certain land uses.

Land use development projects implemented under the proposed Plan would locate sensitive receptors in proximity to transportation vibration sources such as major arterial roadways and rail transit alignments. Based on the operational characteristics of mechanical equipment and distribution methods used for general light industrial and commercial land uses, it is not anticipated that light industrial or commercial operations would result in groundborne vibration levels that approach or exceed applicable vibration-level standards.

Predicted groundborne noise levels are compared to applicable criteria to determine construction impacts at the project level. For example, FTA provides groundborne noise criterion (Category 2) for residential receivers of 43 dBA for infrequent vibration events. In some cases, applicable groundborne noise thresholds would be exceeded. Based on the above analysis, in some locations, groundborne vibration and noise impacts associated with the construction of new development under the proposed Plan would exceed the applicable groundborne vibration significance threshold for structural damage and human annoyance, and applicable groundborne noise threshold due to location of sensitive receptors near transportation vibration sources and due to pile-driving needed for some projects, e.g., high-rises. This is a significant impact.

Transportation Network Improvements and Programs

Construction of the proposed transportation network improvements in 2050, including additional lanes along portions of I-5, SR 15, I-15, I-805, SR 52, SR 54, SR 56, SR 67, SR 76, SR 94, and SR 125, would use similar construction equipment and thus generate similar groundborne vibrations levels at the source as those described under the regional growth and land use change analysis.

Based on the previous analysis in 2020 and 2035, groundborne vibration levels from train activity would drop below the threshold of perception at distances greater than 250 feet. Vibration increases in 2020 and 2035 would continue in 2050 to exceed applicable thresholds at distances of less than 250 feet from railways. Thus, proposed rail improvements in 2050 would expose local sensitive receptors to vibration levels in excess of applicable groundborne vibration and noise thresholds of human annoyance.

Based on the above analysis, groundborne vibration and noise levels associated with some roadway or rail projects under the proposed Plan would exceed applicable groundborne vibration significance thresholds for structural damage and human annoyance, and applicable groundborne noise threshold of human annoyance. This would be a significant impact.

2050 Conclusion

Implementation of regional growth and land use change as well as transportation network improvements and programs associated with the proposed Plan would expose persons to or generate excessive groundborne vibration and noise exceeding applicable quantitative thresholds. In some locations, vibration levels associated with new development under the proposed Plan would exceed the applicable significance threshold for structural damage and human annoyance, and groundborne noise thresholds due to location of sensitive receptors near transportation vibration sources and due to pile-driving needed for some projects, e.g., high-rises. Similarly, in some locations, transportation network improvements using pile driving would expose receptors to excessive groundborne vibration and noise levels, and from increased train activity would be significant at distances less than 250 feet. Therefore, this is impact (N-4) in the year 2050 is significant.

MITIGATION MEASURES

Excessive Groundborne Vibration and Noise

2020, 2035, and 2050

N-4A Implement Construction Groundborne Vibration and Noise Reduction Measures. SANDAG shall, and other transportation project sponsors, the County of San Diego, cities, and other local jurisdictions can and should, implement measures during design, project-level CEQA review, and construction of transportation network improvements or development projects, to reduce groundborne vibration and noise levels generated by on-site construction equipment, including, but not limited to, the following:

- Predrill pile holes within 300 feet of any sensitive receptor;
- Where feasible, use soil mix wall for excavation;
- Incorporate a comprehensive construction vibration specification into all construction bid documents,
- Require contractor to assess potential for damage to buildings within 100 feet of a tunnel boring;
- Require contractor to perform a physical survey to document existing condition of a building that might incur damage; and
- If pile driving and/or other vibration-generating construction activities are to occur within 60 feet of a historic structure whose integrity would be impaired by exceeding the vibration threshold for historic structures, implement measures to reduce vibration impacts, including but not limited to:
    - Retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that would damage any historic structure, and design construction methods to not exceed the thresholds.
    - Require groundborne vibration monitoring of nearby historic structures. Implement monitoring program to detect ground settlement or lateral movement of structures in the vicinity of pile-driving activities and identify corrective measures to be taken should monitored vibration levels indicate the potential for vibration damage to historic structures.
    - Require contractor to assess potential damage to buildings within 200 feet of areas where excavation requires the use of driven piles either by impact or vibratory methods.~~,~~

N-4B Implement Groundborne Vibration and Noise-reducing Measures for Rail Operations. SANDAG shall, and other transportation project sponsors can and should, implement vibration-reducing measures, to meet FTA vibration guidelines (FTA 2006), during the planning, design, project-level CEQA review, construction, and operation of rail projects, including, but not limited to, providing special track support systems such as floating slabs, resiliently supported ties, high-resilience fasteners, and ballast mats.

In addition, rail operators can and should implement groundborne vibration and noise-reducing measures, to meet applicable FTA vibration guidelines (FTA 2006), during the planning, design, project-level CEQA review, construction, and operation of rail projects, including, but not limited to, the following:

- Conduct rail grinding on a regular basis to keep tracks smooth;
- Conduct wheel truing to re-contour wheels to provide a smooth running surface and removing wheel flats; and
- To reduce groundborne noise, achieve vibration isolation of the track from underlying surface using:
    - Highly resilient direct fixation fasteners,
    - rail suspended fastener system,
    - isolated slab track system, and
    - floating slab track system.

SIGNIFICANCE AFTER MITIGATION

2020, 2035, 2050

Mitigation Measures N-4A and N-4B would reduce significant increases in groundborne vibration so that applicable significance thresholds would not be exceeded. However, it cannot be guaranteed that all future project-level impacts can be mitigated to a less than significant level. Therefore, this impact (N-4) would remain significant and unavoidable.

N-5 EXPOSE PEOPLE RESIDING OR WORKING NEAR PUBLIC AIRPORTS, OR PRIVATE AIRSTRIPS OR HELIPADS TO EXCESSIVE NOISE LEVELS.

ANALYSIS METHODOLOGY

This section discusses noise impacts of locating land development and transportation improvements of the proposed Plan in proximity to public-use and military airports, or private airstrips and helipads in the San Diego region. Impact analysis is based on applicable plans and guidance for noise-land use compatibility such as ALUCPs, AICUZ studies, and Caltrans' Division of Aeronautics permitting.

The locations of regional growth and land use change associated with proposed Plan are analyzed to determine whether people residing by or working near public-use airports and military airfields, or private airstrips and helipads would be exposed to excessive noise levels. Excessive is defined as exceeding land use compatibility noise level limits in ALUCPs for public-use airports, and in Caltrans Aeronautics Division permits for private airstrips The locations of transportation improvements associated with the proposed Plan are analyzed to determine whether people residing by or working near public-use airports and military airfields, or private airstrips and helipads would be exposed to excessive noise levels.

ALUCPs and AICUZ studies, respectively, are used to determine compatibility of development projects with and worker exposure to excessive noise from public-use or military airports, and FAA and Caltrans regulations and permitting for private airstrips or helipads.

IMPACT ANALYSIS

2020

Regional Growth and Land Use Change

Regional growth and land use change forecasted under the proposed Plan by 2020 such as densely developed areas (e.g., Downtown San Diego), would result in development near public-use and military airports, and private airstrips and helipads in the region; however, the proposed Plan would not result in any operational changes (e.g., changes in flight patterns) to San Diego County airports. For public-use and military airports, existing development review procedures, ALUCPs, and AICUZ studies, including existing and future noise contours around the airport runways would be implemented. These procedures ensure compatibility between proposed land uses and airports, to reduce the exposure of excessive aircraft noise impacts to persons residing or working near airports. To prevent incompatible uses in areas with higher aircraft noise levels, the ALUC has adopted ALUCPs with land use policies and criteria in the interest of aircraft noise and land use compatibility.

Regional growth and land use change by 2020 would result in development near public use or military airports in the region. However, existing development procedures, ALUCPs, and AICUZ studies ensure compatibility between land uses and airports and reduce the potential for exposure of people residing or working nearby to excessive aircraft noise. Additionally, the proposed Plan would not result in any operational changes (e.g., changes in flight patterns) to San Diego County airports. Therefore, regional growth and land use change associated with the proposed Plan would not expose residents or employees to excessive noise levels from airports.

For private airstrips and helipads, no ALUCPs are required (i.e., no noise contours). The location of new private airstrips or helipads is controlled by the Caltrans Division of Aeronautics permitting process. As required for safety zones, appropriate separation between private airports and development is identified in accordance with the California Airport Land Use Planning Handbook and FAA standards. Appropriate separation between development projects and private airstrips or helipads would be identified during project-level planning and CEQA review in accordance with existing regulations and FAA procedures, which would ensure compatibility.

A high rate of residential or commercial development is not projected to occur in rural areas of the region, where there are several private airstrips. However, regional growth is forecasted to occur near other private or special-use airstrips or helipads, such as hospitals and police stations. As required for safety zones, appropriate separation between private airports and development is identified in accordance with the California Airport Land Use Planning Handbook and FAA standards. Appropriate separation between development projects and private airstrips or helipads would be implemented during project-level planning and CEQA review in accordance with existing regulatory mechanisms. The existing regulations and FAA procedures would ensure compatibility between land uses and private airstrips. Additionally, regional growth forecasted under the proposed Plan is not anticipated to increase activity or access to private airstrips or result in any operational changes (e.g., changes in flight patterns) at any private airstrips.

Based on the above analyses, regional growth and land use change by 2020 would not expose residents or workers to excessive noise levels from public-use airports, military airfields, or private airstrips or helipads. Therefore, this impact is less than significant.

Transportation Network Improvements and Programs

Many transportation improvements developed by 2020, including new lanes along I-5, I-805, SR 11, and SR 76; widening and extensions of local roads; and double-tracking the LOSSAN railway corridor, would be located near public-use airports and military airfields. Transportation improvements located near public airports would not expose construction workers of traffic improvements near airports to excessive noise levels associated with operation of airports.

Transportation improvements developed by 2020 would also be located near private airstrips or helipads. Improvements to highways and arterials, and railways, included in the proposed Plan are unlikely to expose construction workers to excessive aircraft noise working near private airstrips or helipads.

Based on the above analyses, construction workers for transportation network improvements by 2020 would not be exposed to excessive noise levels from public-use airports and military airfields, or private airstrips and helipads. Therefore, this impact is less than significant.

2020 Conclusion

Regional growth and land use change would not expose residents or employees to excessive noise levels from public-use airports, military airfields, or private airstrips or helipads. Similarly, construction workers for transportation network improvements would not be exposed to excessive noise levels from these sources. Therefore, this impact (N-5) in the year 2020 is less than significant.

2035

Regional Growth and Land Use Change

Regional growth and land use change by 2035 (i.e., Downtown, College Area, Mira Mesa, Otay Mesa, Mission Valley, Navajo, and Uptown) and the County (i.e., Lakeside, North County Metro, Fallbrook, Spring Valley, and Ramona) would result in development near public use or military airports in the region. However, existing procedures, ALUCPs and AICUZ studies ensure compatibility between land uses and airports and reduce the potential for exposure of people residing or working nearby to excessive aircraft noise. Additionally, the proposed Plan would not result in any operational changes (e.g., changes in flight patterns) to San Diego County airports that would cause significant noise impacts. Therefore, regional growth and land use change by 2035 would not expose residents or employees to excessive noise levels from public-use airports and military airfields.

Additional regional growth and land use change is forecasted to occur in 2035 (i.e., Downtown, College Area, Mira Mesa, Otay Mesa, Mission Valley, Navajo, and Uptown) and the County (i.e., Lakeside, North County Metro, Fallbrook, Spring Valley, and Ramona) near private airstrips or helipads, particularly in the urbanized areas of the region. As described above, appropriate separation between development projects and private airstrips or helipads would be implemented during project-level planning and CEQA review in accordance with existing regulatory mechanisms. FAA may condition certain requirements for project sites to ensure compatibility with air safety. Existing regulations and FAA procedures would ensure compatibility between land uses and airports and reduce the potential for aircraft noise impacts.

Therefore, regional growth and land use change by 2035 would not expose construction workers to excessive noise levels from private airstrips or helipads. Based on the above analyses, regional growth and land use change by 2035 would not expose construction workers to excessive noise levels from public-use airports and military airfields, or private airstrips and helipads. Therefore, this impact is less than significant.

Transportation Network Improvements and Programs

As discussed in the 2020 analysis, transportation improvements included in the proposed Plan in 2035, including additional lanes along I-5, between SR 905 and SR 78, SR 54 to SR 15; portions of SR 15 and I-15, SR 78, SR 94, and I-805; and portions of SR 52 and SR 67, would not develop noise-sensitive land uses or employment centers and would not interfere with air traffic or result in operational changes at public use or military airports. Therefore, transportation network improvements would not expose construction workers to excessive noise levels from public-use airports or military airfields.

Transportation improvements developed by 2035 would be located near private or special-use airports or helipads, particularly if they are located in the western portion of the region. Therefore, regional growth developed by 2035 would not expose construction workers to excessive noise levels from airports.

Based on the above analyses, construction workers for transportation network improvements by 2035 would not be exposed to excessive noise levels from public-use airports and military airfields, or private airstrips and helipads. Therefore, this impact is less than significant.

2035 Conclusion

Regional growth and land use change would not expose construction workers to excessive noise levels from public-use airports, military airfields, helipads, or private airstrips. Similarly, construction workers for transportation network improvements would not be exposed to excessive noise levels from these sources. Therefore, this impact (N-5) in the year 2035 is less than significant.

2050

Regional Growth and Land Use Change

Regional growth and land use change by 2050 (i.e., cities of National City and Chula Vista, the City of San Diego, north county cities of San Marcos and Vista, the unincorporated County, and the City of La Mesa) would result in development near public use or military airports in the region. However, existing procedures, ALUCPs, and AICUZ studies ensure compatibility between land uses and airports and reduce the potential for exposure of people residing or working nearby to excessive aircraft noise. Therefore, regional growth and land use change associated with the proposed Plan would not expose construction workers to excessive noise levels from public-use airports and military airfields.

By 2050, the additional regional growth forecasted would occur near private airstrips or helipads, particularly in the urbanized areas of the region. As described in the 2020 analysis, appropriate separation between development projects and the airstrip or helipad would be identified during project-level planning and CEQA review in accordance with existing regulatory mechanisms. FAA may condition certain requirements for project sites to avoid or reduce incompatibilities with surrounding land uses.

Existing regulations and FAA procedures would ensure compatibility between land uses and airstrips or helipads. Therefore, with adherence to the regulations above, regional growth and land use change by 2050 would not expose construction workers to excessive noise levels from private airstrips or helipads. Based on the above analyses, regional growth and land use change by 2050 would not expose construction workers to excessive noise levels from public-use airports and military airfields, or private airstrips or helipads. Therefore, this impact is less than significant.

Transportation Network Improvements and Programs

As discussed in the 2020 and 2035 analyses, transportation improvements included in the proposed Plan in 2050, including additional lanes along portions of I-5, SR 15, I-15, I-805, SR 52, SR 54, SR 56, SR 67, SR 76, SR 94, and SR 125, would not develop noise-sensitive land uses or employment centers and would not interfere with air traffic or result in operational changes at public use or military airports. Therefore, transportation network improvements would not expose construction workers to excessive noise levels from airports.

Some of the transportation improvements developed by 2050 would be located near private or special-use airstrips or helipads, particularly if they are located in the western portion of the region. Transportation network improvements and programs developed by 2050 would not expose residents or employees to excessive noise levels from private airstrips. Based on the above analyses, construction workers for transportation network improvements by 2050 would not be exposed to excessive noise levels from public-use airports and military airfields, or private airstrips and helipads. Therefore, this impact is less than significant.

2050 Conclusion

Regional growth and land use change would not expose construction workers to excessive noise levels from public-use airports, military airfields, helipads, or private airstrips. Similarly, construction workers for transportation network improvements would not be exposed to excessive noise levels from these sources. Therefore, this impact (N-5) in the year 2050 is less than significant.

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