3.6 Noise and Vibration

3.6.1 Introduction

This section identifies potential noise-sensitive land uses within the Tier 1/Program EIS/EIR Study Area and evaluates the noise- and vibration-related effects associated with the No Build Alternative and Build Alternative Options on these areas. Information contained in this section is summarized from the *Noise and Vibration Technical Memorandum* (Appendix F of this Tier 1/Program EIS/EIR).

3.6.2 Regulatory Framework

In accordance with NEPA (42 USC Section 4321 et seq.), CEQ regulations implementing NEPA (40 CFR Parts 1501-1508), FRA's Procedures for Considering Environmental Impacts (64 FR 28545, May 26, 1999) and CEQA, FRA identified potential noise-sensitive land uses within the Tier 1/Program EIS/EIR Study Area, and evaluated the potential impacts that could occur from implementation of the Build Alternative Options.

Federal

Environmental Protection Agency Guidance

In 1974, U.S. EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, a comprehensive document that identifies noise levels to protect public health and welfare against hearing loss, annoyance, and activity interference (U.S. EPA 1974). In response to the requirements of the Noise Control Act, U.S. EPA identified indoor and outdoor noise limits to protect public health and welfare. U.S. EPA identified outdoor day-night average noise level (L_{dn}) limits of 55 decibels (dB) and indoor L_{dn} limits of 45 dB as desirable for protecting against speech interference and sleep disturbance in residential areas and at educational and health care facilities. The sound-level criterion for protecting against hearing damage in commercial and industrial areas is identified as the 24-hour equivalent sound level (L_{eq}) value of 70 dB (both outdoors and indoors). Based on attitudinal surveys, U.S. EPA determined that a 5 dB increase in L_{dn} or L_{eq} could result in a change in community reaction (U.S. EPA 1974). L_{dn} and L_{eq} are described in further detail in Appendix F of this Tier 1/Program EIS/EIR.

Federal Transit Administration Noise and Vibration Impact Criteria

FTA has published impact assessment procedures and criteria pertaining to noise and vibration. The *FTA Transit Noise and Vibration Impact Assessment Manual* (FTA Manual) (FTA 2018) is used for rail projects where conventional train speeds are below 90 miles per hour (FRA 2012). Therefore, FRA conventional rail projects generally use noise and vibration assessment guidance from the FTA Manual. The FTA Manual also includes assessment methods for noise and vibration from construction.

Federal Highway Administration Noise Impact Criteria

Implementation of the Program may involve the construction of new roads and/or grade crossings. The need for an impact analysis and evaluation of noise abatement for these types of infrastructure improvements depends on whether new project roadways meet the definition of a Type I Project as defined by FHWA.

Procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects are provided under 23 CFR Part 772. Under 23 CFR Part 772.7, highway projects are categorized as Type I, Type II, or Type III Projects.

FHWA defines a Type I Project as a proposed federal or federal-aid highway project for the construction of a highway at a new location or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment of the highway. The following projects are also considered to be Type I Projects:

- The addition of a through-traffic lane. This includes the addition of a through-traffic lane that functions as a high-occupancy vehicle lane, high-occupancy toll lane, bus lane, or truck climbing lane;
- The addition of an auxiliary lane, except when the auxiliary lane is a turn lane;
- The addition or relocation of interchange lanes or addition of ramps to a quadrant to complete an existing partial interchange;
- Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; and
- The addition of a new weigh station, rest stop, ride-share lot, or toll plaza or substantial alteration to such features.

If a project is determined to be a Type I Project under this definition, the entire project area, as defined in the environmental document, is a Type I Project. Type I Projects include those that add an interchange, ramp, auxiliary lane, or truck-climbing lane to an existing highway or widen an existing

ramp by a full lane width for its entire length. Projects that are unrelated to increased noise levels, such as striping, lighting, signing, and landscaping projects, are not considered Type I Projects. A Type II Project is a noise barrier retrofit project that involves no changes to highway capacity or alignment. A Type III Project is a project that does not meet the classifications of a Type I or Type II Project. Type III Projects do not require a noise analysis.

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

Traffic noise impacts are considered to occur when the predicted noise level in the design year approaches or exceeds noise abatement criteria (NAC) specified in 23 CFR Part 772, or a predicted noise level substantially exceeds the existing noise level (a "substantial" noise increase). However, 23 CFR Part 772 does not specifically define the terms "substantial increase" or "approach"; these criteria are defined in the state-level implementation of 23 CFR Part 772. An NAC value of 67 A-weighted decibel (dBA) L_{eq} is used for residences, schools, parks, places of worship, active sport areas, and other land uses where there are areas of outdoor frequent human use.

Noise Control Act of 1972

The Noise Control Act of 1972 (Public Law 92 574) established a requirement for all federal agencies to administer their programs in a manner that promotes an environment that is free of noise that jeopardizes public health or welfare. U.S. EPA was assigned the following responsibilities:

- Providing information to the public regarding the identifiable effects of noise on public health and welfare
- Publishing information on the levels of environmental noise to protect the public health and welfare with an adequate margin of safety
- Coordinating federal research and activities related to noise control
- Establishing federal noise emission standards for selected products distributed in interstate commerce

State

California Department of Transportation Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects

The Traffic Noise Analysis Protocol (Protocol) developed by Caltrans is the implementation of 23 CFR Part 772 in California. The Protocol specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or federal-aid highway projects. The Protocol defines a noise increase from a roadway project as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA or more. The Protocol also states that a sound level approaches the NAC when the sound level is within 1 dB of the NAC value specified in 23 CFR Part 772 (e.g., 66 dBA would be considered to be approaching the NAC of 67 dBA for residential use, but 65 dBA would not be considered to be approaching the NAC).

California Department of Transportation Vibration Standards

For continuous/frequent intermittent sources, such as pile driving, Caltrans recommends a 0.25-inch-per-second peak particle velocity (PPV) threshold for “historic and some old buildings” and a PPV of 0.3 inch per second for “older residential structures” (Caltrans 2004). These criteria are directed primarily toward, but not limited to, all construction related to pile driving, demolition, and pavement-breaking activities.

California Noise Control Act

The California Noise Control Act of 1973 requires a city or county to identify local noise sources and analyze and quantify to the extent practicable current and projected noise levels from various sources, including highways and freeways; passenger and freight railroad operations; ground rapid transit systems; commercial, general, and military aviation and airport operations; and other stationary ground noise sources.

Regional

Los Angeles County General Plan

The Noise Element of the *Los Angeles County 2035 General Plan* (County of Los Angeles 2015) provides goals, objectives, policies, and programs related to noise mitigation and noise compatibility with adjacent land uses. These goals include the minimization of impacts on noise-sensitive land uses by ensuring adequate site design, acoustical constriction, and the use of barriers, berms, or

additional engineering controls through best available technologies and utilizing traffic management and noise suppression techniques to minimize noise from traffic and transportation systems.

Orange County General Plan

The Noise Element of the *Orange County General Plan* (Orange County 2005) provides goals, objectives, and policies related to noise. These include transportation system noise control, noise abatement and monitoring, and land use and planning integration to prevent new noise and land use conflicts.

County of Riverside General Plan

The Noise Element of the *County of Riverside General Plan* (County of Riverside 2015) includes goals and policies to reduce compatibility impacts between sensitive land uses and noise generation sources. The policies identified in the plan are intended to ensure that land use and siting decisions take noise generation and reduction into account.

County of San Bernardino General Plan

The Noise Element of the *County of San Bernardino General Plan* (County of San Bernardino 2014) identifies noise abatement provisions to guide local decisions. The plan includes goals and polices to minimize potential land use computability conflicts resulting from exposure of county residents to mobile and stationary noise sources.

Local and Tribal Governments

Regulations from cities, local agencies, and tribal governments would be identified in the Tier 2/Project-level analysis once site-specific rail infrastructure improvements and station facilities are known.

3.6.3 Methods for Evaluating Environmental Effects

Because this analysis was conducted at a Tier 1/Program EIS/EIR service-evaluation level, a screening-level noise and vibration impact assessment was completed rather than a detailed quantitative evaluation of project noise and vibration levels. Detailed quantitative analysis would occur during Tier 2/Project-level analysis. Assessment of noise and vibration impacts associated with the Program is based on guidance in the FTA Manual (FTA 2018).

Construction Noise Assumptions

The FTA Manual does not contain standardized criteria for assessing construction noise impacts. Instead, it includes guidelines for suggested noise limits for residential uses exposed to construction noise to describe levels that may result in an adverse community reaction. These guidelines are summarized in Table 3.6-1.

Table 3.6-1. Federal Transit Administration Construction Noise Impact Limit Guidelines

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

Source: FTA 2018

Notes:
dBA=A-weighted decibel; L_{eq}=equivalent sound level

The noise impact limit guidelines are recommended to be used in construction noise assessment of transit projects under FTA and are appropriate given federal involvement in the Program. Thresholds for construction in local jurisdictions, if more stringent, would be identified as part of a Tier 2/Project-level analysis. In many cases, local jurisdictions do not regulate daytime construction noise, and FTA daytime standards are often used to determine potential for community annoyance during construction. As such, local ordinances were not evaluated for potential noise effects under this Tier 1/Program EIS/EIR service-level evaluation. FTA guidelines for temporary construction, as summarized in Table 3.6-1, provide a reasonable set of indicators that can be used as impact thresholds for this Tier 1/Program EIS/EIR service-level evaluation.

Individual types of heavy construction equipment commonly used for construction activities are expected to generate noise levels ranging from 74 to 89 dBA at 50 feet. Given construction requirements, pile drivers could be used. Pile drivers typically generate a maximum noise level of up to 101 dBA at 50 feet. The construction noise level at a given receptor would depend on the type of construction activity, the noise level generated by that activity, and the distance and shielding between the activity and the noise-sensitive receptor. Additional details for noise levels produced by commonly used construction equipment is provided in Appendix F of this Tier 1/Program EIS/EIR.

Based on FTA guidance, a construction noise impact may occur if construction equipment exceeds 80 dBA L_{eq} (8 hours) at a residential location between the hours of 7:00 a.m. and 10:00 p.m. or 70 dBA L_{eq} (8 hours) between the hours of 10:00 p.m. and 7:00 a.m. In addition, thresholds for

construction noise may be set at the local level, according to the expected hours of equipment operation and the noise limits specified in the noise ordinances of the applicable local jurisdiction(s).

Rail Operation Noise Assumptions

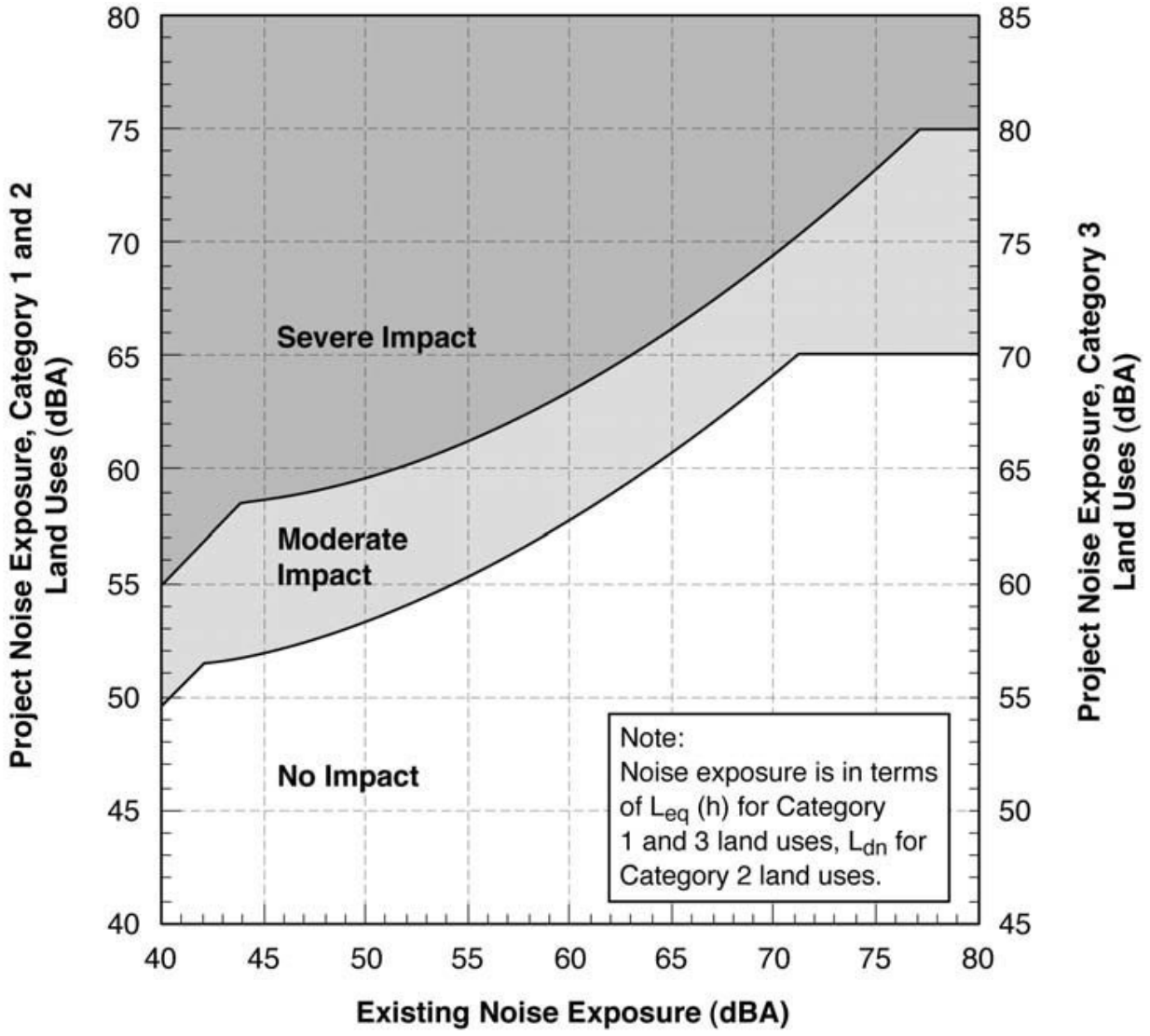
Operational noise impacts associated with the Program are based on guidance in the FTA Manual. The FTA Manual describes the noise impact criteria that have been adopted to assess noise contributions and potential impacts on the existing environment from rapid transit sources. The noise impact criteria defined in the FTA Manual are based on an objective that calls for maintaining a noise environment that is considered acceptable for noise-sensitive land uses. For assessing noise from transit operations, this Tier 1/Program service-level evaluation relies on FTA's three land use noise categories:

- **Category 1**: Tracts of land where quiet is an essential element of their intended purpose, such as outdoor amphitheaters, concert pavilions, and national historic landmarks with significant outdoor use.
- **Category 2**: Residences and buildings where people normally sleep, including homes, hospitals, and hotels.
- **Category 3**: Institutional land uses (e.g., schools, places of worship, libraries) that are typically available during daytime and evening hours. Other uses in this category can include medical offices, conference rooms, recording studios, concert halls, cemeteries, monuments, museums, historical sites, parks, and recreational facilities.

Noise exposure values are reported as the L_{dn} average sound level for residential land uses (Category 2) or the L_{eq} over a 1-hour time period for other land uses (Categories 1 and 3). Commercial and industrial uses are not included in the vast majority of cases because they are generally compatible with higher noise levels. Exceptions include commercial land uses with a feature that receives significant outdoor use, such as a playground, or uses that require quiet as an important part of their function, such as recording studios.

In the FTA Manual, noise impact criteria for operation of rapid transit facilities consider a project's contribution to existing noise levels, using a sliding scale, according to the land uses affected. The criteria correspond to heightened community annoyance because of the introduction of a new transit facility relative to existing ambient noise conditions. Noise impacts are assessed by comparing existing outdoor exposures with future project-related outdoor noise levels, as shown on Figure 3.6-1. The criterion for each degree of impact is based on a sliding scale that is dependent on the existing noise exposure and the increase in noise exposure with the project.

Figure 3.6-1. Federal Transit Administration Noise Impact Criteria



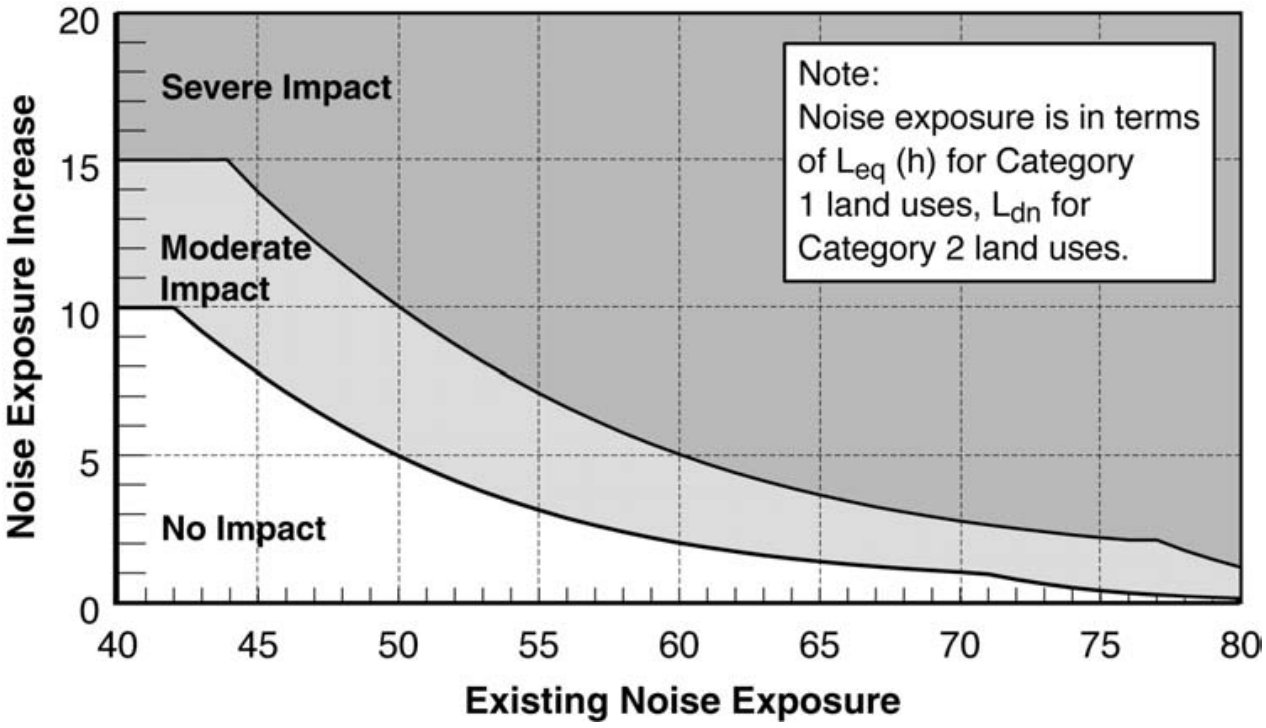
Source: FTA 2018

For assessing noise from transit operations, this Tier 1/Program service-level evaluation relies on the following noise impact classifications:

- **No Impact:** A project, on average, would result in an insignificant increase in the number of instances where people are highly annoyed by new noise.
- **Moderate Impact:** The change in cumulative noise is noticeable to most people but may not be enough to cause strong adverse community reactions.
- **Severe Impact:** A significant percentage of people would be highly annoyed by the noise, perhaps resulting in vigorous community reaction.

A project's noise contribution relative to the existing noise levels, as shown on Figure 3.6-1, differs according to the level of existing noise exposure. For example, a project contribution of 59 dBA L_{dn} would be considered a severe impact at a Category 2 receptor with an existing noise exposure of up to 50 dBA L_{dn} (a difference of 9 dBA), whereas a project contribution of 69 dBA L_{dn} would result in a severe impact at a Category 2 receptor with an existing noise exposure of up to 70 dBA L_{dn} (a difference of 1 dBA). The impact curves shown on Figure 3.6-1 are based on community increases in cumulative noise exposure relative to existing conditions, as depicted on Figure 3.6-2. The justification for the sliding scale depicted in these figures recognizes that people who are already exposed to high levels of noise in the ambient environment are expected to tolerate small increases in noise in their community according to the level of their existing noise exposure.

Figure 3.6-2. Increase in Cumulative Noise Levels Allowed by Criteria



Notes:
Noise exposure increase impact curves are adjusted by +5 dB for Category 3 land uses.

The rail noise model utilized as part of this Tier 1/Program EIS/EIR service-level evaluation focuses on land uses that could be subject to Program-related transit noise impacts. Although all developed land uses were evaluated in this analysis, the focus of the impact evaluation was on outdoor locations with frequent human use, institutional land uses, and residential buildings where people normally sleep. The FTA Manual specifies that criteria are to be applied to compare future noise with existing noise rather than future noise with projections of future no build noise exposure.

Existing noise levels for receptor locations were derived from projected daily freight, intercity passenger, and commuter rail trips along the existing corridor, described in Section 3.6.4. Given the high density of residential use along much of the Program Corridor, existing noise levels from rail operation were calculated by adjusting varying distances between noise-sensitive receptors and noise sources. The primary sources of noise along the Program Corridor were assumed to consist of either wayside noise from train passbys or grade crossings where trains are required to sound horns as they approach within 0.25 mile of the crossing.

The noise model was based on FTA single-event source levels for train vehicles and horns, as defined in the FTA Manual. For this Tier 1/Program EIS/EIR service-level evaluation, rail vehicle source levels specified in the FTA General Assessment methodology were used to determine projected future Program-induced noise and vibration levels as a function of distance and to identify impacts on noise-sensitive receivers. Noise contributions from rail vehicles were calculated using the noise source levels for at-grade rail transit vehicles operating on welded rail, as outlined in the FTA Manual. Calculated Program noise levels were then compared with moderate and severe impact criteria, according to existing ambient levels at a given receptor location.

A noise impact is considered to occur at a receptor location if the Program-related noise exposure for the receptor's applicable land use category (Category 1, 2, or 3) equals or exceeds the FTA criterion for a moderate or severe impact, as shown on Figure 3.6-1, based on the existing noise exposure for the receptor. The analysis assumes that the configuration of the track would be the same under both existing and future conditions as the Build Alternative Options would use the existing railroad ROW. Therefore, the focus of the analysis was on the overall increase in daily train trips (four additional daytime [7:00 a.m. to 10:00 p.m.] one-way intercity train trips per day).

Traffic Noise Assumptions

Noise analysis procedures specified in the Caltrans Protocol would be used to evaluate Program highway improvements considered to be Type I projects, as defined by FHWA. For roadways where changes in traffic volume are anticipated due to implementation of the Program, traffic noise levels under the Build Alternative Options would be analyzed at the Tier 2/Project-level based on anticipated changes in ridership and subsequent effects on traffic. A traffic noise impact is considered to occur where the increase in traffic volume on a given road segment would result in a 3 dBA increase relative to existing conditions.

Construction Vibration Assumptions

For assessing vibration effects associated with the Program, this Tier 1/Program service-level evaluation relies on the FTA's vibration impact criteria for the land use categories summarized in Table 3.6-2. The criteria in Table 3.6-2 are based on the frequency of events and related to

ground-borne vibration that can cause human annoyance or interfere with the use of vibration-sensitive equipment. The criteria for acceptable ground-borne vibration are based on the velocity in decibels (VdB) for a single event and expressed in terms of root-mean-square velocity levels.

Table 3.6-2. Ground-borne Vibration Impact Criteria for General Assessment

Land Use Category	Vibration Impact Level: Frequent Events[a] (VdB re 1 micro inch per second)	Vibration Impact Level: Occasional Events[b] (VdB re 1 micro inch per second)	Vibration Impact Level: Infrequent Events[c] (VdB re 1 micro inch per second)
Category 1: High Sensitivity[e]	65 VdB[d]	65 VdB[d]	65 VdB[d]
Category 2: Residential[f]	72 VdB	75 VdB	80 VdB
Category 3: Institutional[g]	75 VdB	78 VdB	83 VdB

Source: FTA 2018

Notes:

[a] The term *frequent events* is defined as more than 70 vibration events from the same source each day. Most rapid transit projects fall into this category.

[b] The term *occasional events* is defined as between 30 and 70 vibration events from the same source each day. Most commuter trunk lines have operations in this range.

[c] The term *infrequent events* is defined as fewer than 30 vibration events of the same kind each day. This category includes most commuter rail branch lines.

[d] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air conditioning systems and stiffened floors.

[e] This category includes land where quiet is an essential element of its intended purpose. Example land uses include preserved land for serenity and quiet, outdoor amphitheaters and concert pavilions, and national historic landmarks with considerable outdoor use. Recording studios and concert halls are also included in this category.

[f] This category is applicable all residential land use and buildings where people normally sleep, such as hotels and hospitals.

[g] This category is applicable to institutional land uses with primarily daytime and evening use. Example land uses include 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 are also included in this category.

VdB=velocity in decibels

FTA analysis guidelines also call for an investigation of the potential for vibration-induced damage to fragile or extremely fragile buildings (FTA 2018). Damage to a building is possible (but not necessarily probable) if ground-borne vibration levels exceed the following criteria:

- A 0.20-inch-per-second PPV (approximately 100 VdB) for non-engineered timber and masonry buildings
- A 0.12-inch-per-second PPV (approximately 95 VdB) for buildings that are extremely susceptible to vibration damage

Potential ground-borne vibration that could occur during construction activities was analyzed using the methodology discussed in Chapter 12 of the FTA Manual. For this Tier 1/Program service-level evaluation, a vibratory roller (source vibration level of 0.21-inch-per-second PPV) was identified as the piece of non-impact equipment that could produce the highest vibration levels. Additional detail for vibration levels produced by commonly used construction equipment is provided in Appendix F of this Tier 1/Program EIS/EIR.

Vibration from use of construction equipment within the Program Corridor could cause damage to buildings or structures adjacent to the Build Alternative Options. The potential for building damage was determined by using FTA methodology, including the damage potential vibration thresholds described under FTA vibration impact criteria. In addition, construction-related vibration impacts could occur if vibration levels from construction equipment are perceptible at a receiving residential land use (i.e., 75 VdB, described as the annoyance impact criterion for occasional events at Category 2 land uses, summarized in Table 3.6-2).

Operational Vibration Assumptions

The FTA procedure for a general vibration assessment was used for the analysis of ground-borne vibration levels from trains within the existing Program Corridor. For the operational vibration analysis, the number of daily events was classified under the FTA category of frequent events for the Western Section, which corresponds to more than 70 vibration events from freight, intercity passenger, and commuter trains per day, as defined in Table 3.6-2. For the Eastern Section, the number of daily events was classified under the FTA category of occasional events, which corresponds to between 30 and 70 vibration events from freight and intercity passenger trains per day. Land use designations for Category 2 (residences and lodging facilities) and Category 3 (institutional use) were used in the analysis.

Vibration source levels were derived from the FTA Manual using the generalized surface vibration curve for locomotive-powered passenger or freight vehicles. Soil propagation characteristics were assumed to be normal. For the generalized ground-surface vibration curve, root-mean-square

velocity-level data at the receptor were used, with the distance of interest adjusted according to vehicle speed (a maximum of 79 miles per hour was assumed throughout the Program Corridor), wheel condition (normal), track condition (normal), track treatments, and the number of floors above grade-to-receptor locations. Vibration-level adjustments for special track work were applied as applicable in areas adjacent to vibration-sensitive land uses.

Ground-borne vibration impact criteria for the FTA general assessment were used to assess vibration impacts from train operations. Impacts would be triggered at a vibration-sensitive location if future vibration levels were to exceed the FTA general assessment criteria under FTA vibration criteria identified in Table 3.6-2, and predicted future vibration levels were to exceed existing vibration levels by 3 VdB or more.

Tier 1/Program EIS/EIR Study Area

The Tier 1/Program EIS/EIR Study Area for noise includes land uses that could be subject to Program-related transit noise impacts. Although all developed land uses were evaluated in this analysis, the focus of the impact evaluation was on outdoor locations with frequent human use, institutional land uses, and residential buildings where people normally sleep.

Data Sources

The data sources used to establish the existing conditions include information from U.S. EPA, FRA, and Caltrans.

Related Resources

Noise or vibration impacts identified in this analysis affect related resources identified in Table 3.6-3.

Table 3.6-3. Related Resources Affected by Noise and Vibration

Resource	Effects
Land Use and Planning (Section 3.2)	Sensitive land uses (residential uses, educational facilities) may be affected by increased noise/vibration.
Cultural Resources (Section 3.13)	Historic buildings or structures may be affected by increased vibration.
Parklands and Community Services (Section 3.14)	Sensitive land uses (parks and recreational areas) may be affected by increased noise/vibration.

Resource	Effects
Environmental Justice (Chapter 4)	Sensitive receptors in EJ communities may be affected by increased noise/vibration.

Notes:

EJ=environmental justice

3.6.4 Affected Environment

Noise and Vibration Sensitive Land Uses

The Program Corridor crosses a large geographic area within Southern California, spanning approximately 144 miles from its western terminus in Los Angeles to its eastern terminus in Coachella. The Program Corridor occurs within an existing railroad corridor that traverses areas that have predominately been heavily modified for urban purposes, especially in the Western Section, although some areas occur in, or adjacent to, lands that are in a natural condition. Much of the Program Corridor from Los Angeles to Redlands is urbanized. The Eastern Section of the Program Corridor east of Colton is less urbanized with vacant land comprising of the largest land use category.

Build Alternative Option 1 (Coachella Terminus)

Almost the entire Western Section of the Program Corridor passes through highly developed urban and suburban areas, including many areas with adjacent sensitive land uses, such as residences (Category 2), schools (Category 3), and other institutional uses (Category 3). The Western Section also extends through many commercial and industrial areas, which are generally not noise sensitive unless they are associated with areas of frequent outdoor use.

The Eastern Section of the Program Corridor is highly developed in many locations but also passes through sparsely populated rural areas and open space areas, including a large wind farm west of Palm Springs. There are several single- and multifamily residences (Category 2), lodging uses (Category 2), churches (Category 3), schools (Category 3), and other institutional uses (Category 3) within the Program Corridor. No Category 1 land uses were identified within the Program Corridor. Additional details related to land use within the Program Corridor, parks and schools located within the Program Corridor, and potentially historic buildings (which may be affected by vibration) are provided in Section 3.2, Land Use and Planning; Section 3.13, Cultural Resources; and Section 3.14, Parklands and Community Services; of this Tier 1/Program EIS/EIR.

Build Alternative Option 2 (Indio Terminus)

Distribution of existing land uses within the Western Section of the Program Corridor under Build Alternative Option 2 are the same as Build Alternative Option 1. There are fewer acres of land within Build Alternative Option 2 because of the shorter route alignment and reduced station options; however, Build Alternative Option 2 still contains several single- and multifamily residences (Category 2), lodging uses (Category 2), churches (Category 3), schools (Category 3), and other institutional uses (Category 3) within the Eastern Section.

Build Alternative Option 3 (Indio Terminus with Limited Third Track)

Potential sensitive land uses within Build Alternative Option 3 are the same as those identified for Build Alternative Option 2.

Existing Noise Sources

The urban setting that constitutes most of the Western Section of the Program Corridor contains a mix of transportation and stationary noise sources associated with a highly developed area. Within the Eastern Section of the Program, there is a mix of urban, suburban, and rural areas that contain a similar mix of transportation and stationary noise sources. Noise from freeway and local traffic, transit, aircraft, heavy equipment, and industrial and commercial sources contributes to ambient noise along the Program Corridor. Train and traffic operations are assumed to be primary contributors to ambient noise within the Program Corridor.

Build Alternative Option 1 (Coachella Terminus)

Table 3.6-4 presents existing train operations from the three host railroads along the Program Corridor – UP, BNSF, and SCRRA (Metrolink). Operations vary considerably by segment, but both the Western and Eastern Sections of the Program Corridor have high-density, multiple-track main lines that support freight and passenger rail operations, which contribute to existing noise and vibration levels within the Program Corridor. The highest density segment in the Western Section is between Los Angeles and Fullerton and has an average of 86 daily trains, while the lowest density segment is between Fullerton and Atwood and has an average of 43 daily trains. The Eastern Section averages 43 daily trains along the Colton-Coachella segment, consisting of freight and passenger trains.

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Table 3.6-4. Existing Year (2018) Daily Train Operations within Program Corridor (One-Way Trips)

Endpoints	Eastbound Commuter Trains (SCRRA)	Westbound Commuter Trains (SCRRA)	Eastbound Intercity Trains (Amtrak, Pacific Surfliner)	Westbound Intercity Trains (Amtrak, Pacific Surfliner)	Eastbound Long Distance Passenger Trains (Amtrak)	Westbound Long Distance Passenger Trains (Amtrak)	Eastbound Freight Trains (UP, BNSF)	Westbound Freight Trains (UP, BNSF)	Total Average Daily Volume of Trains
Western Section (SCRRA – Host Railroad; Additional Operators – Amtrak, BNSF)									
Los Angeles (Union Station-Soto)[a]	14	14	12	12	1	1	0.5	0.5	55
Western Section (BNSF – Host Railroad; Additional Operators – Amtrak, SCRRA, UP)									
Los Angeles (Soto)[a] –Fullerton	14	14	12	12	1	1	16	16	86
Fullerton-Atwood	5	4	0	0	1	1	16	16	43
Atwood-Riverside	13	12	0	0	1	1	17	17	61
Riverside-Highgrove	10	10	0	0	1	1	27	27	76
Highgrove-Colton	4	4	0	0	1	1	27	27	64

Endpoints	Eastbound Commuter Trains (SCRRA)	Westbound Commuter Trains (SCRRA)	Eastbound Intercity Trains (Amtrak, Pacific Surfliner)	Westbound Intercity Trains (Amtrak, Pacific Surfliner)	Eastbound Long Distance Passenger Trains (Amtrak)	Westbound Long Distance Passenger Trains (Amtrak)	Eastbound Freight Trains (UP, BNSF)	Westbound Freight Trains (UP, BNSF)	Total Average Daily Volume of Trains
Eastern Section (UP – Host Railroad; Additional Operator – Amtrak)									
Colton-Coachella	0	0	0	0	0.5	0.5	21	21	43

Notes:

Daily train counts represent revenue train movements on a weekday (Monday-Friday). Freight train counts are based on Base Year (2013) daily freight train totals for the line segments shown above, as published in the 2018 *California State Rail Plan*, Appendix A.4, Table 20. Passenger and commuter train counts are based on the following public timetables in effect in September 2018: Metrolink "All Lines" timetable effective May 14, 2018, the 2018 LOSSAN Southern California Passenger Rail System Map and Timetables effective April 1, 2018, the Amtrak Southwest Chief timetable effective July 31, 2018, and the Amtrak Sunset Limited timetable effective March 11, 2018.

[a] Soto interlocking (Milepost 144.4) in Los Angeles

LOSSAN=Los Angeles-San Diego-San Luis Obispo; SCRRA=Southern California Regional Rail Authority; UP=Union Pacific Railroad

Passenger trains, such as commuter and intercity trains, are operated on specific schedules and operate at higher maximum authorized speeds than freight trains using the Program Corridor. The number of freight trains per day and their days and times of operation can vary depending on customer requirements, including volumes at the Ports of Los Angeles and Long Beach. Freight and commuter trains are required to sound horns within 0.25 mile of grade crossings. This safety measure warns motor vehicle operators of an approaching train and is required under FRA regulations. Several grade crossings along the Western and Eastern Sections are located near noise-sensitive uses.

Existing noise levels associated with rail operations within the Program Corridor are calculated using methods in the FTA Manual, based on the existing frequency of train events. Calculated ambient noise levels from total daily train operations were calculated for wayside and horn noise, based on the existing operations are summarized in Table 3.6-5.

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Table 3.6-5. Ambient Noise Levels within Program Corridor from Existing Train Operations

Section	Train Noise Source	Ranges of Distance from Track (feet)	Range of Total Average Daily L_{dn} (dBA)	Range of Average L_{eq} (1 hour) (dBA)
Western Section				
Los Angeles (Union Station-Soto[a])	Wayside noise from train passbys	50 – 150	63.4 – 70.5	58.4 –65.5
Los Angeles (Union Station-Soto[a])	Horn noise levels within 0.25 mile of grade crossings	50 – 150	68.7 – 81.0	69.8 – 77.0
Los Angeles (Soto[a]-Fullerton)	Wayside noise from train passbys	50 - 150	70.6 – 77.8	64.6 –71.8
Los Angeles (Soto[a]-Fullerton)	Horn noise levels within 0.25 mile of grade crossings	50 – 150	74.1 – 83.4	71.4 – 78.6
Fullerton−Atwood	Wayside noise from train passbys	50 – 150	70.2 – 77.4	63.8 – 71.0
Fullerton-Atwood	Horn noise levels within 0.25 mile of grade crossings	50 – 150	73.1 – 81.3	67.8 – 75.0
Atwood-Riverside	Wayside noise from train passbys	50 – 150	70.7 – 77.8	64.3 – 71.5
Atwood-Riverside	Horn noise levels within 0.25 mile of grade crossings	50 – 150	73.8 – 82.4	69.6 – 76.8
Riverside-Highgrove	Wayside noise from train passbys	50 – 150	72.4 – 79.6	66.2 – 73.3
Riverside-Highgrove	Horn noise levels within 0.25 mile of grade crossings	50 – 150	75.4 – 83.5	70.5 – 77.6
Highgrove-Colton	Wayside noise from train passbys	50 – 150	72.4 – 79.5	66.0 – 73.2
Highgrove-Colton	Horn noise levels within 0.25 mile of grade crossings	50 – 150	75.3 – 82.9	69.6 – 76.8

Section	Train Noise Source	Ranges of Distance from Track (feet)	Range of Total Average Daily L_{dn} (dBA)	Range of Average L_{eq} (1 hour) (dBA)
Eastern Section				
Colton-Coachella	Wayside noise from train passbys	50 – 150	71.0 – 78.2	64.8 – 71.9
Colton-Coachella	Horn noise levels within 0.25 mile of grade crossings	50 – 150	73.9 – 81.1	67.6 – 74.8

Notes:
[a] Soto interlocking (Milepost 144.4) in Los Angeles

dBA=A-weighted decibel; L_{dn}=day-night average noise level; L_{eq}=equivalent sound level

In addition to rail operation noise, traffic noise from cars and trucks is a primary source of ambient noise within the Program Corridor. Many highways and local roads serve commuter and heavy trucking demands in both the Western and Eastern Section of the Program Corridor, including I-10, SR 60, and SR 91 in the Western Section and I-10, SR 60, and SR 111 in the Eastern Section.

Build Alternative Option 2 (Indio Terminus)

Existing noise sources and levels within Build Alternative Option 2 are the same as Build Alternative Option 1.

Build Alternative Option 3 (Indio Terminus with Limited Third Track)

Existing noise sources and levels within Build Alternative Option 3 are the same as Build Alternative Option 1.

Existing Vibration Sources

At higher frequencies, ground-borne vibration can be perceived as a noise source. At sufficiently high amplitudes, the propagation of vibration waves through the ground can couple with building elements and cause them to vibrate at a frequency that is audible to the human ear. Ground-borne noise could rattle windows, walls, or other items that are coupled to building surfaces. Ground-borne vibration levels that result in ground-borne noise are often experienced as a combination of perceptible vibration and low-frequency noise.

Build Alternative Option 1 (Coachella Terminus)

Existing vibration sources in the Tier 1/Program EIS/EIR Study Area include train traffic in the Western and Eastern Sections of the Program Corridor and motor vehicle traffic on freeways and local arterial streets. Existing vibration levels were not quantified in this analysis since FTA classification of vibration events would not change under future conditions with implementation of the Build Alternative Options as described in Section 3.6.5.

Build Alternative Option 2 (Indio Terminus)

Existing vibration sources within Build Alternative Option 2 is the same as Build Alternative Option 1.

Build Alternative Option 3 (Indio Terminus with Limited Third Track)

Existing vibration sources within Build Alternative Option 3 is the same as Build Alternative Option 1.

3.6.5 Environmental Consequences

Overview

Effects as a result of implementing the Build Alternative Options can be broadly classified into construction and operational effects. Both short-term or temporary effects and long-term or permanent noise and vibration effects would be anticipated as a result of constructing any of the Build Alternative Options.

Construction effects associated with noise and vibration are generally short term and are due to the use of construction equipment and vehicles, as well as operation of on-site materials processing and handling, such as concrete plants. The potential construction effects on noise and vibration are evaluated based on the intensity of the construction activities and the duration of construction of the Program. The longer the construction period and the more non-road construction equipment used (such as cranes, bulldozers, heavy duty trucks, and concrete batch plants), the greater the potential for construction noise and vibration effects.

Noise and vibration effects could also result from operation of any of the Build Alternative Options as the addition of two daily roundtrips would result in the increase of passenger rail trains traveling within the Program Corridor and the addition of new station facilities (e.g., new sources of mobile and stationary noise).

Site-specific sensitive land uses potentially affected by the Program would be further identified as part of the Tier 2/Project-level environmental review process. Specific types and degrees of noise and vibration impacts on sensitive receptors would not be known until further design and construction information is known.

No Build Alternative

The No Build Alternative, as described in Chapter 2, Program Alternatives, of this Tier 1/Program EIS/EIR, is used as the baseline for comparison. The No Build Alternative would not implement the Program associated with this service-level evaluation. Under the No Build Alternative, ambient noise and vibration levels from existing train operations and local traffic would continue. No Program-related construction or increase in service would occur; however, freight and intercity train trips would increase in frequency due to regional growth and demand from other projects. Under the No Build Alternative, ambient noise and vibration levels from existing train operations and local traffic would continue. While no Program-related construction or increase in service would occur, rail noise is anticipated to increase within the Program Corridor.

The No Build Alternative assumes completion of those reasonably foreseeable transportation, development, and infrastructure projects that are already in progress or are programmed. These projects would result in an increase in freight service, as well as an increase in passenger rail services in the Program Corridor.

In addition, an increase in traffic is anticipated with the No Build Alternative because more cars would be on the roadways compared with what would occur with implementation of the Program. These increases in traffic could result in localized increases in ambient noise levels along local roadways.

Build Alternative Options 1, 2, and 3

Rail and Station Noise Effects

CONSTRUCTION

Western Section. The Build Alternative Options would not require construction of additional rail or station infrastructure in the Western Section of the Program Corridor because the existing railroad and stations from LAUS to Colton would be used. When compared with the No Build Alternative, short-term/temporary effects associated with noise-level increases would be negligible because no additional construction activities are planned within the Western Section under Build Alternative Options 1, 2, and 3.

Eastern Section. Construction activities required for infrastructure improvements (such as sidings, additional main line track, wayside signals, drainage, grade-separation structures) and station facilities would result in short-term increases in noise in, and around, the construction site. Noise during construction would be generated by construction equipment and vehicles during soil disturbance, earthwork, and other construction activities. The noise that could be generated would vary depending on the length of the construction period, specific construction activity (e.g., grading, paving, pile driving), types of equipment, and number of personnel. Potential worst-case equipment noise levels from construction of rail infrastructure improvements were evaluated by combining the noise levels of up to three of the loudest pieces of equipment that would most likely operate at the same time during a given phase of construction. This worst-case scenario assumes a paving project, which would include a paver, a dump truck, and an excavator, with an overall noise level of 88 dBA L_{eq} (8 hours) at 50 feet. However, estimated overall noise levels (not including impact construction equipment like a pile driver or blasting) can range from 88 dBA L_{eq} at 50 feet to 62 dBA L_{eq} at 1,000 feet ground. The noise calculations conducted for construction equipment is described in further detail in Appendix F of this Tier 1/Program EIS/EIR.

Although construction equipment may operate in many different areas as rail infrastructure improvements and station facilities are constructed, the highest noise levels are expected at those sites where the duration and intensity of construction activities would be greatest. Construction may occur within areas containing sensitive noise receptors and could potentially generate noise that would affect these sensitive noise receptors.

Potential noise levels from construction activities are predicted to exceed the FTA daytime construction noise criterion at nearby residences, lodging facilities, and institutional uses within 120 feet of construction areas. The FTA nighttime noise criterion could be exceeded at residences and lodging facilities up to 400 feet from construction areas. The need for construction during nighttime hours has not been specified and is, therefore, assumed to occur as a worst-case scenario. Impact pile drivers produce a maximum noise level of up to 101 dBA at 50 feet. If impact pile driving is used, the FTA daytime criterion may be exceeded up to 275 feet, and the FTA nighttime criterion may be exceeded at up to 850 feet. The need for pile-driving during construction has not been specified and is, therefore, assumed to occur as a worst-case scenario.

Construction at a given location would be intermittent and short term for the noise-sensitive receptors adjacent to construction sites. Construction noise would cease once the rail infrastructure improvement or station facility is complete. Site-specific noise impacts on sensitive receptors and mitigation measures would be considered during Tier 2/Project-level analysis.

When compared with the No Build Alternative, Build Alternative Option 1 could have a substantial construction noise effect on sensitive receptors within the Eastern Section of the Program Corridor. When compared with Build Alternative Option 1, Build Alternative Option 2 would have slightly reduced effects due to a shorter route alignment and reduced station options. However, the magnitude of effects would be similar and considered substantial when compared with the No Build Alternative. When compared with Build Alternative Options 1 or 2, Build Alternative Option 3 may have slightly reduced effects due to a smaller footprint associated with a shorter route alignment, reduced station options, and reduced third track rail infrastructure. However, the magnitude of effects would be similar for Build Alternative Option 3 and considered substantial when compared with the No Build Alternative.

OPERATION

Western Section. Noise-level calculations for train operations were modeled as part of this Tier 1/Program service-level evaluation assuming the addition of four daytime (7:00 a.m. to 10:00 p.m.) one-way intercity diesel-powered passenger train trips (two daily round-trips) per day within the Western Section of the Program Corridor. Current traffic volumes on the Western Section range from 43 to 86 average daily trains per segment, where a substantial number of freight, passenger, and commuter trains operate. The addition of four daily intercity passenger trips would result in a total of

90 one-way trips per day on the Los Angeles to Fullerton segment, which carries the highest volume of trains.

Based on the noise modeling conducted, wayside (engine and wheel/rail noise) and warning horn noise (at the at-grade crossings) that could be generated by Program operation would be lower than existing average daily rail noise that occur at Category 2 (residential/lodging) and Category 3 (institutional) land uses. The noise calculations conducted for Category 2 and Category 3 land uses within the Western Section of the Program is described in further detail in Appendix F of this Tier 1/Program EIS/EIR.

Operation of the enhanced passenger rail system within the Western Section of the Program Corridor under the Build Alternative Options is not be anticipated to result in changes associated with operational noise from passenger rail trains or the continuation of operational activities at existing rail stations. Operational noise effects associated with the Western Section of the Program Corridor under Build Alternative Option 1 would be negligible when compared with the No Build Alternative. When compared with Build Alternative Option 1, Build Alternative Options 2 and 3 would have the same magnitude of effect and be considered negligible when compared with the No Build Alternative.

Eastern Section. Noise-level calculations for train operations were modeled as part of this Tier 1/Program service-level evaluation assuming the addition of four daytime (7:00 a.m. to 10:00 p.m.) one-way intercity diesel-powered passenger train trips (two daily round-trips) per day within the Eastern Section of the Program Corridor. Current rail traffic volumes on the Eastern Section average 43 one-way trains per day. The addition of 4 daily intercity passenger trips would result in a total of 47 one-way trips per day on the Eastern Section of the Program Corridor.

Based on the noise modeling conducted, wayside (engine and wheel/rail noise) and warning horn noise (at the at-grade crossings) that could be generated by Program operation would be lower than existing average daily rail noise that occurs at Category 2 (residential/lodging) and Category 3 (institutional) land uses. The noise calculations conducted for Category 2 and Category 3 land uses within the Eastern Section of the Program Corridor are described in further detail in Appendix F of this Tier 1/Program EIS/EIR.

Operation of the enhanced passenger rail system within the Eastern Section of the Program Corridor under the Build Alternative Options is not anticipated to result in changes associated with operational noise from passenger rail trains. However, it is currently unknown if the operation of the enhanced passenger rail system would require rail infrastructure improvements that would change the existing noise environment (e.g., the provision of grade separations, bridges, or sidings).

Depending on the configuration of, and amenities available at, rail station facilities, the type of operational noise varies. Station platform noise sources generally include a public announcement

system and chiming sounds from ticket vending machines. Announcement systems are typically designed to adjust volume levels automatically to a few dBs above ambient noise. Operation noise associated with these sources would occur for brief periods and would not likely result in an exceedance of FTA or local standards. However, the operation of new rail station facilities could also result in new sources of mobile (e.g., vehicles accessing the station) and stationary noise (e.g., building heating, ventilation, and air conditioning systems and truck deliveries [if there are commercial uses included as part of the station facility]), which may result in exceedances of FTA or local standards on adjacent sensitive noise receptors.

Design specifics and locations of the rail infrastructure improvements and station facilities are not known at this time, so the operational noise that could be generated and potential sensitive receptors that could be affected during operational activities cannot be quantified at the Tier 1/Program-level evaluation. Once detailed information for the site-specific rail infrastructure improvement or station facility is available, a quantitative estimate of the noise levels during operation and impacts on sensitive receptors evaluated during the Tier 2/Project-level analysis would be conducted.

When compared with the No Build Alternative, operational noise effects could be moderate within the Program Corridor under Build Alternative Option 1. When compared with Build Alternative Option 1, Build Alternative Option 2 would have the same magnitude of effects and be considered moderate when compared with the No Build Alternative. When compared with Build Alternative Options 1 or 2, Build Alternative Option 3 may have slightly reduced effects due to a smaller footprint associated with a shorter route alignment, reduced station options, and reduced third track rail infrastructure. However, the magnitude of effects would be similar for Build Alternative Option 3 and considered moderate when compared with the No Build Alternative.

Traffic Noise Effects

CONSTRUCTION

Western Section. The Build Alternative Options would not require construction of additional rail or station infrastructure in the Western Section because the existing railroad infrastructure and stations from LAUS to Colton would be used. When compared with the No Build Alternative, short-term/temporary traffic noise effects would be negligible because no additional construction activities are planned within the Western Section under Build Alternative Options 1, 2, and 3.

Eastern Section. Construction of rail infrastructure improvements, such as sidings, additional main line track, wayside signals, drainage, grade-separation structures, and stations would generate construction traffic, which could contribute to localized increases in roadway noise levels. However, these increases in roadway noise generated by construction traffic would occur for brief periods and

would not likely result in an exceedance of FTA standards or local standards. When compared with the No Build Alternative, short-term/temporary noise effects related to roadways and vehicular traffic would be negligible within the Eastern Section under Build Alternative Option 1. When compared with Build Alternative Option 1, Build Alternative Option 2 would have the same magnitude of effects and be considered negligible when compared with the No Build Alternative. When compared with Build Alternative Options 1 or 2, Build Alternative Option 3 may have slightly reduced effects due to a smaller footprint associated with a shorter route alignment, reduced station options, and reduced third track rail infrastructure. However, the magnitude of effects would be similar for Build Alternative Option 3 and considered negligible when compared with the No Build Alternative.

OPERATION

Western Section. During operation of the Program within the Western Section of the Program Corridor, access streets around each existing station would likely be affected because of additional automobile traffic generated by patrons accessing and departing from each station. However, these existing stations are located in urbanized areas that already experience moderate to high noise levels. The additional traffic trips that could be generated around the existing stations are not anticipated to result in a perceptible change in existing noise levels on local roadways. When compared with the No Build Alternative, traffic noise effects related to roadways and vehicular traffic would be negligible within the Western Section under Build Alternative Option 1. When compared with Build Alternative Option 1, Build Alternative Options 2 and 3 would have the same magnitude of effects and be considered negligible when compared with the No Build Alternative.

Eastern Section. New train ridership resulting from implementation of any of the Build Alternative Options is anticipated to affect the number of automobile trips within the Eastern Section of the Program Corridor. For the proposed stations within the Eastern Section of the Program Corridor, catchment areas have been identified, but no specific sites have been selected. Therefore, it is not known at the Tier 1/Program evaluation phase which local streets may be impacted by operation of station facilities. It is possible that the addition of automobile trips to the existing roadway network could result in increases of noise levels along these local roadways that would require mitigation. The location of Type I roadway projects (if any) would require an analysis of traffic noise based on procedures described in the Caltrans Protocol, on a case by case basis. A detailed assessment of operational traffic impacts would be conducted during the Tier 2/Project-level analysis once site-specific rail infrastructure or station facility details are known.

When compared with the No Build Alternative, traffic noise effects related to roadways and vehicular traffic would be moderate within the Eastern Section under Build Alternative Option 1. When compared with Build Alternative Option 1, Build Alternative Option 2 would have the same magnitude of effects and be considered moderate when compared with the No Build Alternative.

When compared with Build Alternative Options 1 or 2, Build Alternative Option 3 may have slightly reduced effects due to a smaller footprint associated with a shorter route alignment, reduced station options, and reduced third track rail infrastructure. However, the magnitude of effects would be similar for Build Alternative Option 3 and considered moderate when compared with the No Build Alternative.

Vibration Effects

CONSTRUCTION

Western Section. The Build Alternative Options would not require construction of additional rail or station infrastructure in the Western Section of the Program Corridor because the existing railroad and stations from LAUS to Colton would be used. When compared with the No Build Alternative, short-term/temporary vibration effects would be negligible because no additional construction activities are planned within the Western Section under Build Alternative Options 1, 2, and 3.

Eastern Section. Construction activities required for infrastructure improvements (such as sidings, additional main line track, wayside signals, drainage, grade-separation structures) and station facilities would result in short-term increases in vibration levels in, and around, the construction site. Vibration during construction would be generated by the use of construction equipment and vehicles during soil disturbance, earthwork, and other construction activities. The vibration that could be generated would vary depending on the length of the construction period, specific construction activity (e.g., grading, paving, pile driving), types of equipment, and number of personnel. Vibration levels that would be generated from various construction equipment (e.g., bulldozers, vibratory rollers, and pile drivers) at a range of distances were modeled as part of this Tier 1/Program service-level evaluation and are provided in Appendix F of this Tier 1/Program EIS/EIR.

There are two types of construction vibration effects to consider during construction: human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly for extended periods. Fragile buildings, specifically historic structures, are generally more susceptible to damage from ground vibration than newer, less fragile buildings. The potential for moderate or substantial vibration effects during construction increases where construction activities are located adjacent to sensitive land uses.

Based on the vibration modeling conducted for this Tier 1/Program service-level evaluation, ground-borne vibration from construction activities may periodically exceed the FTA vibration criterion at residences and lodging facilities (Category 2 land uses) within 110 feet of construction areas when using typical heavy equipment. If impact equipment, such as a pile driver, is used, the FTA vibration criterion would be exceeded at up to 230 feet. Although vibration from construction equipment may be intermittently perceptible at sensitive-receptor locations, the potential for

substantial annoyance of occupants at nearby building structures is unlikely and would occur only during short intervals when equipment is operated near structures.

Depending on where construction would occur within the Eastern Section of the Program Corridor, construction activities have the potential to cause vibration-induced damage to fragile or extremely fragile buildings. This vibration-induced damage could occur if ground-borne vibration levels exceed 0.20 PPV for non-engineered timber and masonry buildings and 0.12 PPV for buildings that are extremely susceptible to vibration damage.

Based on the vibration modeling conducted for this Tier 1/Program service-level evaluation, vibration levels from operation of a vibratory roller would exceed the 0.200-PPV threshold for fragile buildings 25 feet from the building (0.210 PPV) and the 0.120-PPV threshold for extremely fragile buildings 40 feet from the building (0.125 PPV). Vibration from operation of a pile driver would exceed the 0.20-PPV threshold for fragile buildings 70 feet from the building (0.207 PPV) and the 0.120-PPV threshold for extremely fragile buildings 110 feet (0.126 PPV) from the building.

Construction of any of the Build Alternative Options would have the potential to cause temporary vibration effects. However, potential vibration effects from each construction project would be short term, occurring at a location only while construction work is in progress. In general, the degree of adverse construction effects is proportional to the length of new rail proposed to be constructed, number of grade separations, number and size of new facilities, proximity of the improvements and facilities to sensitive receptors, and the duration of construction at each site. Design specifics and locations of the rail infrastructure improvements and station facilities are not known at this time, so the vibration levels that could be generated and potential sensitive receptors that could be affected during specific construction activities cannot be quantified at the Tier 1/Program-level evaluation. Once detailed construction information for the site-specific rail infrastructure improvement or station facility is available, a detailed estimate of the vibration levels that could be generated during construction would be conducted and impacts on sensitive receptors and resources would be evaluated during the Tier 2/Project-level analysis.

When compared with the No Build Alternative, vibration effects could be moderate within the Program Corridor under Build Alternative Option 1. When compared with Build Alternative Option 1, Build Alternative Option 2 would have the same magnitude of effects and be considered moderate when compared with the No Build Alternative. When compared with Build Alternative Options 1 or 2, Build Alternative Option 3 may have slightly reduced effects due to a smaller footprint associated with a shorter route alignment, reduced station options, and reduced third track rail infrastructure. However, the magnitude of effects would be similar for Build Alternative Option 3 and considered moderate when compared with the No Build Alternative.

OPERATION

Western and Eastern Section. As summarized in Table 3.6-2, the FTA classification of vibration events under existing conditions within the Program Corridor is frequent. Operation of the Program would increase the number of average daily rail trips within the Western Section from a maximum of 86 rail trips per day to 90 rail trips per day and an increase from 43 rail trips per day to 47 rail trips per day within the Eastern Section of the Program Corridor. These increases in average daily rail trips would not result in a change in classification from frequent events (e.g., more than 70 events per day). Train speeds are not projected to increase under future conditions within the Program Corridor.

If train traffic with implementation of the Build Alternative Options would exceed the vibration criteria for frequent events and increase vibration levels by 3 VdB or more, this would result in a significant vibration impact. However, train activity with implementation of the Program would involve commuter trains, which produce vibration levels that are more than 10 dB below freight trains in terms of VdB root-mean-square values. When compared with the No Build Alternative, vibration effects would be negligible within the Western and Eastern Sections of the Program Corridor under Build Alternative Option 1. When compared with Build Alternative Option 1, Build Alternative Options 2 and 3 would have the same magnitude of effects and be considered negligible when compared with the No Build Alternative.

3.6.6 NEPA Summary of Potential Effects

Table 3.6-6 and Table 3.6-7 summarize the qualitative assessment of potential effects (negligible, moderate, or substantial) under NEPA for each of the Build Alternative Options. This service-level evaluation uses the Tier 1/Program EIS/EIR Study Area to determine the relative magnitude of potential effects associated with noise and vibration under each of the Build Alternative Options. Specific mitigation measures to reduce effects would be identified during the Tier 2/Project-level environmental process.

Table 3.6-6. NEPA Summary of Noise Effects

Alternative Options	Potential Intensity of Effect: Western Section	Potential Intensity of Effect: Eastern Section
No Build Alternative[a]	Construction: None Operation: None	Construction: None Operation: None
Build Alternative Option 1 (Coachella Terminus)	Construction: Negligible Operation: Negligible	Construction: Substantial Operation: Moderate

Alternative Options	Potential Intensity of Effect: Western Section	Potential Intensity of Effect: Eastern Section
Build Alternative Option 2 (Indio Terminus)	Construction: Negligible Operation: Negligible	Construction: Substantial Operation: Moderate
Build Alternative Option 3 (Indio Terminus with Limited Third Track)	Construction: Negligible Operation: Negligible	Construction: Substantial Operation: Moderate

Notes:

[a] The No Build Alternative, as identified, includes existing and potential expansion of roadway, passenger rail, and air travel facilities within the Tier 1/Program EIS/EIR Study Area; however, for the service-level evaluation, identifying levels of effect from potential expansion of those facilities is speculative and would be dependent on Tier 2/Project-specific analysis.

EIS/EIR=environmental impact statement/environmental impact report; NEPA=National Environmental Policy Act

Table 3.6-7. NEPA Summary of Vibration Effects

Alternative Options	Potential Intensity of Effect: Western Section	Potential Intensity of Effect: Eastern Section
No Build Alternative[a]	Construction: None Operation: None	Construction: None Operation: None
Build Alternative Option 1 (Coachella Terminus)	Construction: Negligible Operation: Negligible	Construction: Moderate Operation: Moderate
Build Alternative Option 2 (Indio Terminus)	Construction: Negligible Operation: Negligible	Construction: Moderate Operation: Moderate
Build Alternative Option 3 (Indio Terminus with Limited Third Track)	Construction: Negligible Operation: Negligible	Construction: Moderate Operation: Moderate

Notes:

[a] The No Build Alternative, as identified, includes existing and potential expansion of roadway, passenger rail, and air travel facilities within the Tier 1/Program EIS/EIR Study Area; however, for the service-level evaluation, identifying levels of effect from potential expansion of those facilities is speculative and would be dependent on Tier 2/Project-specific analysis.

EIS/EIR=environmental impact statement/environmental impact report; NEPA=National Environmental Policy Act

3.6.7 CEQA Summary of Potential Impacts

Based on the information provided in Section 3.6.4 and 3.6.5, and considering the CEQA Guidelines Appendix G Checklist questions for noise and vibration, the Build Alternative Options would have potentially significant impacts on noise and vibration when reviewed on a Program-wide basis. Placing the rail infrastructure improvements and new station facilities largely within, or along, the existing ROW reduces the potential for significant noise and vibration impacts. However, because the sites have not been selected, some adjacent noise-sensitive uses may be significantly impacted. At the Tier/Program analysis level, it is not possible to know the location, extent, and particular characteristics of impacts on these areas. Proposed programmatic mitigation strategies discussed in Section 3.6.8 would be applied to reduce potential impacts.

Table 3.6-8 summarizes the CEQA significance conclusions for the Build Alternative Options; the proposed programmatic mitigation strategies that could be applied to minimize, reduce, or avoid the potential impacts; and the significance determination after mitigation strategies are applied. The identification and implementation of additional site-specific mitigation measures necessary for Project implementation would occur as part of the Tier 2/Project-level analysis.

Table 3.6-8. CEQA Summary of Impacts for Noise and Vibration

Impact Summary	Mitigation Strategy	Significance with Mitigation Strategy
Would the Program result in generation of a substantial temporary or permanent increase in ambient noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?		
Construction		
Western Section – No Impact. No construction are anticipated at the Tier 1/Program EIS/EIR evaluation level impacts under Build Alternative Option 1, 2, or 3 because no physical improvements are proposed or required within the Western Section.	Not applicable	Not applicable
Eastern Section – Potentially Significant. Potentially significant impacts may occur at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3. Potential impacts related to a substantial, temporary increase in ambient noise levels are dependent on the location of rail infrastructure improvements, station facilities, and the type of construction activities required. Construction at a given location would be intermittent and short term for the noise-sensitive receptors adjacent to construction sites, with construction noise ceasing once construction of a project is completed. The Tier 2/Project-level analysis would identify and evaluate impacts associated with site-specific construction noise on adjacent noise-sensitive receptors.	NOI-1 NOI-2 LU-3	**Potentially Significant.** NOI-1, NOI-2, and LU-3 would minimize, reduce, or avoid potential impacts associated with construction noise through design and further analysis during the Tier 2/Project-level environmental process. However, impacts may remain significant and unavoidable as further analysis may determine that there is a temporary construction noise that cannot be mitigated between land uses.
Operation		
Western Section – Less Than Significant. The increase in train service (two additional round-trip daily trains within the Program Corridor) would not change existing land use and would not result in a change in the existing noise environment within the existing rail corridor. Therefore, no operational impacts are anticipated at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3.	Not applicable	Not applicable

Impact Summary	Mitigation Strategy	Significance with Mitigation Strategy
Eastern Section – Potentially Significant. Potentially significant impacts may occur at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3. A permanent increase in ambient noise around new rail infrastructure improvements and station facilities could occur. This increase in ambient noise may result in potentially significant impacts on adjacent noise-sensitive land uses depending on the location of sensitive receptors. The Tier 2/Project-level analysis would identify and evaluate impacts associated with noise levels increases on adjacent land uses.	NOI-2 LU-3	**Potentially Significant.** NOI-2 and LU-3 would minimize, reduce, or avoid potential impacts associated with operational noise through design and further analysis during the Tier 2/Project-level environmental process. However, impacts may remain significant and unavoidable as further analysis may determine that there is a conflict that cannot be mitigated between land uses.
Would the Program result in generation of excessive ground-borne vibration or ground-borne noise levels?		
Construction		
Western Section – No Impact. No construction impacts are anticipated at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3 because no physical improvements are proposed or required within the Western Section.	Not applicable	Not applicable
Eastern Section – Potentially Significant. Potentially significant impacts may occur at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3. Potential impacts related to excessive ground-borne vibration or noise levels are dependent on the location of rail infrastructure improvements, station facilities, and the type of construction activities. Vibration from construction equipment may be intermittently perceptible at sensitive-receptor locations. The Tier 2/Project-level analysis would identify and evaluate impacts associated with excessive ground-borne vibration or noise levels.	NOI-2	**Less than Significant.** NOI-2 would minimize, reduce, or avoid potential impacts from excessive ground-borne vibration or noise through design and further analysis during the Tier 2/Project-level environmental process.

Impact Summary	Mitigation Strategy	Significance with Mitigation Strategy
Operation		
Western Section – Less Than Significant. The increase in train service (two additional round-trip daily trains within the Program Corridor) would not change existing land use and would not result in a change in the existing noise environment within the existing rail corridor. Therefore, no operational impacts under Build Alternative Option 1, 2, or 3 are anticipated at the Tier 1/Program EIS/EIR evaluation level.	Not applicable	Not applicable
Eastern Section – Potentially Significant. Potentially significant impacts may occur at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3. Potential impacts related to excessive ground-borne vibration or noise levels are dependent on the location of rail infrastructure improvements, station facilities, and the type of operational activities. Operation of station facilities or new rail infrastructure improvements may result in a new source of vibration within a particular site. The Tier 2/Project-level analysis would identify and evaluate impacts associated with from excessive ground-borne vibration or noise levels during operation.	NOI-2	**Less than Significant.** NOI-2 would minimize, reduce, or avoid potential impacts from excessive ground-borne vibration or noise through design and further analysis during the Tier 2/Project-level environmental process.
Would the Program be located within the vicinity of a private airstrip or an airport land use plan area or, where such a plan has not been adopted, within two miles of a public airport or public use airport and expose people residing or working in the Program area to excessive noise levels?		
Construction		
Western Section – No Impact. Although the Western Section of the Program Corridor contains areas that are located within an airport land use plan, no construction impacts are anticipated at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3 because no physical improvements are proposed or required within the Western Section.	Not applicable	Not applicable

Impact Summary	Mitigation Strategy	Significance with Mitigation Strategy
Eastern Section – Potentially Significant. Potentially significant impacts may occur at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3. Potential impacts associated with consistency with airport land use compatibility plans depend on the location of rail infrastructure improvements, station facilities, and type of construction activities, which are currently unknown. Portions the Eastern Section of the Program Corridor are located within the Banning Municipal Airport, Bermuda Dunes Executive Airport, Palm Springs International Airport, and Jacqueline Cochran Regional Airport Influence Areas. A detailed analysis of the airport land use compatibility plans for these airports cannot be considered at the Tier 1/Program EIS/EIR level as the locations of infrastructure and station facilities is unknown. The Tier 2/Project-level analysis would identify conflicts with these airport land use compatibility plans.	LU-3	**Less than Significant.** LU-3 would minimize, reduce, or avoid potential impacts from conflicts with applicable airport land use consistency plans and policies through design and further analysis.
Operation		
Western Section – Less Than Significant. The Western Section of the Program Corridor contains areas that are located within an airport land use plan. However, the increase in train service (two additional round-trip daily trains within the Program Corridor) would not change existing land use and would not result in new safety hazards or excessive noise for people residing or working in the area. A less than significant impact is anticipated at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3.	Not applicable	Not applicable

Impact Summary	Mitigation Strategy	Significance with Mitigation Strategy
Eastern Section – Potentially Significant. Potentially significant impacts may occur at the Tier 1/Program EIS/EIR evaluation level under Build Alternative Option 1, 2, or 3. Potential operational impacts associated with consistency with airport land use compatibility plans depend on the location of rail infrastructure improvements and station facilities, which are currently unknown. Portions the Eastern Section of the Program Corridor are located within the Banning Municipal Airport, Bermuda Dunes Executive Airport, Palm Springs International Airport, and Jacqueline Cochran Regional Airport Influence Areas. A detailed analysis of the airport land use compatibility plans for these airports cannot be considered at the Tier 1/Program EIS/EIR level, as the locations of infrastructure and station facilities is unknown. The Tier 2/Project-level analysis would identify conflicts with these airport land use compatibility plans.	LU-3	**Less than Significant.** LU-3 would minimize, reduce, or avoid potential impacts from conflicts with applicable airport land use consistency plans and policies through design and further analysis.

Notes:

EIS/EIR=environmental impact statement/environmental impact report

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3.6.8 Avoidance, Minimization, and Mitigation Strategies

Identified below are proposed programmatic mitigation strategies for further consideration in the Tier 2/Project-level analysis. Specific mitigation measures, to the extent required, would be identified and discussed during Tier 2/Project-level analysis after design details are known and specific impacts are identified. Potential mitigation measures and design features that would avoid or minimize noise and vibration effects would be developed in consultation with the appropriate agencies with jurisdiction. Proposed programmatic mitigation strategies include, but are not limited to the following:

Mitigation Strategy NOI-1: During Tier 2/Project-level analysis, a site-specific construction noise management plan shall be prepared for the specific rail infrastructure or station facility proposed. The construction noise management plan shall include, but not be limited to, the following:

- A detailed construction schedule correlating to areas or zones of on-site Project construction activity(ies) and the anticipated equipment types and quantities involved. Information will include expected hours of actual operation per day for each type of equipment per phase and indication of anticipated concurrent construction activities on site.
- Identification of construction noise reduction methods such as shutting off idling equipment, construction of a temporary noise barrier, maximizing the distance between construction equipment staging areas and adjacent sensitive land use receptors.
- Identification of construction hours, allowable workdays, and the phone number of the job superintendent shall be clearly posted at all construction entrances to allow surrounding property owners to contact the job superintendent if necessary. In the event the municipality with jurisdiction receives a complaint, the construction noise management plan shall include guidance to ensure the appropriate corrective actions are implemented and a report of the action is provided to the reporting party. Appropriate corrective actions may include stricter enforcement of construction schedule, re-location of stationary equipment further from adjacent noise-sensitive receptors, reduction in the number of equipment working simultaneously in proximity to the sensitive receptor, erection of temporary noise barriers, or a combination of the above.

Mitigation Strategy NOI-2: During Tier 2/Project-level analysis, a site-specific noise and vibration assessment shall be prepared for the specific rail infrastructure or station facility proposed. The site-specific noise and vibration assessment shall include, but not be limited to, the following:

- Identification of adjacent noise sensitive land uses that would be impacted by construction and operation activities associated with the specific rail infrastructure or station facility.

- Identification of construction equipment required to be within 50 feet of existing structures. If construction equipment is required within 50 feet, the assessment will demonstrate that the human annoyance threshold of 78 velocity in decibels (0.032 inches per second peak particle velocity) and structural damage thresholds of 0.2 inches per second peak particle velocity for nonengineered timber and masonry buildings and 0.12 inches per second peak particle velocity for historic-age buildings that are extremely susceptible to vibration damage is achieved.
- Identification of existing noise levels at the nearest noise sensitive land uses.
- Identification of any on-site generated noise sources, including generators, mechanical equipment, and trucks and predicted noise levels at property lines from all identified equipment.
- Recommended mitigation to be implemented (e.g., enclosures, barriers, site orientation), to ensure compliance with the local jurisdiction's noise regulations or ordinances. Noise reduction measures shall include building noise-attenuating walls, reducing noise at the source by requiring quieter machinery or limiting the hours of operation, or other attenuation measures. Exact noise mitigation measures and their effectiveness shall be determined by the site-specific noise analyses.

Mitigation Strategy LU-3: During a subsequent Tier 2/Project-level analysis, a land use consistency analysis shall be conducted by the identified lead agency or agencies to determine consistency of the Tier 2/Project-level improvement being proposed with the applicable local jurisdictional general plans or programs. If the land use consistency analysis identifies sensitive land uses or environmental resources within the Tier 2/Project-level Study Area, design or siting strategies shall be identified by the lead agency or agencies to avoid or minimize conflicts with sensitive land uses or environmental resources.