Chapter 13—Noise and Vibration

13.1 Introduction

This chapter describes the existing conditions (environmental and regulatory) and assesses the potential of the 2016 Metropolitan Transportation Plan/Sustainable Communities Strategy (proposed MTP/SCS) to affect the noise and vibration environment within the MTP/SCS plan area. This chapter evaluates potential noise and vibration impacts that may result from implementation of the proposed MTP/SCS. Where necessary and feasible, mitigation measures are identified to reduce these impacts.

The information presented in this EIR chapter is based on review of existing and available information and is regional in scope. Data, analysis and findings provided in this chapter are programmatic rather than project-specific. This document is appropriate for general policy planning and to use for tiering in preparation of subsequent environmental documents; however, site-specific, project-level evaluations may be necessary to determine future project-level environmental effects and appropriate mitigation measures. Once certified, this EIR may be used to streamline CEQA compliance for those projects listed in the Preferred Scenario Project List as well as the anticipated community development shown on the proposed Draft MTP/SCS Preferred Scenario map to the extent those projects are consistent with requirements set forth in the Public Resources Code for streamlined environmental review.

No comments were received during the circulation of the Notice of Preparation for the proposed MTP/SCS Environmental Impact Report.

13.1.1 Noise Background

DESCRIBING NOISE

Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and hence are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, called hertz (Hz). Noise is often described as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel (dB) scale uses the hearing threshold of 20 micropascals as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. Another useful aspect of the decibel scale is that changes in levels correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise, levels can be approximated by weighting the frequency response of a sound-level measurement device (called a sound level meter) by means of the standardized A-weighting network. There is a strong correlation
between A-weighted sound levels (expressed as sound levels in dB) and community response to noise. For this reason, the A-weighted sound pressure level (dBA) has become the standard tool of environmental noise assessment.

Because noise is measured on a logarithmic scale, two sources of equal noise added together result in an increase of 3 dBA. For example, 70 dBA plus 70 dBA yields a total noise level of 73 dBA. An increase of 3 dBA is also notable because changes of 3dBA or more are perceptible to the human ear, while changes of less than 3 dBA are only perceptible in laboratory settings.

Figure 13.1 illustrates the typical dBA associated with common sources.

Figure 13.1 Typical A-Weighted Noise Levels

*Sources:
www.cdc.gov/noise/topics/noise/nioshnoise.html
http://a-a-r.com/hearingconservation/lag_main.cfm
Community noise is commonly described in terms of the *ambient noise level*, which is defined as the all-encompassing noise level associated with a given noise environment. It is the composite of sound from many sources in all directions with no particular sound being dominant. A common measure used to quantify the ambient noise level is the equivalent sound level (Leq), which corresponds to a steady-state sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The Leq is the foundation of the composite noise descriptors such as Ldn (described below), and shows very good correlation with community response to noise.

While transportation noise sources are evaluated relative to highest hourly average noise levels in studies prepared in accordance with state and federal noise criteria, the following two composite noise descriptors are in common use today for assessing transportation noise sources at the local level. In some jurisdictions, these composite descriptors are also used to describe non-transportation noise sources.

- **Day-Night Average Level (Ldn)**: Ldn is based upon the average hourly Leq over a 24-hour day, with a 10-decibel weighting applied to nighttime (10:00 p.m. to 7:00 a.m.) Leq values. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures.

- **Community Noise Equivalent Level (CNEL)**: CNEL, like Ldn, is based upon the weighted average hourly Leq over a 24-hour day, except that an additional 5-decibel penalty is applied to evening (7:00 p.m. to 10:00 p.m.) hourly Leq values. CNEL was developed for the California Airport Noise Regulations, and is most commonly used for airport and aircraft noise assessment. For this reason, the Ldn descriptor, rather than CNEL, is used for the assessment of transportation noise levels in the MTP/SCS plan area.

Hourly performance standards, such as Leq, Lmax, and Ln, are commonly used to assess noise from non-transportation noise sources because the noise source in question may not be present for an entire 24-hour day. As a result, using a 24-hour average composite descriptor (Ldn or CNEL) to describe noise generated for a relatively short duration can result in the underestimation of noise impacts upon sensitive receptors. As a result, the following hourly performance standards are in common use today for assessing non-transportation noise sources.

- **Equivalent Noise Level (Leq)**: Leq is the average noise level of a given period of time, typically one hour. It does not include any weighting factors.

- **Maximum Noise Level (Lmax)**: Lmax is the highest sound pressure level measured during a given interval of time, typically one hour.

- **Noise Level Exceeded a Percentage of the Hour (Ln)**: Ln represents the level exceeded “n” percent of the hour. For example, L90 represents the level, which is exceeded 90 percent of the hour, whereas L10 represents the noise level exceeded 10 percent of the hour.

Noise levels standards provided in terms of Ln are based on the duration of time during an hour in which the noise is being generated. More specifically, higher noise levels are allowed provided the noise is generated for shorter durations. While Ln-based standards provide a more accurate representation of public reaction to non-transportation noise than the use of Leq and Lmax alone,
the Ln value for a given noise source can be very complex to determine, particularly when other
noise sources are present.

**Effects of Noise on People**

Excessive noise in a community has often been cited as a health problem, not in terms of actual
damage such as hearing impairment, but in terms of inhibiting general well-being and contributing
to undue stress and annoyance. The health effects of excessive noise in the community arise from
interference with human activities such as sleep, speech, recreation, and tasks demanding
concentration or coordination. When community noise interferes with human activities or
contributes to stress, public annoyance with the noise source increases, and the acceptability of the
environment for people decreases. This decrease in acceptability and the threat to public well-being
are the basis for land-use planning policies designed to prevent exposure of communities to
excessive levels of noise.

Some land uses are considered more sensitive to ambient noise levels than others due to the
amount of noise exposure (in terms of both exposure duration and insulation from noise) and the
types of activities typically involved. Furthermore, it is important to delineate where the noise
sensitivity exists for various land uses. For example, residential uses have noise sensitivity at both
outdoor activity areas and interior spaces of the residence. School playgrounds are often noise-
generating and, therefore, not considered noise sensitive. Interior spaces of school classrooms,
however, are considered sensitive. Exterior areas of passive recreation parks are considered
sensitive, whereas sensitivity of hospitals, libraries, and auditoriums occurs within the building
(exterior areas of these uses are frequently parking lots). The noise-sensitive areas of residences,
hotels, and airports, schools, libraries, churches, hospitals, nursing homes, auditoriums, and parks
are generally more sensitive to noise than are commercial and industrial land uses. Increases in noise
near these sensitive receptors are more likely to cause an adverse community response.

**Noise Mitigation**

Any noise problem may be considered as being composed of three basic elements: the noise source,
a transmission path, and a receiver. The appropriate acoustical treatment for a given project should
consider the nature of the noise source and the sensitivity of the receiver. The problem should be
defined in terms of appropriate criteria (i.e., Ldn, Ln, Leq, or Lmax), the location of the sensitive
receiver (i.e., inside or outside), and when the problem occurs (i.e., daytime, nighttime, or 24-hour
average). Noise control techniques should then be selected to provide an acceptable noise
environment for the receiving property while remaining consistent with local aesthetic standards
and practical structural and economic limits. Fundamental noise control techniques include the
following:

**Use of Setbacks**

Noise exposure may be reduced by increasing the distance between the noise source and receiving
use. The available noise attenuation from this technique is limited by the characteristics of the noise
source, but is generally about 4.5 dB per doubling of distance from a roadway noise source, and
approximately 6 dB per doubling of distance from fixed, or non-transportation noise source.
**Use of Barriers**

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the “path length difference,” and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends upon the relative heights of the source, barrier and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path-length-difference for a given increase in barrier height than does a location closer to either source or receiver.

For maximum effectiveness, barriers must be continuous and relatively airtight along their length and height. To ensure that sound transmission through the barrier is insignificant, barrier mass should be about 3-4 lbs. per square foot, although a lesser mass may be acceptable if the barrier material provides sufficient transmission loss. Satisfaction of the above criteria requires substantial and well-fitted barrier materials, placed to intercept line of sight to all significant noise sources. Earth, in the form of berms or the face of a depressed area, is also an effective barrier material.

There are practical limits to the noise reduction provided by barriers. For traffic noise, a 5 to 10 dB noise reduction may often be reasonably attained. A 15 dB noise reduction is usually difficult but sometimes possible to attain, but a 20 dB noise reduction is extremely difficult to achieve. Barriers usually are provided in the form of walls, berms, or berm/wall combinations. The use of an earth berm in lieu of a solid wall may provide additional attenuation over that attained by a solid wall alone due to the absorption provided by the earth. Berm/wall combinations offer slightly better acoustical performance than solid walls, and are often preferred for aesthetic reasons over solid barrier walls alone.

Noise barriers currently exist or are planned in many areas of the SACOG region that are adjacent to state highways, major arterial roadways, railroad tracks, and/or industries. In cases of new residential development adjacent to a major noise source in the SACOG region, the responsibility for noise mitigation is typically placed on the project developer. In such cases, noise barriers are commonly constructed within the project confines, rather than within public right-of-way. In some cases, local jurisdictions and Caltrans have built barriers as part of roadway improvement projects or barrier retrofit programs.

**Site Design**

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise level caused by reflections. The use of one building to shield another can significantly reduce overall project noise control costs, particularly if the shielding structure is insensitive to noise. As an example, carports or garages can be used to form or complement a barrier shielding adjacent dwellings or an outdoor activity area. Similarly, one residential unit can be placed to shield another so that noise reduction measures are needed only for the building closest to the noise source. Placement of outdoor activity areas within the shielded portion of a building complex, such as a central courtyard, can be an effective method...
of providing a quiet retreat in an otherwise noisy environment. Patios or balconies should be placed on the side of a building opposite the noise source, and “wing walls” can be added to buildings or patios to help shield sensitive uses.

Another useful option in site design is the placement of relatively insensitive land uses, such as commercial uses, between the noise source and a more sensitive portion of the project. Examples include development of a commercial strip along a busy arterial to block noise affecting a residential area. If existing topography or development adjacent to the project site provides some shielding, as in the case of an existing berm, knoll, or building, sensitive structures or activity areas may be placed behind those features to reduce noise control requirements.

**Building Design**

When structures have been located to provide maximum noise reduction by site design or shielding, noise reduction measures may still be required to achieve an acceptable interior noise environment. The cost of such measures may be reduced by placement of interior dwelling unit features. For example, bedrooms, living rooms, family rooms, and other noise-sensitive portions of a dwelling can be located on the side of the unit farthest from the noise source.

Bathrooms, closets, stairwells, and food preparation areas are relatively insensitive to exterior noise sources and can be placed on the noisy side of a unit. When such techniques are employed, noise reduction requirements for the building facade can be significantly reduced, although the architect must take care to isolate the noise-impacted areas by the use of partitions or doors.

**Noise Reduction by Building Facades**

When interior noise levels are of concern in a noisy environment, noise reduction may be obtained through acoustical design of building facades. Standard residential construction practices provide 10 to 15 dB noise reduction for building facades with open windows, and approximately 25 to 30 dB noise reduction when windows are closed. Therefore, a 25 dB exterior-to-interior noise reduction can be obtained by the requirement that building design include adequate ventilation systems, allowing windows on a noise-impacted facade to remain closed under any weather condition.

Where greater noise reduction is required, acoustical treatment of the building facade is necessary. The greatest improvement in building façade noise reduction can typically be realized through specification of upgraded windows with higher Sound Transmission Class (STC) ratings.

Noise transmitted through walls can be reduced by increasing wall mass (using stucco or brick in lieu of wood siding), isolating wall members by the use of double- or staggered- stud walls, or mounting interior walls on resilient channels. Noise control for exterior doorways is provided by reducing door area, using solid-core doors, and by acoustically sealing door perimeters with suitable gaskets. Roof treatments may include the use of plywood sheathing under roofing materials.

Whichever noise control techniques are employed, it is essential that attention be given to installation of weather-stripping and caulking of joints. Openings for attic or subfloor ventilation may also require acoustical treatment, while tight-fitting fireplace dampers and glass doors may be needed in aircraft noise-impacted areas.
Use of Vegetation

Trees and other vegetation are often thought to provide significant noise attenuation. However, approximately 100 feet of dense foliage (so that no visual path extends through the foliage) is required to achieve a 5 dB attenuation of traffic noise. Therefore, the use of vegetation as a noise barrier should not be considered a practical method of noise control unless large tracts of dense foliage are part of the existing landscape.

Vegetation can be used to acoustically “soften” intervening ground between a noise source and receiver, increasing ground absorption of sound and thus increasing the attenuation of sound with distance. Planting of trees and shrubs is also of aesthetic and psychological value, and may reduce adverse public reaction to a noise source by removing the source from view, even though noise levels will be largely unaffected.

In summary, the effects of vegetation upon noise transmission are minor, and are primarily limited to increased absorption of high frequency sounds and to reducing adverse public reaction to the noise by providing aesthetic benefits.

Noise-Reducing Paving Materials (i.e. Gap Graded and Rubberized Asphalt)

Studies conducted for the Sacramento County Planning and Environmental Review Department and Transportation Department to determine the noise reduction provided by rubberized asphalt have been completed in recent years. Those studies indicate that the use of rubberized asphalt on County roadways resulted in an average traffic noise level reduction of approximately 4 dB over that provided by conventional asphalt.

13.1.2 Vibration Background

According to the Federal Transit Administration Noise and Vibration Impact Assessment Guidelines (FTA-VA-90-06), groundborne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. Groundborne vibration caused by other sources (i.e., heavy industry, construction, agriculture, mineral extraction) can also be a source of concern for nearby sensitive receptors. In contrast to airborne noise, groundborne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving and operating heavy earth-moving equipment.

The effects of groundborne vibration include perceptible movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Rumbling is the noise radiated from the motion of the room surfaces. In essence, the room surfaces act like a giant loudspeaker causing what is called groundborne noise.

Groundborne vibration is rarely annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of a building, the motion does not provoke the same adverse human reaction. In addition, the rumble noise that usually accompanies the building vibration is perceptible only inside buildings. In extreme cases, the
Vibration can cause damage to buildings. Building damage is not a factor for normal transportation projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance will typically be well below the damage threshold for normal buildings.

Vibration can be described in terms of acceleration, velocity, or displacement. An industry-standard practice is to monitor vibration measures in terms of peak particle velocities (inches/second). Table 13.1 shows expected responses to different levels of groundborne vibration.

<table>
<thead>
<tr>
<th>Response</th>
<th>Peak Vibration Threshold (in./sec. ppv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural damage to commercial structures</td>
<td>6</td>
</tr>
<tr>
<td>Structural damage to residential structures</td>
<td>2</td>
</tr>
<tr>
<td>Architectural damage to structures (cracking, etc.)</td>
<td>1</td>
</tr>
<tr>
<td>General threshold of human annoyance</td>
<td>0.1</td>
</tr>
<tr>
<td>Approximate threshold of human perception</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic, Caltrans, 1976

13.2 Environmental Setting

The noise environment in the proposed MTP/SCS plan area comprises two major categories of noise sources: transportation and non-transportation noise sources. Transportation noise sources include surface traffic on public roadways, railroad line operations, and aircrafts in flight. Non-transportation (or fixed) noise sources commonly consist of commercial, industrial, and active outdoor recreation activities, railroad yard activities, small mechanical devices (i.e., lawnmowers, leaf blowers, air conditioners, radios), and other non-transportation noise sources not included in the traffic, railroad, and aircraft category.

13.2.1 Traffic Noise

The ambient noise environment in the proposed MTP/SCS plan area is defined by a wide variety of noise sources. The most pervasive source of noise in the region is traffic noise. With thousands of miles of roadways in the region, it is difficult to escape the sound of traffic. Traffic noise exposure is mainly a function of the number of vehicles on a given roadway per day, the speed of those vehicles, the percentage of medium and heavy trucks in the traffic volume, and the receiver’s proximity to the roadway. Every vehicle passage on every roadway in the region radiates noise.

The existing traffic noise environment in the proposed MTP/SCS plan area has been characterized by using traffic noise modeling. The Federal Highway Administration Traffic Noise Model (TNM) Version 2.5 and daily traffic volumes on major roadways in the proposed MTP/SCS plan area were used to calculate the traffic noise level at a fixed distance of 150 feet from each roadway. SACOG performed noise analyses on nearly 625 roadway locations throughout the proposed MTP/SCS plan area. The results indicated that noise levels in the proposed MTP/SCS region vary between 37 dBA and 83 dBA, depending on the location.
13.2.2 Rail Noise

The region is affected by noise from freight and passenger railroad operations and light-rail train operations. While these operations generate significant noise levels in the immediate vicinity of the railroad tracks during train passages, these operations are intermittent and the tracks are widely dispersed throughout the region. For these reasons, the contribution of railroad noise to the overall ambient noise environment in the SACOG region is relatively minor.

While it is difficult to predict increases in future rail activity in the region, an expansion of the Amtrak Capitol Corridor service has been proposed, which could potentially affect the noise environment along the Union Pacific Rail Road (UPRR) tracks between Fairfield and Auburn. The expansion would increase existing Capitol Corridor service from 15 daily operations to approximately 20 daily trips. In addition to increased passenger rail activity, Valero Refining Company officials anticipate shipping two 50-car oil trains a day through Sacramento, starting in 2015. Relative to existing levels of passenger and heavy rail activity in the region, the two additional oil trains per day would not appreciably affect existing railroad noise levels. For more information on the transport of crude oil, see Chapter 10 – Hazards and Hazardous Materials.

The specific increase in rail noise depends on the level of current activity on the tracks, which would be utilized by the additional trains, and the time of day those additional train operations would occur. For a track with 20 daily freight trains, for example, the two additional oil trains would result in an increase of 0.4 dB Ldn.

Future high-speed rail activity within the SACOG region will result in increased railroad noise levels at locations in proximity to the high-speed rail tracks. Although studies of high-speed rail impacts have not been completed for the SACOG region, Figure 7 of the California High-Speed Train Project EIR/EIS for the Merced to Fresno Section indicates that high-speed train noise could exceed normally acceptable noise levels for new residential uses (60 dB Ldn) at locations exceeding 1,000 feet from the tracks. The specific impacts on the ambient noise environments within the SACOG region will depend upon many variables and will require additional analysis.

13.2.3 Aircraft Noise

The SACOG region is home to many airports, including public, private, and military airports. In addition to the numerous daily aircraft operations that originate and terminate at these airports, aircrafts not using the regional airports also frequently fly over the region. All of these operations contribute in some degree to the overall ambient noise environment in the proposed MTP/SCS plan area. The intensity of aircraft noise exposure depends on one’s proximity to the aircraft flight path; the type, speed, and altitude of the airplane; and atmospheric conditions. The farther away the noise source, the more weather affects the sound propagation from source to receiver.

A map of airport noise contours provided in terms of Community Noise Equivalent Level (CNEL) is shown in Figure 13.2. Because noise levels described in terms of CNEL contain penalties for sound levels occurring during evening hours (5 dB penalty) and sound generated during nighttime hours (10 dB penalty), the CNEL contours reflect the greater sensitivity to noise during those evening and nighttime hours. For more information about airports in the region, see Chapter 10 – Hazards and Hazardous Materials.
Figure 13.2 Airport Noise Contours

MTP/SCS Community Types
- Center/Corridor Community
- Developing Community
- Established Community
- Rural Residential Community
- Lands not Identified for Development in the MTP/SCS Planning Period

Airpport Noise Contours
County Boundaries
Water Features
SACOG Planning Area

Sacramento Area Council of Governments
Noise – Page 13-10
13.2.4 Construction Noise

New development within the SACOG region will result in construction activities that create new sources of short-term noise. Construction typically occurs in discrete steps, each of which has a distinctive mix of equipment and, consequently, distinctive noise characteristics. These various sequential phases change the character of the noise generated on each site and, therefore, the noise levels surrounding these sites as construction progresses. Construction activities typically involve several vehicles and equipment operating at various times within a fixed area. Construction noise sources can be both stationary and mobile. Table 13.2 lists typical construction noise levels for various types of construction equipment.

13.2.1 Industry and Other Non-Transportation Noise

A wide variety of industrial and other non-transportation noise sources are located in the proposed MTP/SCS plan area, including manufacturing operations, power plants, food packaging and processing facilities, lumber mills, aggregate mining and processing plants, race tracks, shooting ranges, amphitheaters, loading docks and car washes. Noise generated by these sources varies widely, but in some cases can be a potentially significant contributor to the local ambient noise environment. Although non-transportation noise sources can define the ambient noise environment within a given distance to the noise source, the overall ambient noise environment is, nonetheless, defined primarily by traffic. This is because traffic noise is pervasive throughout the SACOG region, whereas noise generated by an individual industry would only affect a localized area in the immediate vicinity of the industrial noise source.

Non-transportation noise levels are difficult to quantify at the regional level, as noise levels can vary dramatically from location to location, even in the same Community Type. The types of land uses, the distance between noise sources, and the presence or absence of barriers can all greatly affect noise levels in a given area. Typically, ambient noise levels in a quiet residential area with light background traffic noise will range from 50 dBA to 60 dBA. In busy central business districts and mixed-use areas, ambient noise levels in the range of 60 to 70+ dBA are not uncommon. However, higher noise levels in mixed-use areas are becoming more acceptable as cities and counties strive to provide housing options in closer proximity to busy urban centers. At locations near freeways, ambient noise levels can reach 75 dBA or higher. Similarly, industrial activity also has a widely varying range of noise outputs, depending on the type of activity taking place and whether the activity is indoors or outdoors.
Table 13.2
Typical Construction Equipment Noise

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>Maximum Noise Level at 50 feet, dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auger drill rig</td>
<td>85</td>
</tr>
<tr>
<td>Backhoe</td>
<td>80</td>
</tr>
<tr>
<td>Bar bender</td>
<td>80</td>
</tr>
<tr>
<td>Blasting</td>
<td>94</td>
</tr>
<tr>
<td>Boring jack power unit</td>
<td>80</td>
</tr>
<tr>
<td>Chain saw</td>
<td>85</td>
</tr>
<tr>
<td>Clam shovel</td>
<td>93</td>
</tr>
<tr>
<td>Compactor (ground)</td>
<td>80</td>
</tr>
<tr>
<td>Compressor (air)</td>
<td>80</td>
</tr>
<tr>
<td>Concrete batch plant</td>
<td>83</td>
</tr>
<tr>
<td>Concrete mixer truck</td>
<td>85</td>
</tr>
<tr>
<td>Concrete pump truck</td>
<td>82</td>
</tr>
<tr>
<td>Concrete saw</td>
<td>90</td>
</tr>
<tr>
<td>Crane (mobile or stationary)</td>
<td>85</td>
</tr>
<tr>
<td>Dozer</td>
<td>85</td>
</tr>
<tr>
<td>Dump truck</td>
<td>84</td>
</tr>
<tr>
<td>Excavator</td>
<td>85</td>
</tr>
<tr>
<td>Flat bed truck</td>
<td>84</td>
</tr>
<tr>
<td>Front end loader</td>
<td>80</td>
</tr>
<tr>
<td>Generator (25 kilovolt-amperes [kVA] or less)</td>
<td>70</td>
</tr>
<tr>
<td>Generator (more than 25 kVA)</td>
<td>82</td>
</tr>
<tr>
<td>Grader</td>
<td>85</td>
</tr>
<tr>
<td>Hydra break ram</td>
<td>90</td>
</tr>
<tr>
<td>Impact pile driver (diesel or drop)</td>
<td>95</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>85</td>
</tr>
<tr>
<td>Mounted impact hammer (hoe ram)</td>
<td>90</td>
</tr>
<tr>
<td>Paver</td>
<td>85</td>
</tr>
<tr>
<td>Pickup truck</td>
<td>55</td>
</tr>
<tr>
<td>Pneumatic tools</td>
<td>85</td>
</tr>
<tr>
<td>Pumps</td>
<td>77</td>
</tr>
<tr>
<td>Rock drill</td>
<td>85</td>
</tr>
<tr>
<td>Scraper</td>
<td>85</td>
</tr>
<tr>
<td>Soil mix drill rig</td>
<td>80</td>
</tr>
<tr>
<td>Tractor</td>
<td>84</td>
</tr>
<tr>
<td>Vacuum street sweeper</td>
<td>80</td>
</tr>
<tr>
<td>Vibratory concrete mixer</td>
<td>80</td>
</tr>
<tr>
<td>Vibratory pile driver</td>
<td>95</td>
</tr>
<tr>
<td>Welder/Torch</td>
<td>73</td>
</tr>
</tbody>
</table>

Source: Federal Highway Administration, 2006
13.3 Regulatory Setting

13.3.1 Federal Regulations

**The Federal Aviation Act of 1958 – Federal Aviation Administration (FAA)**

The FAA, which was created under the Federal Aviation Act, has authority to regulate and oversee all aspects of American civil aviation. Originally called the Federal Aviation Agency, FAA adopted its current name in 1966 when it became a part of the U.S. Department of Transportation.

The FAA pursues a program of aircraft noise control in cooperation with the aviation community. Noise control measures include noise reduction at the source, i.e., development and adoption of quieter aircraft, soundproofing and buyouts of buildings near airports, operational flight control measures, and land use planning strategies. The FAA defines significant aircraft noise exposure as being 65 dB Ldn (DNL).

**Urban Mass Transportation Act of 1964 – Federal Transit Administration (FTA)**

The FTA is an agency within the United States Department of Transportation (DOT) that was established by the Urban Mass Transportation Act, which created the Urban Mass Transportation Administration. The agency was charged with providing federal assistance for mass transit projects and renamed the FTA in 1991.

FTA procedures for the evaluation of noise from transit projects are specified in the document titled, “Transit Noise and Vibration Impact Assessment” (Federal Transit Administration, 2006). The FTA Noise Impact Criteria categorizes noise-sensitive land uses into the following categories:

- Category 1 includes buildings or parks where quiet is an essential element of their purpose.
- Category 2 includes residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- Category 3 includes institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches, and active parks.

Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise-sensitive land uses, such as outdoor amphitheaters and school buildings (Categories 1 and 3), the maximum 1-hour Leq during the facility’s operating period is used. Noise impacts are identified based on absolute predicted noise levels and increases in noise associated with the project.
Table 13.3
Activity Categories and Noise Abatement Criteria

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Activity L_{eq}[h]^1</th>
<th>Evaluation Location</th>
<th>Description of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57</td>
<td>Exterior</td>
<td>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.</td>
</tr>
<tr>
<td>C^2</td>
<td>67</td>
<td>Exterior</td>
<td>Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.</td>
</tr>
<tr>
<td>D</td>
<td>52</td>
<td>Interior</td>
<td>Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.</td>
</tr>
<tr>
<td>E</td>
<td>72</td>
<td>Exterior</td>
<td>Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A–D or F.</td>
</tr>
<tr>
<td>F</td>
<td>--</td>
<td>--</td>
<td>Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (i.e., water resources, water treatment, electrical), and warehousing.</td>
</tr>
<tr>
<td>G</td>
<td>--</td>
<td>--</td>
<td>Undeveloped lands that are not permitted.</td>
</tr>
</tbody>
</table>

^1 The L_{eq}(h) activity criteria values are for impact determination only and are not design standards for noise abatement measures. All values are A-weighted decibels (dBA).

^2 Includes undeveloped lands permitted for this activity category.

Source: 23 Code of Federal Regulations 772

DEPARTMENT OF TRANSPORTATION ACT OF 1966 – FEDERAL RAILROAD ADMINISTRATION (FRA)

The FRA was created by the Department of Transportation Act to promulgate and enforce rail safety regulations, administer railroad assistance programs, conduct research and development in support of improved railroad safety and national rail transportation policy, and consolidate government support of rail transportation activities. FRA noise standards are the same as those specified by the FTA.

FEDERAL HIGHWAY ADMINISTRATION (FHWA), 1966

FHWA regulations (23 Code Fed. Regs., § 772) specify procedures for evaluating noise impacts associated with federally-funded highway projects and for determining whether these impacts are sufficient to justify funding noise abatement actions. The FHWA noise abatement criteria are based on worst hourly Leq sound levels, not Ldn or CNEL values. The worst-hour one-hour Leq noise abatement criteria are listed in Table 13.3 above.
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1969 – U.S. ENVIRONMENTAL PROTECTION AGENCY (US EPA)

NEPA (42 U.S. Code, §§ 4321-4347), which was passed in 1969, created a Council on Environmental Quality (CEQ) in the Executive Office of the President. An executive reorganization in 1970 moved CEQ responsibilities to the newly established US EPA.

In 1974, in response to the requirements of the federal Noise Control Act, the US EPA identified indoor and outdoor noise limits to protect public health and welfare (communication disruption, sleep disturbance, and hearing damage). Outdoor Ldn limits of 55 dBA and indoor Ldn limits of 45 dBA are identified as desirable to protect against speech interference and sleep disturbance for residential, educational, and healthcare areas. Sound-level criteria to protect against hearing damage in commercial and industrial areas are identified as 24-hour Leq values of 70 dBA (both outdoors and indoors).

NOISE CONTROL ACT OF 1972

The federal Noise Control Act of 1972 (42 U.S. Code, § 4901 note) established a requirement that all federal agencies administer their programs to promote an environment free of noise that would jeopardize public health or welfare. The US EPA was given the responsibility for:

- providing information to the public regarding identifiable effects of noise on public health and welfare;
- publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety;
- coordinating federal research and activities related to noise control; and
- establishing federal noise emission standards for selected products distributed in interstate commerce.

The Noise Control Act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations. Although the US EPA was given a major role in disseminating information to the public and coordinating with other federal agencies, each federal agency retains authority to adopt noise regulations pertaining to agency programs. The EPA can, however, require other federal agencies, such as those listed below, to justify their noise regulations in terms of Noise Control Act policy requirements.

- The FHWA is responsible for noise standards for federally-funded highway projects.
- The FTA is responsible for noise standards for federally-funded transit projects.
- The FRA is responsible for noise standards for federally-funded rail projects.

13.3.2 State Regulations

TITLE 24, CALIFORNIA CODE OF REGULATIONS – CALIFORNIA NOISE INSULATION STANDARDS

Part 2, Title 24, of the California Code of Regulations, “California Noise Insulation Standards,” establishes minimum noise insulation standards to protect persons within new hotels, motels,
dormitories, long-term care facilities, apartment houses, and dwellings other than single-family residences. Under this regulation, interior noise levels attributable to exterior noise sources cannot exceed 45 Ldn in any habitable room. Where such residences are located in an environment where exterior noise is 60 Ldn or greater, an acoustical analysis is required to ensure that interior levels do not exceed the 45 Ldn interior standard.

**STATE OF CALIFORNIA GENERAL PLAN GUIDELINES, 2003**

The State of California General Plan Guidelines (California Governor's Office of Planning and Research, 2003) provide the State’s recommendations for city and county general plan noise elements. The guidelines include a sound level and land-use compatibility chart that categorizes by land use, outdoor Ldn ranges in up to four categories (i.e., normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable). Compliance by the cities and counties is not required, but nonetheless many general plan noise elements are based on these guidelines. These guidelines are not applicable to SACOG or projects without a city or county sponsor.

The noise element guidelines identify the normally acceptable range for low-density residential uses as less than 60 dBA, and the conditionally acceptable range as 55 to 70 dBA. The normally acceptable range for high-density residential uses is identified as Ldn values below 65 dBA, and the conditionally acceptable range is identified as 60 to 70 dBA. For educational and medical facilities, Ldn values below 70 dBA are considered normally acceptable, and Ldn values of 60 to 70 dBA are considered conditionally acceptable. For office and commercial land uses, Ldn values below 70 dBA are considered normally acceptable, and Ldn values of 67.5 to 77.5 are categorized as conditionally acceptable.

These overlapping Ldn ranges are intended to indicate that local conditions (existing sound levels and community attitudes toward dominant sound sources) should be considered in evaluating land-use compatibility at specific locations. Because of the variation in noise environments and land use patterns within the SACOG region, city and county general plan noise elements often provide some flexibility for interpretation. For example, although a general plan may not include a specific category for mixed-use developments, the lead agency may choose to focus on achieving compliance with only the interior noise standards of residences constructed within mixed-use projects. This approach properly deals with the noise-sensitivity within the residence, but recognizes that more elevated exterior noise environments are typically encountered within urban environments where mixed-use projects tend to be located.

**CALIFORNIA DEPARTMENT OF TRANSPORTATION TRAFFIC NOISE ANALYSIS PROTOCOL, JULY 2011**

The California Department of Transportation (Caltrans) Traffic Noise Analysis Protocol (Protocol) specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction projects. The noise abatement criteria specified in the Protocol are the same as those specified in 23 Code of Federal Regulations Section 772. The Protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA. The Protocol also states that a sound level is considered to approach a Noise Abatement Criteria (NAC) level when the sound level is within 1 dBA of the NAC identified in 23 Code of Federal Regulations Section 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).
13.3.3 Local Regulations

Each of the six counties and 22 cities in the proposed MTP/SCS plan area has its own general plan noise element. Some jurisdictions also have noise ordinances. The noise element and local noise ordinances are the two primary documents that local jurisdictions use to set noise standards in their community.

GENERAL PLANS

California Government Code Section 65300 requires that each planning agency shall prepare and the legislative body of each county and city shall adopt a comprehensive, long-term General Plan for the physical development of the county or city, and of any land outside its boundaries, which in the planning agency's judgment bears relation to its planning.

Government Code Section 65302(f) states that a noise element shall identify and appraise noise problems in the community. The noise element shall recognize the guidelines established by the Office of Noise Control in the State Department of Health Services and shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

- Highways and freeways;
- Primary arterials and major local streets;
- Passenger and freight on-line railroad operations and ground rapid transit systems;
- Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation;
- Local industrial plants, including, but not limited to, railroad classification yards; and
- Other ground stationary sources identified by local agencies as contributing to the community noise environment.

A noise element is a required component of each jurisdiction’s general plan. The noise element provides information on the current and future noise levels associated with local noise sources such as freeways and freeways, major streets and arterials, rail operations, aviation activities, and local industrial plants. The noise element also includes planning policies and implementation measures for limiting the exposure of people to noise.

The noise elements of the cities and counties located within the proposed MTP/SCS plan area typically apply land-use compatibility criteria of 60 to 65 dBA Ldn as being normally acceptable for new residential developments affected by transportation noise sources. The intent of these standards is to provide an acceptable noise environment for outdoor activities. In addition, an interior noise level criterion of 45 dBA Ldn is commonly applied to residential land uses. The intent of this standard is to provide a suitable environment for indoor communication and sleep.

Typical options for mitigation of excessive noise levels include the use of setbacks or buffer areas between the noise source and the proposed noise-sensitive land use, noise barriers, residential unit design, and improvements to building façade construction. Neither audibility of a new noise source
nor an increase in noise levels within recognized acceptable limits is usually considered to be a significant noise impact, but these concerns should be addressed and considered in the planning and environmental review processes.

Where projects affected by, or including, non-transportation noise sources are proposed, the performance standards of the various city and county general plans or noise ordinances typically define acceptable noise exposure. For noise generated by new non-transportation noise sources, or noise-sensitive projects affected by non-transportation noise sources, hourly performance standards contained in general plan noise elements are commonly, but not universally, used within the SACOG region. In cases where hourly performance standards are used they vary numerically and in terms of the specific noise metric used to evaluate non-transportation noise sources: Examples of General Plan non-transportation noise metrics used in the SACOG counties are as follows:

- El Dorado County: Leq & Lmax
- Placer County: Ldn
- Sacramento County: L50 & Lmax
- Sutter County: Leq & Lmax
- Yolo County: Ldn or CNEL
- Yuba County: Unspecified

Community Noise Control Ordinances

For the evaluation of potential noise impacts due to or upon new projects, the noise standards contained within city and county general plans are applied. To abate noise and resolve noise-related disputes between existing land uses, many jurisdictions have adopted community noise-control ordinances.

Community noise-control ordinances are generally designed to resolve noise problems on a short-term basis (usually by means of hourly noise-level criteria), rather than on the basis of 24-hour or annual cumulative noise exposures.

Regulation of noise emitted from traffic on public roadways, railroad operations, or aircraft in flight occurs at the federal level. While vehicle noise regulations are established at the federal level, there are a number of these regulations that can be enforced by local authorities through state law requirements, including Sections 23130, 23130.5, 27150, 27151 and 38275 of the California Vehicle Code (OPR General Plan Guidelines, Appendix C, page 249).

13.4 Impacts and Mitigation Measures

13.4.1 Methods and Assumptions

This impacts analysis considers each significance criterion individually, assessing how implementation of the proposed MTP/SCS, including changes to the land use pattern and transportation network, may impact the noise environment. For each impact, implementation of the proposed MTP/SCS is assessed on three levels: regional, Community Type (i.e., Center and Corridor Communities, Established Communities, Developing Communities, Rural Residential
Communities, and Lands Not Identified for Development in the proposed MTP/SCS), and Transit Priority Areas (TPAs; areas of the region that are within one-half mile of a major transit stop or high-quality transit corridor). For a full description of Community Types and TPAs in the region, refer to Chapter 2 – Project Description.

For each of the three levels of analysis (regional, Community Type, and Transit Priority Areas), impacts are assessed in terms of both the land use pattern and the transportation network. By 2036, implementation of the proposed MTP/SCS will result in a land use pattern and transportation network that is different from existing conditions. Unless otherwise stated, “existing conditions” in the proposed MTP/SCS refers to conditions in the baseline year of 2012. The proposed MTP/SCS uses 2012 because it is the most recent year for which comprehensive land use, demographic, traffic count, and VMT data are available for the SACOG region. Chapter 1 – Introduction includes a more detailed discussion of the baseline for the proposed MTP/SCS.

The noise environment in 2014 is not demonstrably different from conditions in 2012, as there has been only limited regional growth due to the economic slowdown. Traffic levels, if anything, are likely lower in 2014 than in 2012, but are expected to recover to and then exceed 2012 baseline conditions, as the economic recovery progresses.

For this noise analysis, the FHWA Traffic Noise Model TNM 2.5 and traffic data developed by SACOG for major roadways in the area were used to calculate the Ldn values associated with approximately 625 roadway segments within the proposed MTP/SCS plan area. These roadway segments do not include every single potential roadway noise source in the region; rather, they constitute a representative sample of typical roadway noise sources seen throughout the proposed MTP/SCS plan area. Locations where noise analyses were performed are displayed in Figure 13.3.

The noise analysis identifies the noise impact of the project by comparing predicted traffic noise levels under the proposed MTP/SCS to the 2012 baseline condition. For purposes of these comparisons, all values are calculated at a fixed distance of 150 feet from each roadway centerline. The evaluation does not take into account whether there are sensitive receptors located adjacent to the freeways and arterials but evaluates all roadways equally, as if all areas contain sensitive receptors.

The initial noise predictions do not account for existing sound barriers (i.e., soundwalls, berms). Therefore, for roadways that do have existing sound barriers, actual noise levels will be lower at sensitive receptor locations, which are shielded by such barriers. In addition, certain types of transportation projects, (e.g., road widenings, HOV lanes, transition lanes, road extensions, new interchanges) will require project-specific noise analyses. In locations where such a transportation project is proposed as part of the proposed MTP/SCS, it is possible that noise impacts will be mitigated as part of the individual project and that noise barriers may be identified as a mitigation option. However, because SACOG cannot require lead agencies to implement mitigation, it is not guaranteed that such mitigation will be implemented. Finally, in other locations where no specific project is included in the proposed MTP/SCS, but where a “lump sum” quantity included in the proposed MTP/SCS would fund re-pavement or re-construction of roadways, opportunities for repaving with rubberized asphalt or “quiet pavement” exist which could mitigate noise impacts in other, unknown locations. Due to these uncertainties, this analysis does not apply offsets to the predicted existing or future traffic noise levels to account for either noise barriers or noise-reducing pavement.
In order to analyze the noise effects of implementation of the proposed MTP/SCS, SACOG developed noise thresholds for each Community Type. These thresholds are shown in Table 13.4. The thresholds were developed based on the California General Plan Guidelines (discussed above in the regulatory setting) and local jurisdiction general plan thresholds. Because the California General Plan Guidelines are suburban in nature, SACOG used the high end of the guidelines for Center and Corridor Communities and Established Communities, the middle of the range for Developing Communities, and the low end of the range for Rural Residential Communities. Lands Not Identified for Development in the proposed MTP/SCS, are not necessarily either noise-sensitive or noise-generating, and a “neutral” noise standard was applied accordingly. SACOG’s thresholds are comparable to other urban jurisdictions in the region, including the city of Sacramento.

### 13.4.2 Criteria for Determining Significance

For the purposes of this EIR, SACOG has determined that adoption and/or implementation of the proposed MTP/SCS (including adoption of the MTP policies, adoption of the SCS, and adoption of the transportation project list and financing plan) would result in significant impacts under CEQA, if any of the following would occur:

1. Result in noise levels that exceed the Community Type Ldn thresholds identified in Table 13.4 and increase noise levels more than 1.5 dB for Center and Corridor Communities or more than 3 dBA over baseline conditions for the other Community Types.
2. Result in excessive vibration and groundborne noise.
3. Result in construction impacts that would increase noise levels above the Community Type Ldn thresholds identified in Table 13.4, result in increases of more than 1.5 dB for Center and Corridor Communities or more than 3 dBA over baseline conditions for the other Community Types; or result in excessive levels of vibration and groundborne noise.

<table>
<thead>
<tr>
<th>Table 13.4</th>
<th>Noise Thresholds by Community Type (Ldn)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geography</strong></td>
<td><strong>Noise Threshold</strong></td>
</tr>
<tr>
<td>Region</td>
<td>NA¹</td>
</tr>
<tr>
<td>Center and Corridor Communities</td>
<td>75 dBA</td>
</tr>
<tr>
<td>Established Communities</td>
<td>65 dBA</td>
</tr>
<tr>
<td>Developing Communities</td>
<td>60 dBA</td>
</tr>
<tr>
<td>Rural Residential Communities</td>
<td>55 dBA</td>
</tr>
<tr>
<td>Lands Not Identified for Development</td>
<td>60 dBA</td>
</tr>
</tbody>
</table>

¹ Noise impacts are experience at the localized level. Therefore, one regional noise threshold cannot reflect the varied noise environments found in the proposed MTP/SCS plan area.

Note: Because transit priority areas (TPAs) may overlap multiple Community Types, each roadway segment in a TPA was analyzed according to the noise threshold for the Community Type in which it is located.

Source: SACOG, 2015

The use of a 1.5 dB threshold of significance for traffic noise level increases affecting Center and Corridor Communities is based on recommendations made by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels. The FICON recommendations are based upon studies that relate noise exposure to the percentage of persons highly annoyed by noise.
According to the FICON research, as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause annoyance. Therefore, while a 3 dB threshold of significance is applied to noise level increases affecting Established, Developing and Rural Residential Communities, and Lands not Identified for Development, a 1.5 dB threshold is applied to Center and Corridor Communities where higher ambient noise levels can be expected.

13.4.3 Impacts and Mitigation Measures

**IMPACT NOI-1: RESULT IN NOISE LEVELS THAT EXCEED THE COMMUNITY TYPE LDN THRESHOLDS IDENTIFIED IN TABLE 13.4 AND INCREASE NOISE LEVELS MORE THAN 1.5 DB FOR CENTER AND CORRIDOR COMMUNITIES OR MORE THAN 3 DBA OVER BASELINE CONDITIONS FOR THE OTHER COMMUNITY TYPES.**

Regional Impacts

A summary of land use and transportation changes as a result of the proposed MTP/SCS, including by Community Type and TPAs, is provided in Chapter 2 – Project Description.

As noted in Table 13.4 there is no numeric regional noise threshold. Different types of land uses necessarily have different noise environments. For example, urban environments tend to be louder than suburban environments because urban environments typically have a wide variety of uses located in close proximity to one another. Suburban environments, where land uses are often more segregated, have more moderate noise levels. Agricultural areas also have a unique noise environment. Agricultural machinery and operations can often produce noise levels that are quite high. However, because agricultural areas are sparsely populated, noise generally does not impact surrounding land uses.

Of the 625 transportation segments analyzed, 61 segments exceeded the noise thresholds in Table 13.4 and increased noise levels over baseline conditions by a significant level. These segments are summarized in Table 13.5. However, as explained above, different noise environments will experience transportation noise in different ways. Because of the nature of noise impacts (noise dissipates with distance from the source), new transportation operations will have noise impacts, and those impacts may exceed applicable noise thresholds for determining significance, but such potentially significant noise impacts will be confined to specific geographies and therefore cannot be evaluated from a regional perspective.
Number of Locations with Potentially Significant Transportation Noise Impacts Resulting from Implementation of the Proposed MTP/SCS

<table>
<thead>
<tr>
<th>Geography</th>
<th>Potentially Significant Locations Pre-Mitigation</th>
<th>Locations Potentially Mitigated to LS</th>
<th>Total Locations Analyzed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Locations with Soundwall Alone¹</td>
<td>Locations with MTP Project² Alone</td>
<td>Locations with Soundwall and MTP Project</td>
</tr>
<tr>
<td>Center and Corridor Communities</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>in Placer TPAs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>in Sacramento TPAs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>in Yolo TPAs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Established Communities</td>
<td>26</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>in Placer TPAs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>in Sacramento TPAs</td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>in Yolo TPAs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Developing Communities</td>
<td>13</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>in Sacramento TPAs</td>
<td>1</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Rural Residential Communities</td>
<td>22</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td>61</td>
<td>625</td>
<td></td>
</tr>
</tbody>
</table>

¹ Noise reduction provided by barriers was not included in the noise predictions. Therefore, in locations where an existing noise barrier is in place, actual noise levels will be lower. If those lower noise levels reduces the location to a less than significant level, the location could be included as a location potentially mitigated to LS. If the shielding by barriers does not reduce the location to a less than significant level, the location would remain potentially significant.

² Certain types of transportation projects, (e.g., road widenings, HOV lanes, transition lanes, road extensions, new interchanges) may require project-specific noise analyses. In locations where such a transportation project is proposed as part of the proposed MTP/SCS, it is possible that noise impacts will be mitigated as part of the individual project. However, because SACOG cannot require implementing agencies to implement mitigation, it is not guaranteed that these locations will be reduced to less than significant levels.

Source: SACOG, 2015

Localized Impacts

Center and Corridor Communities
Noise is an inevitable part of urban living. Urban areas experience noise from any number of sources associated with living in proximity to other people and among different land uses. Typical community noise sources include small mechanical devices (e.g., lawn mowers, leaf blowers), parks and playgrounds, restaurants and bars, commercial uses, and industrial plants. Traffic and transportation-related noise is also a dominant noise source in this Community Type. Center and Corridor Communities already experience higher levels of noise than the other Community Types, and noise is an expected part of life in this Community Type.

Therefore, noise impacts related to land use changes from implementation of the proposed MTP/SCS in Center and Corridor Communities are considered less than significant (LS) for Impact NOI-1. No mitigation is required.

Implementation of the proposed MTP/SCS is likely to increase the amount of noise experienced in Center and Corridor Communities because of the increased density in these areas. However, Table
13.5 shows that the increase would be less than significant on each of the 140 roadway segments analyzed within the roadway segments identified as being within Center and Corridor Communities.

Heavy rail improvements will increase the number of passenger and freight trains in the region. Because of the high number of existing passenger and freight trains that use the existing heavy rail tracks, and because a doubling of rail activity would be required before a 3 dB increase in noise would result, additional trains are not expected to increase daily noise (Ldn) along any given track by more than 3 dBA relative to baseline conditions. It is unknown if future increases in rail activity would result in an increase of 1.5 dB within Center and Corridor Communities.

Light rail improvements will include improvements to existing corridors and the addition of new corridors. In general, the proposed transit improvements along existing corridors will occur in developed urban areas where noise levels are already high from existing transportation systems. Because improvements along existing corridors would not double the number of daily trains along the corridors, these improvements are not expected to increase daily noise (Ldn) along these corridors by more than 1.5 dBA relative to baseline conditions. However, in areas that do not currently have light rail operations, implementation of the proposed MTP/SCS could increase noise levels above 75 dBA Ldn and increase daily noise (Ldn) by more than 1.5 dB relative to baseline conditions for Center and Corridor Communities.

Therefore, the potential noise impacts as a result of increased heavy and light rail traffic in new areas related to transportation improvements from implementation of the proposed MTP/SCS in Center and Corridor Communities are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.

Established Communities
Similar to Center and Corridor Communities, Established Communities already have a significant amount of urban development, but these areas are generally not as dense as Center and Corridor Communities and will actually have their proportional share of regional housing decrease from 2012 to 2036. While Established Communities will add population, housing, and employment, the growth rate will be relatively modest when compared to Center and Corridor Communities and Developing Communities, which have much higher rates of growth.

Although not as dense or loud as Center and Corridor Communities, Established Communities already experience a significant amount of noise from urban uses. Typical community noise sources include small mechanical devices (e.g., lawn mowers, leaf blowers), parks and playgrounds, restaurants and bars, commercial uses, and industrial plants. Traffic and transportation-related noise is also a dominant noise source in this Community Type. Noise is an expected part of urban life in this Community Type. Implementation of the proposed MTP/SCS is likely to increase the amount of noise experienced in Established Communities because of the increased density in these areas. Although the rate of growth is not as fast as in Center and Corridor Communities and Developing Communities, Established Communities will still add over one quarter of a million people by 2036. This growth has the potential to increase noise levels above 65 dBA Ldn and increases in noise levels of more than 3 dBA over baseline conditions.

Therefore, the noise impacts related to land use changes from implementation of the proposed MTP/SCS in Established Communities are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.
As with Center and Corridor Communities, Established Communities will see a variety of transportation improvements by 2036 that will increase the amount of noise in the region, including new HOV lanes, auxiliary lanes, roadway widenings, bicycle and pedestrian infrastructure improvements, transit facilities, increased transit service, and roadway maintenance and rehabilitation projects. As noted in Table 13.5 above, implementation of the proposed MTP/SCS will result in 26 Established Community roadway segments that increase noise levels to potentially significant levels. However, as explained in the methods and assumptions section above, after consideration of locations where noise barriers are currently located, or where soundwalls may be located in the future as a result of proposed MTP/SCS projects, impacts along some segments may be reduced to less than significant levels. After these considerations, noise impacts would remain significant on at least two roadway segments. More detail on these locations is given in Table 13.6.

Heavy rail improvements will increase the number of passenger and freight trains in the region. Because of the number of existing passenger and freight trains that use the existing heavy rail tracks, additional trains are not expected to increase daily noise (Ldn) along any given track by more than 3 dBA relative to baseline conditions. Light rail improvements will include increasing frequency on and making improvements to existing corridors and adding new corridors. In general, the proposed transit improvements along existing corridors will occur in developed urban areas where noise levels are already high from existing sources.

Because improvements along existing corridors would not double the number of daily trains along the corridors, these improvements are not expected to increase daily noise (Ldn) along these corridors by more than 3dBA relative to baseline conditions. However, in areas that do not currently have light rail operations, implementation of the proposed MTP/SCS could increase noise levels above 65 dBA Ldn and increase daily noise (Ldn) by more than 3 dBA relative to baseline conditions.

Therefore, the potential noise impacts as a result of increased automobile, heavy rail, and light rail traffic in new areas related to transportation improvements from implementation of the proposed MTP/SCS in Established Communities are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.
## Table 13.6
### Location of Potentially Significant Transportation Noise Impacts in Established Communities before and after Implementation of the Proposed MTP/SCS

<table>
<thead>
<tr>
<th>Street</th>
<th>Cross Street</th>
<th>County</th>
<th>2012 Noise Level</th>
<th>MTP/SCS Noise Level</th>
<th>Change from 2012 to MTP/SCS</th>
<th>Locations with Soundwall Alone</th>
<th>Location with MTP Project Alone</th>
<th>Locations with Soundwall and MTP Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roseville Rd</td>
<td>South of Cirby Wy</td>
<td>Placer</td>
<td>63.2</td>
<td>67.3</td>
<td>4.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sunset Blvd</td>
<td>West of Hwy 65</td>
<td>Placer</td>
<td>61.2</td>
<td>69.3</td>
<td>8.1</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Blue Oaks Blvd</td>
<td>East of Fiddyment Rd</td>
<td>Placer</td>
<td>62.9</td>
<td>66.2</td>
<td>3.3</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Fiddyment Rd</td>
<td>West of Pleasant Grove Blvd</td>
<td>Placer</td>
<td>63.5</td>
<td>67.1</td>
<td>3.6</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Washington Blvd</td>
<td>South of Pleasant Grove Blvd</td>
<td>Placer</td>
<td>62.8</td>
<td>66.9</td>
<td>4.1</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Green Valley Rd</td>
<td>East of Francisco Dr</td>
<td>El Dorado</td>
<td>59.7</td>
<td>65.4</td>
<td>5.7</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Old Placerville Rd</td>
<td>East of Bradshaw Rd</td>
<td>Sacramento</td>
<td>60.4</td>
<td>69.7</td>
<td>9.3</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Old Placerville Rd</td>
<td>East of Routier Rd</td>
<td>Sacramento</td>
<td>63.6</td>
<td>68.8</td>
<td>5.2</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>South Watt Ave</td>
<td>North of Fruitridge Rd</td>
<td>Sacramento</td>
<td>63.2</td>
<td>69.1</td>
<td>5.9</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>South Watt Ave</td>
<td>South of Alderson Ave</td>
<td>Sacramento</td>
<td>64.8</td>
<td>71.1</td>
<td>6.3</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Taylor Rd</td>
<td>North of I-80</td>
<td>Placer</td>
<td>63.7</td>
<td>68.0</td>
<td>4.3</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Pacific St</td>
<td>South of Sunset Blvd</td>
<td>Placer</td>
<td>63.4</td>
<td>67.8</td>
<td>4.4</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Bridge St/Feather River Crossing</td>
<td>East of 2nd Street</td>
<td>Sutter</td>
<td>60.2</td>
<td>68.0</td>
<td>7.8</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SR 70/Bear River Crossing</td>
<td>South of Feather River Blvd</td>
<td>Yuba</td>
<td>68.7</td>
<td>72.3</td>
<td>3.6</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Green Valley Rd</td>
<td>West of Sophia Pkwy</td>
<td>El Dorado</td>
<td>61.9</td>
<td>67.6</td>
<td>5.7</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>White Rock Rd</td>
<td>Sacramento - El Dorado CL</td>
<td>Sacramento</td>
<td>51.4</td>
<td>66.5</td>
<td>15.1</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Auburn-Folsom Rd</td>
<td>North of Auburn Dam Rd</td>
<td>Placer</td>
<td>68.2</td>
<td>71.4</td>
<td>3.2</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Watt Ave</td>
<td>South of PFE Rd</td>
<td>Sacramento</td>
<td>61.5</td>
<td>70.0</td>
<td>8.5</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Walerga Rd</td>
<td>South of PFE Rd</td>
<td>Sacramento</td>
<td>62.3</td>
<td>70.3</td>
<td>8.0</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Baseline Rd</td>
<td>East of Fiddyment Rd</td>
<td>Placer</td>
<td>61.7</td>
<td>69.6</td>
<td>7.9</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Baseline Rd</td>
<td>West of Foothills Blvd</td>
<td>Placer</td>
<td>61.2</td>
<td>68.4</td>
<td>7.2</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Grant Line Rd</td>
<td>East of East Stockton Rd</td>
<td>Sacramento</td>
<td>65.4</td>
<td>71.0</td>
<td>5.6</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>McGowan Pkwy</td>
<td>East of SR 70</td>
<td>Yuba</td>
<td>62.2</td>
<td>66.3</td>
<td>4.1</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SR 99</td>
<td>Feather River Crossing</td>
<td>Sutter</td>
<td>66.6</td>
<td>70.9</td>
<td>4.3</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Table 13.6
Location of Potentially Significant Transportation Noise Impacts in Established Communities before and after Implementation of the Proposed MTP/SCS

<table>
<thead>
<tr>
<th>Location</th>
<th>County</th>
<th>2012 Noise Level</th>
<th>MTP/SCS Noise Level</th>
<th>Change from 2012 to MTP/SCS</th>
<th>Locations with Soundwall Alone</th>
<th>Location with MTP Project Alone</th>
<th>Locations with Soundwall and MTP Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elkhorn Blvd East of SR 99</td>
<td>Sacramento</td>
<td>62.6</td>
<td>65.9</td>
<td>3.3</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Arena Blvd East of I-5</td>
<td>Sacramento</td>
<td>61.8</td>
<td>65.3</td>
<td>3.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total Locations Potentially Reduced to LS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: SACOG, 2015
Developing Communities

Developing Communities are expected to include a high rate of growth during the proposed MTP/SCS plan period. Developing Communities see the highest growth rate of any of the Community Types and will see substantial increases in their proportional share of population, housing, and to a lesser extent employment.

Because Developing Communities may not have existing developed land uses, the introduction of new noise sources will likely increase the perceived loudness in this Community Type. As discussed in the settings section the “loss of peace and quiet” does not necessarily constitute a significant impact. However, with the type of rapid growth forecasted for this Community Type, it is likely that implementation of the proposed MTP/SCS will expose Developing Communities to new or increased noise from mechanical systems, industrial operations, and other stationary sources of community noise. These areas could be exposed to noise in excess of 60 Ldn and increases greater than 3 dBA over baseline conditions.

Therefore, the noise impacts related to land use changes from implementation of the proposed MTP/SCS in Developing Communities are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.

Implementation of the MTP/SCS will result in the construction of transportation improvement projects. However, Developing Communities will not necessarily see the same mix of transportation projects as Center and Corridor Communities and Established Communities. Developing Communities will see more road widening projects and newly constructed road projects to serve the new residential and employment developments that will be built by 2036. These areas will see road maintenance and rehabilitation projects, but because these areas have less transportation infrastructure to begin with, these projects will not be as prevalent as in Center and Corridor Communities and Established Communities. Developing Communities generally are not served by transit today, but new transit service may be added incrementally to align with the completion of new housing and employment centers. Pedestrian and bicycle infrastructure will be similarly phased in over the life of the proposed MTP/SCS.

Table 13.5 shows that, of the 42 roadway segments analyzed within Developing Communities, the noise standards of significance would be exceeded along 13 segments. However, as explained in the methods and assumptions section above, some segments that initially were projected to have significant noise impacts may be reduced to less than significant levels after considering existing soundwalls or future MTP projects. After these considerations, at least one location would still be exposed to significant noise levels. More detail about these locations is given in Table 13.7.
Table 13.7
Location of Potentially Significant Transportation Noise Impacts in Developing Communities Before and After Implementation of the Proposed MTP/SCS

<table>
<thead>
<tr>
<th>Street</th>
<th>Cross Street</th>
<th>County</th>
<th>2012 Noise Level</th>
<th>MTP/SCS Noise Level</th>
<th>Change from 2012 to MTP/SCS</th>
<th>Locations with Soundwall Alone</th>
<th>Locations with MTP Project Alone</th>
<th>Locations with Soundwall and MTP Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 193</td>
<td>West of Sierra College Blvd</td>
<td>Placer</td>
<td>62.0</td>
<td>66.0</td>
<td>4.0</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiddyment Rd</td>
<td>South of Blue Oaks Blvd</td>
<td>Placer</td>
<td>62.7</td>
<td>67.3</td>
<td>4.6</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiddyment Rd</td>
<td>South of W. Sunset Blvd</td>
<td>Placer</td>
<td>56.4</td>
<td>64.3</td>
<td>7.9</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline Rd</td>
<td>West of Watt Ave</td>
<td>Placer</td>
<td>63.2</td>
<td>69.4</td>
<td>6.2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bass Lake Rd</td>
<td>North of Country Club Dr</td>
<td>El Dorado</td>
<td>56.0</td>
<td>61.4</td>
<td>5.4</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elk Grove-Florin</td>
<td>North of Gerber Rd</td>
<td>Sacramento</td>
<td>63.4</td>
<td>68.5</td>
<td>5.1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Watt Ave</td>
<td>North of Florin Rd</td>
<td>Sacramento</td>
<td>64.3</td>
<td>68.9</td>
<td>4.6</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sierra College Blvd</td>
<td>North of Granite Dr</td>
<td>Placer</td>
<td>62.3</td>
<td>65.4</td>
<td>3.1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bradshaw Rd</td>
<td>South of SR 16 / Jackson Highway</td>
<td>Sacramento</td>
<td>65.2</td>
<td>70.3</td>
<td>5.1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline Rd</td>
<td>East of Pleasant Grove Rd</td>
<td>Placer</td>
<td>62.9</td>
<td>68.2</td>
<td>5.3</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline Rd</td>
<td>East of Watt Ave</td>
<td>Placer</td>
<td>64.1</td>
<td>68.3</td>
<td>4.2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riego Rd</td>
<td>East of SR 99</td>
<td>Sutter</td>
<td>63.3</td>
<td>68.3</td>
<td>5.0</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bogue Rd</td>
<td>West of SR 99</td>
<td>Sutter</td>
<td>53.9</td>
<td>61.4</td>
<td>7.5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subtotal                   | 0                              | 11      | 1

Total Locations Potentially Reduced to LS | 12

Source: SACOG, 2015
Heavy rail improvements will include increasing the number of passenger and freight trains in the region. Because of the number of existing passenger and freight trains that use the existing heavy rail tracks, additional trains are not expected to increase daily noise (Ldn) along any given track by more than 3 dBA relative to baseline conditions.

Light rail improvements will include increasing frequency on existing corridors. Because improvements along existing corridors would not double the number of daily trains along the corridors, these improvements are not expected to increase daily noise (Ldn) along these corridors by more than 3 dBA relative to baseline conditions.

The noise impacts as a result of increased automobile traffic in new areas related to transportation improvements from implementation of the proposed MTP/SCS in Developing Communities are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.

**Rural Residential Communities**

Rural Residential Communities are very low-density communities with mostly residential development and some small-scale farming. These communities are expected to have very limited growth by 2036, or less than two percent of the regional growth. This Community Type is expected to have the lowest rate of growth and will have a decreasing share of regional population, housing units, and employment.

As with Developing Communities, Rural Residential Communities have fewer sources of existing stationary noise sources than Center and Corridor Communities and Established Communities. Although these areas will see some growth over the proposed MTP/SCS planning period, growth is expected to be minimal and of the same character as existing development. As noted in the Developing Communities analysis, the loss of “peace and quiet” is not in and of itself a significant impact, as long as daily noise levels remain within established thresholds. It is unlikely that the small amount of growth in these areas would expose Rural Residential Communities to noise in excess of 55 dBA Ldn and increase noise levels by more than 3 dBA over baseline conditions.

Therefore, noise impacts related to land use changes from implementation of the proposed MTP/SCS in Rural Residential Communities are considered less than significant (LS) for Impact NOI-1. No mitigation is required.

Existing transportation infrastructure in rural communities consists primarily of roads serving automobile traffic with some very limited transit service in a few places in the region. Implementation of the proposed MTP/SCS will result in the construction of roadway improvements, including road maintenance and rehabilitation, roadway widenings, newly constructed roadways, and freeway improvements. There may also be limited improvements to transit service.

As noted in Table 13.5 above, implementation of the proposed MTP/SCS will result in 22 Rural Residential Community roadway segments that increase noise levels to potentially significant levels. However, as explained in the methods and assumptions section above, some segments that initially were projected to have significant noise impacts may be reduced to less than significant levels after considering existing soundwalls or future MTP projects. After these considerations, noise impacts
would remain significant on at least eight roadway segments. More detail about these locations is given in Table 13.8.

Heavy rail improvements will include increasing the number of passenger and freight trains in the region. Because of the number of existing passenger and freight trains that use the existing heavy rail tracks, additional trains are not expected to increase daily noise (Ldn) along any given track by more than 3 dBA relative to baseline conditions. The proposed MTP/SCS does not include any improvements to light rail in Rural Residential Communities.

The noise impacts as a result of increased automobile traffic related to transportation improvements from implementation of the proposed MTP/SCS in Rural Residential Communities are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.

*Lands Not Identified for Development in the Proposed MTP/SCS*
Although some housing and employment growth, consistent with historical trends, may occur in this Community Type within the MTP/SCS planning period, the proposed MTP/SCS does not forecast any development in these areas by 2036. Therefore, noise impacts related to land use changes from implementation of the proposed MTP/SCS in Lands Not Identified for Development are considered less than significant (LS) for Impact NOI-1. No mitigation is required.

The proposed MTP/SCS will make a limited number of transportation investments in this Community Type by 2036. The focus for investments in these areas is on road maintenance, safety enhancements, other roadway operational improvements, and targeted capacity improvements to existing facilities that accommodate increased travel between urban areas. Development in the Lands Not Identified for Development Community Type is expected to result in very small if any increases in traffic on roadways. Because of this, implementation of the proposed MTP/SCS is not expected to result in significant noise impacts along existing roadways or transit routes and is not expected to result in significant noise impacts associated with new roadways, bridges, and transit facilities. Therefore, noise impacts related to transportation improvements from implementation of the proposed MTP/SCS in Lands Not Identified for Development are considered less than significant (LS) for Impact NOI-1. No mitigation is required.
Table 13.8
Location of Potentially Significant Transportation Noise Impacts in Rural Residential Communities Before and After Implementation of the Proposed MTP/SCS

<table>
<thead>
<tr>
<th>Street</th>
<th>Cross Street</th>
<th>County</th>
<th>2012 Noise Level</th>
<th>MTP/SCS Noise Level</th>
<th>Change from 2012 to MTP/SCS</th>
<th>Locations with Soundwall Alone</th>
<th>Locations with MTP Project Alone</th>
<th>Locations with Soundwall and MTP Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiddyment Rd</td>
<td>North of Athens Ave</td>
<td>Placer</td>
<td>55.5</td>
<td>61.9</td>
<td>6.4</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Industrial Ave</td>
<td>North of Athens Ave</td>
<td>Placer</td>
<td>54.0</td>
<td>59.0</td>
<td>5.0</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Durock Rd</td>
<td>West of S. Shingle Rd</td>
<td>El Dorado</td>
<td>56.5</td>
<td>63.4</td>
<td>6.9</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Elverta Rd</td>
<td>East of Sorento Rd</td>
<td>Sacramento</td>
<td>61.6</td>
<td>64.7</td>
<td>3.1</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hood Franklin Rd</td>
<td>West of Frankin Blvd</td>
<td>Sacramento</td>
<td>59.8</td>
<td>67.2</td>
<td>7.4</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>White Rock Rd</td>
<td>North of Grant Line Rd</td>
<td>Sacramento</td>
<td>62.2</td>
<td>70.4</td>
<td>8.2</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>White Rock Rd</td>
<td>West of Grant Line Rd</td>
<td>Sacramento</td>
<td>55.9</td>
<td>67.9</td>
<td>12.0</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rocklin Rd</td>
<td>East of Sierra College Blvd</td>
<td>Placer</td>
<td>54.5</td>
<td>59.0</td>
<td>4.5</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Simpson Ln</td>
<td>West of Davis Rd</td>
<td>Yuba</td>
<td>56.6</td>
<td>62.3</td>
<td>5.7</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Forty Mile Rd</td>
<td>Wheatland Rd - Leach Rd</td>
<td>Yuba</td>
<td>53.9</td>
<td>59.0</td>
<td>5.1</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Eagles' Nest Rd</td>
<td>South of SR 16</td>
<td>Sacramento</td>
<td>52.0</td>
<td>57.5</td>
<td>5.5</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sunrise Blvd</td>
<td>South of SR 16</td>
<td>Sacramento</td>
<td>64.1</td>
<td>68.0</td>
<td>3.9</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Grant Line Rd</td>
<td>South of SR 16</td>
<td>Sacramento</td>
<td>62.8</td>
<td>66.3</td>
<td>3.5</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sorrento Rd</td>
<td>North of Elverta Rd</td>
<td>Sacramento</td>
<td>47.5</td>
<td>60.1</td>
<td>12.6</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rio Linda Blvd</td>
<td>North of Elverta Rd</td>
<td>Sacramento</td>
<td>53.8</td>
<td>56.9</td>
<td>3.1</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Elverta Rd</td>
<td>West of SR 70/99</td>
<td>Sacramento</td>
<td>53.5</td>
<td>57.3</td>
<td>3.8</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>White Rock Rd</td>
<td>East of Prairie City Rd</td>
<td>Sacramento</td>
<td>59.8</td>
<td>66.8</td>
<td>7.0</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>White Rock Rd</td>
<td>West of Scott Rd</td>
<td>Sacramento</td>
<td>60.3</td>
<td>66.9</td>
<td>6.6</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>40 Mile Rd</td>
<td>South of SR 65</td>
<td>Yuba</td>
<td>54.4</td>
<td>60.2</td>
<td>5.8</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Plumas-Arboga Rd</td>
<td>East of SR 70</td>
<td>Yuba</td>
<td>52.1</td>
<td>56.6</td>
<td>4.5</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>State Route 70-99</td>
<td>South of Elverta Rd</td>
<td>Sacramento</td>
<td>74.2</td>
<td>77.7</td>
<td>3.5</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SR 99</td>
<td>Elverta Rd or Riego Rd</td>
<td>Sacramento</td>
<td>74.8</td>
<td>78.1</td>
<td>3.3</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Subtotal: 0 14 0

Total Locations Potentially Reduced to LS: 14

Source: SACOG, 2015
Transit Priority Area Impacts

Placer County Transit Priority Areas
The Placer County TPAs include portions of Roseville, Rocklin, and Auburn (around the Amtrak station), in areas that are already developed with urban uses. This area is generally more densely developed than surrounding areas. Noise is an inevitable part of urban living. Urban areas experience noise from any number of sources associated with living in proximity to other people and among different land uses. Typical community noise sources include small mechanical devices (e.g., lawn mowers, leaf blowers), parks and playgrounds, restaurants and bars, commercial uses, and industrial plants. Traffic and transportation-related noise is also a dominant noise source in this Community Type. The noise impacts of transportation are discussed below. The Placer County TPAs already experience higher levels of noise than other areas in the region, and noise is an expected part of life in these areas. Implementation of the proposed MTP/SCS is likely to increase the amount of noise experienced in the Placer County TPAs because of the increased density in these areas.

The compact nature of development is likely to expose the Placer County TPAs to noise levels in excess of the noise thresholds identified in Table 13.4 and increases in noise levels of more than 3 dBA over baseline conditions.

Therefore, the noise impacts as a result of more dense and compact development related to land use changes from implementation of the proposed MTP/SCS in the Placer County TPAs are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.

Placer County TPAs will see a variety of transportation improvements by 2036, including new HOV lanes, auxiliary lanes, roadway widenings, bicycle and pedestrian infrastructure improvements, transit facilities, increased transit service, and roadway maintenance and rehabilitation projects. Transit service will include increased frequency on local fixed route buses, but the majority of transit service increases will be commuter service to downtown Sacramento.

As noted in Table 13.5 above, implementation of the proposed MTP/SCS will result in zero Placer County TPA roadway segments that increase noise levels to potentially significant levels.

Heavy rail improvements will include increasing the number of passenger and freight trains in the region. Because of the number of existing passenger and freight trains that use the existing heavy rail tracks, additional trains are not expected to increase daily noise (Ldn) along any given track by more than 3 dBA relative to baseline conditions. The proposed MTP/SCS does not include any improvements to light rail in the Placer County TPAs.

Therefore, the noise impacts related to transportation improvements from implementation of the proposed MTP/SCS in the Placer County TPAs are considered less than significant (LS) for Impact NOI-1. No noise mitigation is required.

Sacramento County Transit Priority Areas
The Sacramento County TPAs include the majority of the City of Sacramento and portions of Rancho Cordova, Folsom, and Citrus Heights. The Sacramento County TPAs will include approximately 37 percent of regional growth. As discussed in the Placer County TPA analysis, noise is an inevitable part of urban living. The Sacramento County TPAs already experience higher levels
of noise than the other areas in the region, and noise is an expected part of life in these areas. Implementation of the proposed MTP/SCS is likely to increase the amount of noise experienced in the Sacramento County TPAs because of the increased density in these areas. The compact nature of development is likely to expose TPAs to noise levels in excess of the Community Type noise thresholds identified in Table 13.4 and increases in noise levels of more than 3 dBA over baseline conditions in established and developing communities.

Therefore, the noise impacts as a result of more dense and compact development related to the land use changes from implementation of the proposed MTP/SCS in the Sacramento County TPAs are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.

Sacramento County TPAs will see a variety of transportation improvements by 2036, including new HOV lanes, auxiliary lanes, roadway widenings, bicycle and pedestrian infrastructure improvements, transit facilities, increased transit service, and roadway maintenance and rehabilitation projects. Transit service will include increased frequency on local fixed route buses, major increases in light rail service, new streetcar service, and more express bus service.

As noted in Table 13.5 above, implementation of the proposed MTP/SCS will result in five Sacramento County TPA roadway segments that increase noise levels to potentially significant levels, of which four will occur in Established Communities, and one will occur in Developing Communities. However, as explained in the methods and assumptions section above, some segments that initially were projected to have significant noise impacts may be reduced to less than significant levels after considering existing soundwalls or future MTP projects. After these considerations, all five locations may be mitigated to less than significant noise levels. More detail about these locations is given in Table 13.9.

Heavy rail improvements will include increasing the number of passenger and freight trains in the region. Because of the number of existing passenger and freight trains that use the existing heavy rail tracks, additional trains are not expected to increase daily noise (Ldn) along any given track by more than 3 dBA relative to baseline conditions.

Light rail improvements will include increasing the frequency of and making improvements to existing corridors and adding new corridors. In general, the proposed transit improvements along existing corridors will occur in developed urban areas where noise levels are already high from existing transportation systems. Because improvements along existing corridors would not double the number of daily trains along the corridors, these improvements are not expected to increase daily noise (Ldn) along these corridors by more than 3 dBA relative to baseline conditions. However, in areas that do not currently have light rail operations, implementation of the proposed MTP/SCS could increase noise levels above acceptable Community Type noise levels (as identified in Table 13.4) and increase daily noise (Ldn) by more than 3 dBA relative to baseline conditions.

Therefore, the potential noise impacts as a result of increased automobile, and light rail traffic related to transportation improvements from implementation of the proposed MTP/SCS in the Sacramento County TPAs are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.
Table 13.9
Location of Potentially Significant Transportation Noise Impacts in the Sacramento TPAs Before and After Implementation of the Proposed MTP/SCS

<table>
<thead>
<tr>
<th>Street</th>
<th>Cross Street</th>
<th>County</th>
<th>2012 Noise Level</th>
<th>MTP/SCS Noise Level</th>
<th>Change from 2012 to MTP/SCS</th>
<th>Locations with Soundwall Alone</th>
<th>Locations with MTP Project Alone</th>
<th>Locations with Soundwall and MTP Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Watt Ave</td>
<td>North of Florin Rd</td>
<td>Sacramento</td>
<td>64.3</td>
<td>68.9</td>
<td>4.6</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Old Placerville Rd</td>
<td>East of Bradshaw Rd</td>
<td>Sacramento</td>
<td>60.4</td>
<td>69.7</td>
<td>9.3</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Old Placerville Rd</td>
<td>East of Routier Rd</td>
<td>Sacramento</td>
<td>63.6</td>
<td>68.8</td>
<td>5.2</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>South Watt Ave</td>
<td>North of Fruitridge Rd</td>
<td>Sacramento</td>
<td>63.2</td>
<td>69.1</td>
<td>5.9</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>South Watt Ave</td>
<td>South of Alderson Ave</td>
<td>Sacramento</td>
<td>64.8</td>
<td>71.1</td>
<td>6.3</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Locations Potentially Reduced to LS</strong></td>
<td><strong>5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: SACOG, 2015
**Yolo County Transit Priority Areas**

The Yolo TPAs include the majority of West Sacramento and Davis, and some portions of Yolo County. The area has relatively balanced growth in residential and employment, bolstering the existing jobs centers in downtown West Sacramento and UC Davis. As discussed in the Placer County TPA analysis, noise is an inevitable part of urban living. The Yolo County TPAs already experience higher levels of noise than the other Community Types, and noise is an expected part of life in these areas. Implementation of the proposed MTP/SCS is likely to increase the amount of noise experienced in the Yolo County TPAs because of the increased density in these areas. The compact nature of development is likely to expose TPAs to noise levels in excess of the Community Type noise thresholds identified in Table 13.4 and increases in noise levels of more than 3 dBA over baseline conditions.

Therefore, the noise impacts as a result of more dense and compact development related to land use changes from implementation of the proposed MTP/SCS in the Yolo County TPAs are considered potentially significant (PS) for Impact NOI-1. Mitigation Measure NOI-1 is described below.

Yolo County TPAs will see a variety of transportation improvements by 2036, including new HOV lanes, auxiliary lanes, roadway widenings, bicycle and pedestrian infrastructure improvements, transit facilities, increased transit service, and roadway maintenance and rehabilitation projects. Transit service will include increased frequency on local fixed route buses, new streetcar service in West Sacramento, and increased express service to downtown Sacramento.

As noted in Table 13.5 above, implementation of the proposed MTP/SCS will result in zero Yolo County TPA roadway segments that increase noise levels to potentially significant levels.

Heavy rail improvements will include increasing the number of passenger and freight trains in the region. Because of the number of existing passenger and freight trains that use the existing heavy rail tracks, additional trains are not expected to increase daily noise (Ldn) along any given track by more than 3dBA relative to baseline conditions. The proposed MTP/SCS does not include any improvements to light rail in the Yolo County TPAs.

The noise impacts related to transportation improvements from implementation of the proposed MTP/SCS in the Yolo County TPAs are considered less than significant (LS) for Impact NOI-1.

**MITIGATION MEASURES**

As part of planning, design, and engineering for projects that result from the proposed MTP/SCS, the implementing agency shall ensure that noise is treated in accordance with applicable federal, state and local laws and regulations. SACOG does not have authority to require the implementing agencies to adopt the identified mitigation measures; the mitigation measures are within the responsibility and jurisdiction of another public agency. However, implementation of the following mitigation measure at a project level would reduce the impacts from noise, and agencies with jurisdiction to adopt these measures should do so (Pub. Resources Code, § 21081).
Mitigation Measure NOI-1: Employ measures to reduce noise from new land uses and transportation projects.

For projects that have not undergone previous noise study and that exceed acceptable noise thresholds, the implementing agency shall require a project-level evaluation of noise impacts in accordance with applicable federal, state, and local noise standards. Where significant impacts are identified, applicable mitigation measures shall be implemented, to reduce noise to be in compliance with applicable noise standards. Measures that shall be implemented, where feasible and necessary to address site-specific impacts, include but are not limited to:

- constructing barriers in the form of sound walls, buildings, or earth berms to attenuate noise at adjacent residences;
- using land use planning measures, such as zoning, restrictions on development, site design, and buffers to ensure that future development is compatible with adjacent transportation facilities and land uses;
- constructing roadways so that they are depressed below-grade of the existing sensitive land uses to create an effective barrier between new roadway lanes, roadways, rail lines, transit centers, park-n-ride lots, and other new noise generating facilities;
- maximizing the distance between noise-sensitive land uses and new noise-generating facilities and transportation systems;
- improving the acoustical insulation of dwelling units where setbacks and sound barriers do not sufficiently reduce noise; and
- using rubberized asphalt or “quiet pavement” to reduce road noise for new roadway segments, roadways in which widening or other modifications require re-pavement, or normal reconstruction of roadways where re-pavement is planned.

**Significance After Mitigation**

If the implementing agency adopts this mitigation measure, Impact NOI-1 would be reduced to a less than significant level (LS). Projects taking advantage of CEQA Streamlining provisions of SB 375 (Pub. Resources Code § 21155.1, 21155.2, and 21159.28) must apply the mitigation measure described above to address site-specific conditions, resulting in impacts that are less than significant (LS). However, because SACOG cannot require the implementing agency to adopt this mitigation measure, and it is ultimately the responsibility of a lead agency to determine and adopt project-specific mitigation, this impact remains significant and unavoidable (SU).

**Impact NOI-2: Result in Excessive Vibration and Groundborne Noise.**

**Regional Impacts**

A summary of land use and transportation changes as a result of the proposed MTP/SCS, including by Community Type and TPAs, is provided in Chapter 2 – Project Description.

Development land uses have been classified into five general categories in the proposed MTP/SCS:
- **Residential**: residential uses include single-family and multi-family housing of all densities and types.

- **Office and Commercial**: this category includes commercial uses that offer goods for sale to the public (retail) and service and professional businesses housed in offices. Office and commercial businesses include those that service neighborhood needs, community or regional needs. Government office buildings are included in this category.

- **Industrial**: the industrial category includes a mix of manufacturing and light industrial uses, some of which are found in business, research, and development parks. Light industrial activities include warehousing and some types of assembly work. Wholesaling and warehousing are also included in this category.

- **Public**: non-office government buildings, public corporation yards, water and wastewater treatment plants, public utilities, libraries, schools, and other public institutions are found in this category. Hospitals are also included in this category.

- **Mixed-Use (vertical)**: residential and commercial uses mixed within one building are included in this category.

Different types of land uses necessarily generate different amounts of vibration and groundborne noise. For example, industrial uses and certain public buildings generate substantially more vibration and groundborne noise than residential and commercial uses since the former often operate machinery and other vibration-inducing equipment.

Similarly, different types of transportation infrastructure generate different amounts of vibration and groundborne noise. Traffic, especially heavy truck traffic, can be a source of vibration and groundborne noise. Rail operations, including freight and light rail trains, can also be a source of vibration. Table 13.10 contains reference to vibration levels associated with heavy equipment.

As explained above, different areas will experience transportation vibration in different ways. Because of the nature of vibration (vibration dissipates with distance from the source), new transportation operations will generate vibration, and that vibration may exceed thresholds for determining significance. However, such potentially significant vibration impacts will be confined to specific geographies and therefore cannot be evaluated from a regional perspective.

### Table 13.10
Vibration Levels for Construction Equipment

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Peak Particle Velocity at 25 feet</th>
<th>Approximate Lv at 25 feet, dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pile Driver – Impact</td>
<td>0.64</td>
<td>104</td>
</tr>
<tr>
<td>Pile Driver - Sonic</td>
<td>.170</td>
<td>93</td>
</tr>
<tr>
<td>Vibratory Roller</td>
<td>.210</td>
<td>94</td>
</tr>
<tr>
<td>Bulldozer</td>
<td>0.09</td>
<td>87</td>
</tr>
<tr>
<td>Loaded Trucks</td>
<td>0.08</td>
<td>86</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>0.04</td>
<td>79</td>
</tr>
</tbody>
</table>

*Source: Transit Noise and Vibration Impact Assessment, FTA-VA-1003-06*
Localized Impacts

Center and Corridor Communities, Established Communities, Developing Communities, and Rural Residential Communities
Normal operation of residential, office and commercial, and mixed-use buildings are unlikely to generate substantial vibration or groundborne noise. Industrial and public buildings could generate vibration and groundborne noise during operations that involve the use of machinery or other vibration-inducing equipment. However, the amount of vibration produced is not anticipated to be excessive, as workplace vibration is typically addressed from an occupational health and safety perspective. As with noise, vibration dissipates with distance from the source, so surrounding land uses would unlikely be affected. Table 13.10 indicates that, even at close distances, vibration levels for most heavy equipment are below 0.1 inches per second.

Therefore, the vibration and groundborne noise impacts related to the land use changes from implementation of the proposed MTP/SCS in Center and Corridor Communities, Established Communities, Developing Communities, and Rural Residential Communities are considered less than significant (LS) for Impact NOI-2. No mitigation is required.

Traffic, especially heavy truck traffic, can be a source of vibration and groundborne noise. However, such vibration is rarely high enough to cause annoyance to surrounding uses, as vehicles are supported on spring suspensions and pneumatic tires, which reduce the amount of vibration and groundborne noise generated from vehicular traffic. Rail operations, including freight and light rail trains, can also be a source of vibration. The Community Types will see increased levels of both heavy rail and light rail with implementation of the proposed MTP/SCS. Existing and future growth and development near existing or planned light rail or heavy rail lines could result in excessive levels of vibration and groundborne noise.

Therefore, the vibration and groundborne noise impacts related to rail improvements from implementation of the proposed MTP/SCS in Center and Corridor Communities, Established Communities, Developing Communities, and Rural Residential Communities are considered potentially significant (PS) for Impact NOI-2. Mitigation Measure NOI-2 is described below.

Lands Not Identified for Development in the Proposed MTP/SCS
Although some housing and employment growth, consistent with historical trends, may occur in this Community Type within the MTP/SCS planning period, the proposed MTP/SCS does not forecast any development in these areas by 2036.

Therefore, the vibration and groundborne noise impacts related to the land use changes from implementation of the proposed MTP/SCS in Lands Not Identified for Development are considered less than significant (LS) for Impact NOI-2. No mitigation is required.

The MTP/SCS will make a limited number of transportation investments in Lands Not Identified for Development. The focus for investments in these areas is on road maintenance, safety enhancements, other roadway operational improvements, and targeted capacity improvements to existing facilities that accommodate increased travel between urban areas. Traffic, especially heavy truck traffic, can be a source of vibration and groundborne noise. However, such vibration is rarely high enough to cause annoyance to surrounding uses, as vehicles are supported on spring suspensions and pneumatic tires, which reduce the amount of vibration and groundborne noise.
generated from vehicular traffic. Rail operations can also be a source of vibration. However, because Lands Not Identified for Development are spread out over a vast land area, it is unlikely that increased freight rail will significantly impact levels of vibration and groundborne noise at the Community Type level.

Therefore, the vibration and groundborne noise impacts related to the transportation improvements from implementation of the proposed MTP/SCS in Lands Not Identified for Development are considered less than significant (LS) for Impact NOI-2. No mitigation is required.

**Transit Priority Area Impacts**

*Placer County, Sacramento County, and Yolo County TPAs*

The Transit Priority Area impacts associated with implementation of the proposed MTP/SCS are the same in each of the TPAs as described above in the localized impacts discussion for Center and Corridor Communities, Established Communities, Developing Communities, and Rural Residential Communities.

Therefore, the impacts on vibration and groundborne noise related to the land use changes from implementation of the proposed MTP/SCS in Transit Priority Areas are considered less than significant (LS) for Impact NOI-2. No mitigation is required.

The impacts on vibration and groundborne noise related to transportation improvements from implementation of the proposed MTP/SCS in Transit Priority Areas are considered potentially significant (PS) for Impact NOI-2. Mitigation Measure NOI-2 is described below.

**Mitigation Measures**

As part of planning, design, and engineering for projects that result from the proposed MTP/SCS, the implementing agency shall ensure that vibration and groundborne noise are treated in accordance with applicable federal, state, and local laws and regulations. SACOG does not have authority to require the implementing agencies to adopt the identified mitigation measures; the mitigation measures are within the responsibility and jurisdiction of another public agency. However, implementation of the following mitigation measure at a project level would reduce the impacts from vibration and groundborne noise, and agencies with jurisdiction to adopt these measures should do so (Pub. Resources Code, § 21081).

**Mitigation Measure NOI-2: Employ vibration-reducing measures on new and expanded rail systems.**

The implementing agency shall require project proponents to undertake a detailed evaluation of vibration and groundborne noise impacts and identify project-specific mitigation measures, as necessary to reduce vibration to a level that is in compliance with applicable local standards or FTA standards. Measures that shall be implemented, where feasible and necessary to address site-specific conditions in order to minimize the effects of vibration and groundborne noise from rail operations include but are not limited to:

- complying with all applicable local vibration and groundborne noise standards, or in the absence of such local standards, comply with FTA vibration and groundborne noise standards;
maximizing the distance between tracks and sensitive uses;

conducting rail grinding on a regular basis to keep tracks smooth;

conducting wheel truing to re-contour wheels to provide a smooth running surface and removing wheel flats;

providing special track support systems such as floating slabs, resiliently supported ties, high-resilience fasteners, and ballast mats; and

implementing operational changes such as limiting train speed and reducing nighttime operations.

**Significance After Mitigation**

If the implementing agency adopts this mitigation measure, Impact NOI-2 would be reduced to less than significant (LS). Projects taking advantage of CEQA Streamlining provisions of SB 375 (Pub. Resources Code § 21155.1, 21155.2, and 21159.28) must apply the mitigation measure described above to address site-specific conditions, resulting in impacts that are less than significant (LS). However, because SACOG cannot require the implementing agency to adopt this mitigation measure, and it is ultimately the responsibility of a lead agency to determine and adopt project-specific mitigation, this impact remains significant and unavoidable (SU).

**Impact NOI-3: Result in Construction Impacts That Would Increase Noise Levels Above the Community Type LDN Thresholds Identified in Table 13.4, Result in Increases of More Than 1.5 DB for Center and Corridor Communities or More Than 3 dBA Over Baseline Conditions for the Other Community Types; Or Result in Excessive Levels of Vibration and Groundborne Noise.**

**Regional Impacts**

As noted in Table 13.4, there are no numeric regional thresholds for noise and vibration. Different types of land uses and transportation infrastructure necessarily have different noise and vibration environments. Because of the nature of noise and vibration impacts (noise and vibration dissipate with distance from the source), construction associated with new development and transportation projects will have noise and vibration impacts, but such potentially significant impacts will be confined to specific geographies and therefore cannot be evaluated from a regional perspective.

Localized impacts are explored below in the Community Type and Transit Priority Area discussions. A summary of land use and transportation changes as a result of the proposed MTP/SCS by Community Type and TPAs is provided in Chapter 2 – Project Description.

**Localized Impacts**

*Center and Corridor Communities, Established Communities, Developing Communities, and Rural Residential Communities*

Construction of new developments or transportation improvements could result in temporary noise and vibration impacts from grading, paving, clearing, landscaping, staging, excavation, earthmoving, and other related construction activities. Such construction activities will require the use of construction equipment (e.g., pile drivers, jackhammers) and vehicles that generate significant amounts of noise and vibration in the immediate vicinity of the source, often resulting in noise and
vibration levels substantially higher than existing conditions. Table 13.2 shows typical construction noise levels for various construction activities. Noise and vibration impacts from construction activities depend on several factors including the types of surrounding land uses, duration and type of construction activities, distance between source and receptor, and the presence or absence of barriers between source and receptor.

Construction impacts are considered temporary and localized in nature, as they are limited to the time during which the project is being constructed and confined to areas adjacent to the construction site. After the project is completed, all construction equipment and vehicles are removed. Any noise or vibration impacts associated with the structure itself, once fully completed and operational, are covered in Impact NOI-1 and NOI-2.

Development has the potential to result in construction-related impacts that increase noise levels above the Community Type Ldn thresholds identified in Table 13.4 and substantially increase noise levels over baseline conditions; or result in excessive levels of vibration and groundborne noise from regional growth and new and expanded transportation facilities. Although construction noise is short-term, it can nonetheless result in substantial increases in ambient noise levels in the immediate vicinity of the construction site. If sensitive receptors are located in the immediate vicinity of construction activities, they could be adversely affected. Therefore, the construction-related noise and vibration impacts related to transportation improvements and land use changes resulting from implementation of the proposed MTP/SCS in Center and Corridor Communities, Established Communities, Developing Communities, and Rural Residential Communities are considered potentially significant (PS) for Impact NOI-3. Mitigation Measure NOI-3 is described below.

**Lands Not Identified for Development in the Proposed MTP/SCS**

Although some housing and employment growth, consistent with historical trends may occur in this Community Type within the MTP/SCS planning period, the proposed MTP/SCS does not forecast any development in these areas by 2036.

Therefore, the construction-related noise and vibration impacts related to the land use changes from implementation of the proposed MTP/SCS in Lands Not Identified for Development are considered less than significant (LS) for Impact NOI-3. No mitigation is required.

The proposed MTP/SCS will make a limited number of transportation investments in this Community Type by 2036. The focus for investments in these areas is on road maintenance, safety enhancements, other roadway operational improvements, and targeted capacity improvements to existing facilities that accommodate increased travel between urban areas. The localized impacts associated with implementation of the proposed MTP/SCS are the same as described in the Community Types discussion above. Transportation projects in Lands Not Identified for Development have the potential to result in construction-related impacts that increase noise levels above the Community Type Ldn thresholds identified in Table 13.4 and increase noise levels by more than 3 dBA over baseline conditions; or result in excessive levels of vibration and groundborne noise from regional growth and new and expanded transportation facilities.

Therefore, the construction-related noise and vibration impacts related to the transportation projects from implementation of the proposed MTP/SCS in Lands Not Identified for Development are considered potentially significant (PS) for Impact NOI-3. Mitigation Measure NOI-3 is described below.
Transit Priority Area Impacts

Placer County, Sacramento County, and Yolo County TPAs

Construction within Transit Priority Area could result in temporary noise and vibration impacts from grading, paving, clearing, landscaping, staging, excavation, earthmoving, and other related construction activities. Such construction activities will require the use of construction equipment (e.g., pile drivers, jackhammers) and vehicles that generate significant amounts of noise and vibration in the immediate vicinity of the source, often resulting in noise and vibration levels substantially higher than existing conditions. Table 13.2 shows typical construction noise levels for various construction activities. Noise and vibration impacts from construction activities depend on several factors including the types of surrounding land uses, duration and type of construction activities, distance between source and receptor, and the presence or absence of barriers between source and receptor.

The Transit Priority Area impacts associated with implementation of the proposed MTP/SCS are the same in each of the TPAs as described above in the localized impacts discussion for Center and Corridor Communities, Established Communities, Developing Communities, and Rural Residential Communities. Land use and transportation projects in all of the TPAs have the potential to result in construction impacts that would increase noise levels above the Community Type Ldn thresholds identified in Table 13.4 and increase noise levels by more than 3 dBA over baseline conditions; or result in excessive levels of vibration and groundborne noise from regional growth and new and expanded transportation facilities.

Therefore, the construction-related noise and vibration impacts related to the land use changes and the transportation projects from implementation of the proposed MTP/SCS in each of the TPAs are considered potentially significant (PS) for Impact NOI-3. Mitigation Measure NOI-3 is described below.

**MITIGATION MEASURES**

As part of the planning, design, and engineering for projects that result from the proposed MTP/SCS, the implementing agency shall ensure that noise, vibration, and groundborne noise generated by construction activities are consistent with applicable federal, state and local laws and regulations. SACOG does not have authority to require the implementing agencies to adopt the identified mitigation measures; the mitigation measures are within the responsibility and jurisdiction of another public agency. However, implementation of the following mitigation measures at a project-level would reduce the impacts from construction vibration and noise, and agencies with jurisdiction to adopt these measures should do so (Pub. Resources Code, § 21081).

Mitigation Measure NOI-3: Reduce noise, vibration, and groundborne noise generated by construction activities.

Measures that shall be implemented to reduce noise, vibration, and groundborne noise generated by construction activities, where feasible and necessary to address site-specific considerations, include but are not limited to:

- restrict construction activities to permitted hours in accordance with local jurisdiction regulations;
- properly maintain construction equipment and outfit construction equipment with the best available noise suppression devices (e.g., mufflers, silencers, wraps);
- prohibit idling of construction equipment for extended periods of time in the vicinity of sensitive receptors;
- locate stationary equipment such as generators, compressors, rock crushers, and cement mixers as far from sensitive receptors as possible; and
- predrill pile holes to the maximum feasible depth, provided that pile driving is necessary for construction.

**SIGNIFICANCE AFTER MITIGATION**

If the implementing agency adopts this mitigation measure, Impact NOI-3 may be reduced to a less than significant (LS) level. For projects proposing to streamline environmental review, lead agencies must conduct project-level analysis for each project to analyze whether, based on substantial evidence in the record, the proposed mitigation will reduce the impact to less than significant. However, SACOG cannot require the implementing agency to adopt this mitigation measure, and it is ultimately the responsibility of the implementing agency to determine and adopt project-specific mitigation. Therefore, Impact NOI-3 remains significant and unavoidable (SU) for purposes of this program-level review.