3.10 NOISE

This section describes the existing noise environment and evaluates the potential noise and vibration impacts that could result from short-term construction and long-term operation of the Project.

3.10.1 Environmental Setting

3.10.1.1 Fundamentals of Sound and Environmental Noise

Noise

Sound is technically described in terms of the loudness (amplitude) and frequency (pitch) of the sound. Noise is typically defined as unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Prolonged exposure to high levels of noise is known to have several adverse effects on people, including hearing loss, communication interference, sleep interference, physiological responses, and annoyance. The noise environment typically includes background noise generated from both near and distant noise sources as well as the sound from individual local sources. These can vary from an occasional aircraft or train passing by to continuous noise from sources such as traffic on a major road.

The standard unit of measurement of the loudness of sound is the decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. In terms of human response to noise, studies have indicated that a noise level increase of 3 dBA is barely perceptible to most people, a 5-dBA increase is readily noticeable, and a difference of 10 dBA would be perceived as a doubling of loudness. Everyday sounds normally range from 30 to 100 dBA. Examples of various noise levels in different environments are shown in Table 3.10-1.

Several rating scales have been developed to analyze the adverse effect of community noise (a.k.a. environmental noise) on people. Since community noise fluctuates over time, these scales consider the total acoustical energy content of the noise, as well as the time of day when the noise occurs. Each noise metric applicable to this analysis is defined as follows:

- L_{eq} (equivalent energy noise level) is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during

exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night. L_{eq} is one of the most frequently used noise metrics as it considers both duration and sound pressure level. Typically L_{eq} is summed over a 1-hour period.

- CNEL (Community Noise Equivalent Level) is a 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 PM to 10:00 PM and a 10 dBA "weighting" added to noise during the hours of 10:00 PM to 7:00 AM to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 CNEL. CNEL is often used due to its utility in identifying noise-related sleep disturbance effects, often a key community concern for increases in noise levels. Most California noise laws specify levels using the CNEL metric and most federal laws use the L_{eq} metric. The City noise thresholds utilize the CNEL and L_{dn} metric.
- L_{dn} (day-night average noise level) is a 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 PM to 7:00 AM to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 L_{dn}. The City noise thresholds utilize the CNEL and L_{dn} metric.
- L_{min} (minimum instantaneous noise level) is the minimum instantaneous noise level experienced during a given period of time.
- L_{max} (maximum instantaneous noise level) is the maximum instantaneous noise level experienced during a given period of time.
- Noise levels from a particular source decline (attenuate) as distance to the receptor increases.[1] Other factors, such as the weather and reflecting or shielding by buildings or other structures, intensify or reduce the noise level at a location. A common method for estimating roadway noise, which dissipates more quickly than stationary sources as the noise source (vehicle) moves away from the receptor, is that for every doubling of distance from the source, the noise level is reduced by about 3 dBA at acoustically "hard" locations (i.e., mostly asphalt, concrete, hard-packed soil, or other solid materials) and 4.5 dBA at acoustically "soft" locations (i.e., contains natural earth or vegetation, such as grass).
- Noise from stationary or point sources (including construction noise) is reduced by about 6 to 7.5 dBA for every doubling of distance at acoustically hard and soft locations, respectively. Noise levels may also be reduced by intervening structures. Generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm can reduce noise levels by up to 5 to 10 dBA. The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior noise reduction of newer residential units is generally 30 dBA or more (FHWA 2014).

[1] With regard to noise, a receptor is defined as a stationary far-field position at which noise or vibration levels are specified (U.S. Department of Transportation 2012).

Table 3.10-1. Representative Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Power Saw	—110—	Rock Band
Jet Fly-over at 1000 feet		Crying Baby
Subway	—100—	
Gas Lawnmower at 3 feet		
Rail Transit Horn/ Tractor	—90—	
Heavy Construction Truck at 50 feet/ Street Sweeper at 50 feet		Food Blender at 3 feet
Concrete Mixer Truck at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawnmower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Rail Transit in Station/ Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	Sewing Machine
Air Conditioner		Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
		Refrigerator
Quiet Urban Area during Nighttime	—40—	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	—30—	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	—20—	
		Broadcast/Recording Studio
	—10—	
Lowest Threshold of Human Hearing	—0—	Lowest Threshold of Human Hearing

Source: Caltrans 1998.

Groundborne Vibration

In the context of noise, groundborne vibration is the vibration, or oscillation, of the ground, floor, and walls. The vibration of floors and walls may cause perceptible vibration, rattling of items such as windows or dishes on shelves, or a rumble noise. The rumble 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 almost never 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. The ground motion caused by vibration is measured as particle velocity in inches per second; in the U.S., this is referenced as vibration decibels (VdB) (Harris Miller & Hanson Inc. 2006).

The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration include construction equipment (e.g., heavy haul trucks, concrete trucks) and traffic on rough roads. If a roadway is smooth, the groundborne vibration from automobile traffic is rarely perceptible, although larger trucks carrying heavy loads can generate perceptible vibration. The range of interest (velocity level) for groundborne vibration is from approximately 50 VdB to 100VdB. General human response to different levels of groundborne vibration velocity levels are described in Table 3.10-2. A velocity level of 50 VdB is the typical background vibration velocity level, while a velocity level of 100 VdB is the general threshold where minor damage can occur in fragile buildings (Harris Miller Miller & Hanson Inc. 2006).

Table 3.10-2. Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Response
65 VdB	Approximate threshold of perception for many humans.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Source: Harris Miller Miller & Hanson Inc. 2006.

3.10.1.2 Existing Noise Environment

Noise generated from vehicular traffic along area roadways, such as LOVR are substantial contributors to existing noise levels on the Project site.

The Project site is bordered by the Irish Hills Natural Reserve to the west, retail and commercial businesses within the Irish Hills Plaza to the north, LOVR and automobile dealerships to the northeast, hotels along Calle Joaquin to the southeast, and Mountainbrook Church to the south. There are three primary sources of noise within the area: roadways such as U.S. 101 which lies 700 to 1,000 feet to the east, and LOVR, which immediately borders the site to the northeast; the Airport located 2 miles to the east; and operation of nearby commercial businesses.

Existing noise levels within the Project vicinity fall within typical suburban levels. Higher noise levels are found proximate to roadway corridors and also near commercial centers where loud speakers from automobile centers and truck loading bay at shopping centers create local higher peak noise levels. Quieter areas include those near residential neighborhoods and the rural Irish Hills, located farther from noise generation sources. The City's General Plan Noise Element (NE) generally identifies noise levels at the Project as being below 60 dB. Overall, airport noise is similarly low given the limited number of overflights and distance from runways and is considered to be less than 50 dB under the Airport's current ALUP (ALUC 2005).

A range of source material was reviewed and utilized in determining the existing noise setting. The City's General Plan NE was adopted in 1996 and thus existing noise levels from that 23-year old document are out of date. Similarly, the ALUP noise contours were last updated in 2005, are more than 14 years old, and are currently being updated. The two most recent sources for noise levels on the Project site and vicinity include the 2014 LUCE Update EIR and the Applicant-prepared Acoustics Assessment, completed in 2017. These two documents therefore form the primary basis for describing the existing noise setting.

The LUCE Update EIR was a citywide document that utilized general programmatic information and analysis that may not precisely reflect the physical conditions of the Project site or vicinity. The Acoustics Assessment utilized six onsite noise measurements taken on a Saturday morning between 10:00 AM and 12:00 PM. These measurements are used as a basis for onsite noise modeling analyzed in the Acoustics Assessment. The

findings of the LUCE Update EIR and the Acoustics Assessment for existing onsite noise levels are discussed below (see also below Section 3.10.3.2, *Impact Assessment Methodology*).

Roadway Noise

U.S. 101 generates the highest noise levels in the Project vicinity. Located approximately 700 to 1,100 feet east of the Project site, this segment of U.S. 101 carries traffic volumes between 65,300 and 80,000 average daily trips (ADT) (Caltrans 2017). LOVR also generates substantial roadway noise in the Project vicinity. LOVR extends immediately adjacent along the northern Project site boundary for approximately 1,700 feet, and carries approximately 30,000 ADT (City of San Luis Obispo 2014). Portions of LOVR that are farther away from the site, as well as Calle Joaquin and other nearby collector roads, carry relatively low traffic volumes, do not generate substantial noise levels on the Project site, and, therefore, are not discussed further in this section.

The City's LUCE Update EIR provides general noise modeling of roadway traffic noise measured from the centerline of U.S. 101 and LOVR based on roadway traffic volumes, but does not consider natural or manmade features, such as topography, vegetation, walls, or buildings, that may block and reduce noise volumes (City of San Luis Obispo 2014, Table 4.11-1). The LUCE Update EIR indicates that the 60 dBA to 65 dBA noise corridors (the maximum acceptable exterior noise level generated by transportation noise sources for sensitive land uses based on City adopted noise guidelines) from the centerlines of U.S 101 and LOVR extend well onto the Project site (Table 3.10-3; Figure 3.10-1).

Table 3.10-3. LUCE Update EIR Projected Roadway Noise Levels within Project Site

	Roadway Noise Source	
Description	**U.S. 101**	**LOVR**
Distance to Project site[1] (ft)	700 - 1,100	40
Distance of 65 dBA CNEL noise contour from roadway centerline[2] (ft)	1,260 - 1,560	75
Distance of 60 dBA CNEL noise contour from roadway centerline (ft)	7,140	239

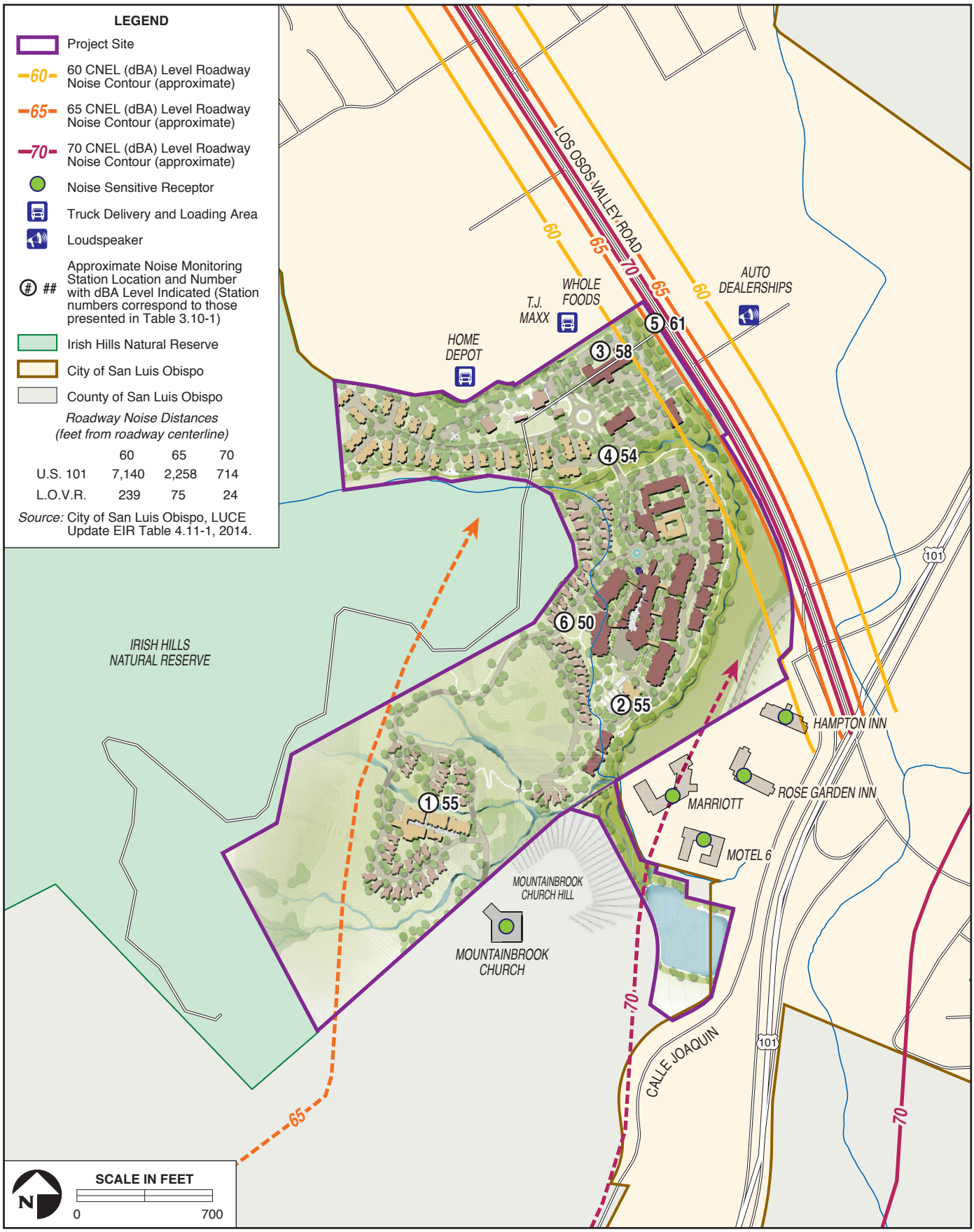
[1]As measured from roadway centerline.
[2]As projected in the LUCE Update EIR.
[3]Source: City of San Luis Obispo 2014. Roadway traffic noise modeling conducted by Ascent Environmental, Inc.

Although U.S. 101 lies between 700 and 1,100 feet to the south and east of the Project site, noise corridor modeling from the LUCE Update EIR indicates that the entire Project site may be located within the 60 dBA CNEL generated by traffic along U.S. 101, with well

over 50 percent of the south and east ends of the Project site projected to fall within the 65 dBA CNEL contour. The 60 dBA CNEL for LOVR, which immediately borders the site to the east, may extend west as far as 240 feet into the Project site; the 65 dBA CNEL may extend as far as 35 feet into the Project site (see Figure 3.10-1).

However, roadway noise corridor modeling in the LUCE Update EIR does not consider reductions in noise resulting from nearby topographic or manmade features that block or redirect sound waves. In the case of the LOVR noise corridor, level topography and a lack of manmade barriers appear to render the programmatic LUCE Update EIR noise corridor modeling generally accurate. However, for U.S. 101, the outlying flank of the Irish Hills that support Mountainbrook Church and the KSBY radio station, four hotels along Calle Joaquin between U.S. 101 and the Project site, and the elevated LOVR overpass likely result in substantial reductions to noise from U.S. 101 to levels well below those modeled in the LUCE Update EIR. This conclusion is also substantiated by the results of the Acoustic Assessment, as further discussed below.

Mountainbrook Church sits on a hill that rises over 200 feet in elevation and largely or entirely blocks noise generated by vehicles on U.S. 101 to the south. The LOVR overpass has a similar noise attenuating effect for vehicular noise to the north. Of the Project site's approximately 1,700 feet of frontage directly facing U.S. 101 between the Mountainbrook Church hill and the LOVR overpass, the four-story Hampton Inn and Suites, three-story Courtyard by Marriot, two-story Motel 6, and one-story Rose Garden Inn provide additional substantial barriers to noise generated by U.S. 101. As noted in Section 3.10.1.1 *Fundamentals of Sound and Environmental Noise*, a single row of buildings between the receptor and the noise source generally reduces the noise level by approximately 5 dBA, while a solid wall or berm (e.g., LOVR overpass) can result in noise level reductions between 5 to 10 dBA. While gaps between hotel buildings may have potential for exposure to noise from U.S. 101, LUCE Update EIR noise modeling was general and did not consider site-specific features or conditions; therefore, the LUCE Update EIR likely overestimates noise levels within the Project site from U.S. 101 by 5 to 10 dBA. However, conservatively, the southern portion of the site along Froom Creek may remain potentially exposed to noise levels of approximately 60 dBA (Figure 3.10-1).



wood.

Noise Environment

FIGURE 3.10-1

The Applicant-prepared Acoustics Assessment includes onsite noise measurements and noise modeling based upon these measurements (Appendix I). Onsite noise measurements were conducted for the Acoustics Assessment at six locations within the Project site between 10:00 AM and 12:00 PM on Saturday, April 22, 2017. These measurement locations recorded noise levels of 61 dBA adjacent to LOVR and 55 dBA in the south-central area of the site, approximately 300 feet north of the Courtyard by Marriott hotel (see Table 3.10-4; Figure 3.10-1).

Although the Acoustics Assessment briefly mentions other noise sources in the Project vicinity (e.g., airport noise, commercial businesses), it focuses on noise generated by traffic, particularly from LOVR and U.S. 101 as these generate the greatest level of noise at the Project site and are the most subject to change under the Project (Appendix I).

Table 3.10-4. Measured Noise Levels within the Project Site[1]

Station No.	Location[2]	L_{dn} /CNEL
1	Along Calle Joaquin and the southeastern boundary of the site	55 dBA
2	South central site approximately 200 feet north of Marriot Hotel	55 dBA
3	Northeastern interior of the site; 200 feet from LOVR	58 dBA
4	Northeastern interior of the site; 300 feet from LOVR	54 dBA
5	Along the boundary of Project site and LOVR	61 dBA
6	Southeastern interior of the site; 300 feet from Calle Joaquin	50 dBA

Source: Lord and Taubitz 2017.
[1]Roadway noise measurements conducted on Saturday, April 22, 2017, between 10:00 AM and 12:00 PM.
[2]See Figure 3.10-1 for precise locations.

As part of the Acoustics Assessment, an acoustic model with noise level contours was generated for the site based on topography, noise sources, and measured noise level values (Appendix I). The Acoustics Assessment found that the interior areas of the site generally fall within the 50 to 60 dBA CNEL noise contour, primarily generated by vehicular traffic on LOVR and more distant U.S. 101.

Airport Noise

The Airport is located approximately 1.8 miles east of the Project site; aircraft flying in the vicinity at above 1,000 feet in elevation several times a day generate intermittent low-level noise. The Project site is approximately 1,000 feet from the 50 dBA CNEL contour mapped within the ALUP, representing the noise environment from aircraft flying in the vicinity of the Project site (ALUC 2005). The General Plan NE indicates the Project site lies over 1 mile from the projected 60 dBA CNEL noise contour within the ALUP. Thus, Airport

activities only generate episodic noise on the Project site from aircrafts flying overhead, and overall noise levels resulting from Airport operations are less than 50 dBA CNEL.

Stationary Sources

Noise is also generated from commercial uses that border the Project site, particularly Irish Hills Plaza to the north, as well as automobile dealerships along Auto Park Way to the northeast, and four hotels to the east. Operational noise generated by these commercial uses includes semi-truck deliveries (85 dBA L_{max} at 50 feet) and associated backup alarms, parking lot sweeping (82 dBA L_{max} at 50 feet), landscape maintenance, rooftop heating and cooling equipment, and loudspeakers from automobile dealerships (89 dBA L_{max} at 50 feet) (FHWA 2013; see Table 3.10-1). Noise generated from such adjacent uses primarily affects the northern area of the Project site associated with Madonna Froom Ranch. Given proximity and types of activities, loading dock activity at the Irish Hills Plaza likely generates the highest levels of noise adjacent to the Project site. Although these operational activities are periodic in nature and do not typically result in high levels of continuous noise, noise levels of 65 dB L_{max} would extend as far as 95 feet into the Project site, with noise levels increasing with proximity to the activity.

Businesses adjacent to the Project site within Irish Hills Plaza include Home Depot, TJ Maxx, and Whole Foods. The loading docks of these businesses are located approximately 60 to 70 feet from the Project site's northern boundary and directly face the Project. These businesses receive regular deliveries by large semi-trucks, as well as deliveries from smaller vendors with variable schedules and frequency. TJ Maxx typically has one semi-truck delivery that occurs from 6:30 AM to 8:30 AM on weekdays, with occasional deliveries on Saturdays and during holidays (TJ Maxx 2019). Home Depot typically has 10 to 15 daily weekday deliveries by semi-trucks that occur between 6:00 AM and 9:00 PM (Home Depot 2019). Whole Foods receives between 5 to 7 deliveries every day of the week by refrigerated semi-trucks that can occur from 5:00 AM to 1:30 PM Whole Foods 2019). In total, TJ Maxx, Whole Foods, and Home Deport receive a combined average of 82 weekly deliveries via semi-trucks to loading docks adjacent to the Project site, as well as multiple smaller deliveries (e.g., UPS, FedEx). In addition to the noise resulting from operation of semi-trucks, deliveries generate additional noises from equipment such as refrigeration units, forklifts, and loudspeakers. Additionally, backup alarms are required by law to be audible above background noise levels.

While vehicular noise identified in the Acoustics Assessment from LOVR and U.S. 101 constitute the main source of ambient noise levels onsite, periodic high noise levels generated by adjacent commercial uses also extend into the Project site.

3.10.1.3 Sensitive Receptors

Noise sensitive uses, or sensitive receptors, generally include single- and multi-family residences, schools, libraries, medical care facilities, retirement/assisted living homes, guest lodging, recreational areas, and places of worship. Such uses can be sensitive to increases in both short-term and long-term noise due to a range of issues, such as sleep disturbance and disruption of conversations, lectures or sermons, or decreased attractiveness of exterior use areas, such as patios, backyards, outdoor pool decks, or parks. Of particular concern is exposure of sensitive receptors to long-term elevated interior noise levels and sleep disturbance, which can be associated with health concerns.

No sensitive land uses are currently located within the Project site. Sensitive land uses in the Project vicinity include Mountainbrook Church and the hotels along Calle Joaquin. Mountainbrook Church is located approximately 75 feet from the southern boundary of the Project site and 580 feet from the Upper Terrace. The church is open daily and offers religious services throughout the week, including classes and programs for children and youth, with most programs offered during evenings and weekends. Four hotels (Rose Garden Inn, Courtyard by Marriott, Hampton Inn & Suites, and Motel 6), three of which have outdoor pools (Rose Garden Inn, Courtyard by Marriott, and Motel 6), are located approximately 40 to 160 feet to the east of the site boundary. These facilities lie along Calle Joaquin with setbacks of 75 to 230 feet between the roadway and the noise-sensitive uses (hotel rooms or pools). The closest school is Pacific Beach High School, which is approximately 0.27 mile northwest of the Project site. The closest existing residential area is approximately 0.3 mile northeast of the Project site.

Additionally, the Project site is located adjacent to the Irish Hills Natural Reserve, an approximately 1,110-acre City-owned natural open space area supporting substantial public recreational trails, as well as a wide variety of native habitats and wildlife species. Irish Hills Natural Reserve supports over 8 miles of trails, including Neil Havlik Way and the Froom Creek Trail, segments of which closely border the Project site. Although the exact distance from the Project boundary varies along these trails, the shortest distance is approximately 70 feet at the Project's northwest boundary. These trails draw hikers, trail runners, mountain bikers, and school groups attracted to the Reserve's natural and undeveloped character. This area also supports several special status wildlife species that

can be sensitive to noise – for discussion of possible noise impacts on wildlife (e.g., foraging, nesting, and reproductive activities), see Section 3.4, *Biological Resources*.

3.10.2 Regulatory Setting

Noise is governed primarily by federal, state, and local laws that would apply to future development under the Project. Federal, state, and local regulations that are directly relevant to the Project are summarized below.

3.10.2.1 Federal

Federal Transit Administration Criteria

The Federal Transit Administration (FTA) developed methodology and significance criteria to evaluate vibration impacts from surface transportation modes (i.e., passenger cars, trucks, buses, and rail) in the Transit Noise Impact and Vibration Assessment (Harris Miller Miller & Hanson Inc. 2006). For residential buildings (Category 2), the threshold applicable to these projects is 80 VdB.

Federal Noise Control Act (1972)

Public Law 92-574 regulates noise emissions from operation of all construction equipment and facilities; establishes noise emission standards for construction equipment and other categories of equipment; and provides standards for the testing, inspection, and monitoring of such equipment. This Act gives states and municipalities primary responsibility for noise control.

3.10.2.2 State

State of California's Guidelines for the Preparation and Content of Noise Element of the General Plan (1987)

These guidelines reference land use compatibility standards for community noise environments as developed by the California Department of Health Services, Office of Noise Control. Noise levels up to 60 L_{dn} or CNEL are determined to be normally acceptable for single-family residential land uses. Noise levels up to 65 L_{dn} or CNEL are determined to be normally acceptable for multi-family residential land and transient lodging (e.g., hotels) land uses. Noise levels up to 70 CNEL are normally acceptable for nursing homes, hospitals, neighborhood parks, and business commercial land uses.

The California Administrative Code Title 24, Noise Insulation Standards

These standards regulate interior noise levels for all new residences to 45 L_{dn} or below. If exterior noise levels exceed 60 L_{dn}, Title 24 requires the preparation of an acoustical analysis showing that the proposed design would limit the noise level to or below the interior 45 L_{dn} requirement.

3.10.2.3 Local

City of San Luis Obispo General Plan, Noise Element and Noise Guidebook (1996)

According to state law, a Noise Element is required in all city and county general plans. The City's maximum noise exposure standards for noise-sensitive land use (specific to transportation noise sources) are shown in Table 3.10-5. Since residential land uses are considered noise-sensitive, there are recommended maximum noise exposure guidelines.

Policy 1.3. New Development Design and Transportation Noise Sources. New noise-sensitive development shall be located and designed to meet the maximum outdoor and indoor noise exposure levels of Table 3.10-5.

Policy 1.4. New Transportation Noise Sources. Noise created by new transportation noise sources, including road, railroad, and airport expansion projects, shall be mitigated to not exceed the levels specified in Table 3.10-5 for outdoor activity areas and indoor spaces of noise-sensitive land uses which were established before the new transportation noise source.

Policy 1.6. New Development and Stationary Noise Sources. New development of noise-sensitive land uses may be permitted only where location or design allow the development to meet the standards of Table 3.10-5 for existing stationary noise sources.

Table 3.10-5. City Maximum Noise Exposure for Noise-Sensitive Land Use Areas Due to Transportation Noise Sources

Land Use	Outdoor Activity Areas[1]	Interior Spaces		
	L_{dn}[2] or CNEL	L_{dn}[2] or CNEL	L_{eq}[3]	L_{max}
Residences, hotels, motels, hospitals, nursing homes	60	45	--	60
Theaters, auditoriums, music halls	--	--	35	60
Churches, meeting halls, office building, mortuaries	60	--	45	--
Schools, libraries, museums	--	--	45	60
Neighborhood parks	65	--	--	--
Playgrounds	70	--	--	--

[1] If the location of outdoor activity areas is not shown in the column, the outdoor noise standard shall apply at the property line of the receiving land use.
[2] L_{dn} (day-night average noise level) is the is the energy-averaged noise level measured over a 24-hour period, with a 10-dB penalty assigned to noise events occurring between 10:00 PM and 7:00 AM and a 5-dB penalty assigned to noise events occurring between 7:00 PM and 10:00 PM.
[3] L_{eq} (equivalent noise level) is the constant or single noise level containing the same total energy as a time-varying sound, over a certain time. If the location of outdoor activity areas is not shown, the outdoor noise standard shall apply at the property line of the receiving land use.
Source: City of San Luis Obispo 1996.

Policy 1.7. New or Modified Stationary Noise Sources. Noise generated by new stationary sources, or by existing stationary noise sources which undergo modifications that may increase noise levels, shall be mitigated so as not to exceed the exposure standards for lands designated for noise-sensitive uses, as measured at the property line of the receiver.

The City's General Plan NE lists mitigation strategies in a descending order of desirability. If preferred strategies are not implemented, it is the responsibility of the Applicant to demonstrate through a detailed noise study that the more desirable approaches are either not effective or not practical, before considering other design criteria contained in the General Plan.

Policy 1.8. Preferred Noise Mitigation Approaches. When approving of new development of noise-sensitive uses or noise sources, the City will require noise mitigation in the descending order of desirability shown below.

1.8.1. Mitigating Noise Sources

A. Arrange activity areas on the site of the noise-producing project so project features, such as buildings containing uses that are not noise-sensitive, shield neighboring noise-sensitive uses;

B. Limit the operating times of noise-producing activities;

C. Provide features, such as walls, with a primary purpose of blocking noise.

1.8.2. Mitigating Outdoor Noise Exposure

A. Provide distance between noise source and recipient;

B. Provide distance plus planted earthen berms;

C. Provide distance and planted earthen berms, combined with sound walls;

D. Provide earthen berms combined with sound walls;

E. Provide sound walls only;

F. Integrate buildings and sound walls to create a continuous noise barrier.

1.8.3. Mitigating Indoor Noise Exposure

A. Achieve indoor noise level standards assuming windows are open;

B. Achieve indoor noise level standards assuming windows must be closed (this option requires air conditioning or mechanical ventilation in buildings).

Policy 1.10. Existing and Cumulative Impacts. The City would consider the following mitigation measures appropriate where existing noise levels significantly impact noise-sensitive land uses, or where cumulative increases in noise levels resulting from new development significantly impact existing noise-sensitive land uses:

A. Rerouting traffic onto streets that can maintain desired levels of service, consistent with the *Circulation Element*, and which do not adjoin noise-sensitive land uses;

B. Rerouting trucks onto streets that do not adjoin noise-sensitive land uses;

C. Constructing noise barriers;

D. Reducing traffic speeds through street or intersection design methods;

E. Retrofitting buildings with noise-reducing features;

F. Establishing financial programs, such as low-cost loans to owners of a noise-impacted property, or developer fees to fund noise-mitigation or trip-reduction programs.

New development of noise-sensitive land uses may only be permitted where standards are met via location or design, as outlined in Table 3.10-6.

Table 3.10-6. City Maximum Noise Exposure for Noise-Sensitive Land Use Areas Due to Stationary Noise Sources

	Daytime (7:00 AM to 10:00 PM)	Nighttime[2] (10:00 PM to 7:00 AM)
Hourly L_{eq} in dB[1, 2]	50	45
Maximum level in dB[1, 2]	70	65
Maximum impulsive noise in dB[1, 3]	65	60

[1] As determined at the property line of the receiver. When determining effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers or other property-line noise mitigation measures.
[2] Noise level measurements shall be made with slow meter response.
[3] Noise level measurements shall be made with fast meter response.
Source: City of San Luis Obispo 1996.

City of San Luis Obispo Municipal Code, Title 9, Chapter 9.12 (Noise Control)

The City's Municipal Code (Section 9.12.060) specifies noise standards for various categories of land use. These limits, shown in Table 3.10-7, would apply to long-term operation of the site, and are not applicable during construction. Prohibitions applied to creating noise for maximum time periods from any source within the City are shown in Table 3.10-8.

Where technically and economically feasible, construction activities shall be conducted so that maximum noise levels at affected properties would not exceed 75 dBA for single-family residential, 80 dBA for multi-family residential, and 85 dBA for mixed residential/commercial land uses, as shown in Table 3.10-9 and Table 3.10-10 (Municipal Code, Section 9.12.050). Except for emergency repair of public service utilities, or where an exception is issued by the City Community Development Department, no operation of tools or equipment used in construction, drilling, repair, alteration, or demolition work shall occur daily between the hours of 7:00 PM and 7:00 AM, or any time on Sundays or holidays, such that the sound creates a noise disturbance across a residential or commercial property line.

Table 3.10-7. City of San Luis Obispo Exterior Noise Limits

Zoning Designation[1]	Time Period	Maximum Acceptable Noise Level (dBA[2])[3]
Low- and Medium-Density Residential (R-1 and R-2); Conservation/Open Space (C/OS)	10:00 PM – 7:00 AM	50
	7:00 AM – 10:00 PM	55
Medium- and High-Density Residential (R-3 and R-4)	10:00 PM – 7:00 AM	50
	7:00 AM – 10:00 PM	55
Office and Public Facility (O and PF)	10:00 PM – 7:00 AM	55
	7:00 AM – 10:00 PM	60
Neighborhood, Retail, Community, Downtown and Tourist Commercial (C-N, C-R, C-C, C-D, C-T)	10:00 PM – 7:00 AM	60
	7:00 AM – 10:00 PM	65
Service Commercial (C-S)	Any Time	70
Manufacturing (M)	Any Time	75

[1] The classification of different areas of the community in terms of environmental noise zones shall be determined by the Noise Control Office(r) based upon community noise survey data. Additional area classifications should be used as appropriate to reflect both lower and higher existing ambient levels than those shown. Industrial noise limits are intended primarily for use at the boundary of industrial zones rather than for noise reduction within the zone (Ord. 1032 § 2 [part] 1985)
[2] dBA (A-weighted decibel scale) emphasizes the range of sound frequencies that are most audible to the human ear (between 1,000 and 8,000 Hertz).
[3] Levels not to be exceeded more than 30 minutes in any hour.
Source: City of San Luis Obispo 2008.

Table 3.10-8. Maximum Time Periods for Increased Noise Levels

Noise Standard for Existing Land Use	Maximum Time Period Allowed
+0 dB	30 minutes/hour
+5 dB	15 minutes/hour
+10 dB	5 minutes/hour
+15 dB	1 minute/hour
+20 dB	Any time

Source: City of San Luis Obispo 1996.

Table 3.10-9. Maximum Noise Levels for Nonscheduled, Intermittent, Short-Term Operation (Less than 10 Days) of Mobile Equipment at Residential Properties

Zoning Category	Time Period	Noise Level (dBA)
Single-Family Residential	Daily 7:00 AM to 7:00 PM, except Sundays and legal holidays	75
Multi-Family Residential		80
Mixed Residential/Commercial		85
Single-Family Residential	7:00 PM to 7:00 AM, all day Sunday and legal holidays	50
Multi-Family Residential		55
Mixed Residential/Commercial		60

Source: City of San Luis Obispo 2008.

Table 3.10-10. Maximum Noise Levels for Repetitively Scheduled, Relatively Long-Term Operation (10 Days or More) of Stationary Equipment at Residential Properties

Zoning Category	Time Period	Noise Level (dBA)
Single-Family Residential	Daily 7:00 AM to 7:00 PM, except Sundays and legal holidays	60
Multi-Family Residential		65
Mixed Residential/Commercial		70
Single-Family Residential	Daily 7:00 PM to 7:00 AM, including all day Sunday and legal holidays	50
Multi-Family Residential		55
Mixed Residential/Commercial		60

Source: City of San Luis Obispo 2008.

3.10.3 Environmental Impact Analysis

3.10.3.1 Thresholds of Significance

Noise levels for the Project must comply with relevant noise policies, standards, and ordinances. Appendix G of the CEQA Guidelines provides a set of screening questions that address impacts related to noise. Specifically, the Guidelines state that a proposed project may have a significant adverse impact related to noise if the project would:

a) Result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies;

b) Result in the generation of excessive groundborne vibration or groundborne noise levels; and

c) For a project located in the vicinity of a private airstrip or airport land use plan or, where such a plan has not been adopted within 2 miles of a public airport or public use airport, the project would expose people residing or working in the project area to excessive noise levels.

3.10.3.2 Impact Assessment Methodology

This analysis was based on review and analysis of the City General Plan NE, the 2014 LUCE Update EIR, the County General Plan NE, the ALUP, the Federal Highway Administration (FHWA) Highway Noise Prediction Model (FHWA-RD-77-108; FHWA Model), the Applicant-prepared Acoustics Assessment for the Project (Appendix I), and

third party peer review of this Acoustics Assessment by the EIR consultant's technical noise specialist.

Construction Noise

Noise impacts related to construction traffic are assessed against noise levels permitted in in the City Municipal Code Section 9.12.060. Noise associated with construction trips is considered an intermittent rather than ongoing noise source, and impacts are accordingly assessed in relation to Table 3.10-8, *Maximum Time Periods for Increased Noise Levels*. Projected construction noise levels are analyzed based on typical construction equipment required for Project development, construction BMPs, and distance between sensitive receptors and anticipated construction activities.

The construction noise impact analysis assumes that Project development would occur over a five-year period in four phases as detailed in Table 2-7, Section 2.0, *Project Description*. Each phase of construction would involve different equipment and activities that would at times overlap and potentially amplify noise levels. For example, the Project would require import of 220,000 cy of soil and 2,300 cy of rock over five years. Utilizing a conservative worst-case approach, the analysis assumes the use of smaller haul trucks and determined Project development could require up to 22,000 heavy haul truck trips.[2] Construction traffic would also include earth and rock export/import, construction material deliveries, and cement trucks.

Although precise numbers are not known, most of the approximately 22,000 heavy truck trips, particularly those associated with hauling of earth and rock, are assumed to access the site directly via the proposed main entrance at LOVR and Auto Park Way during the 21 months of Phase 1 and much of the 29 months of Phase 2. However, after occupancy of residential units in Villaggio's Lower Area toward the end of Phase 2, construction traffic, including a smaller portion of heavy trucks, would access the proposed stormwater detention basin area from Calle Joaquin and the Upper Terrace via Mountainbrook Church's private roadway. Potential impacts of haul trucks traffic on sensitive receptors are analyzed based on the estimated noise level generated by a heavy haul or cement trucks and the estimated distance of sensitive receptors from roadways carrying heavy haul truck

[2] Estimated trips are based on a worst-case estimate for use of single box trucks. Haul truck capacities typically range from 10 cy with a single box to 20 cy with a double box; use of larger single box trucks with a 14-cy capacity is also common. Although major haul projects typically use larger load, 14 to 20 cy load trucks, the final mix of truck sizes cannot be known and will be based on economics, availability, and access routes, making precise numbers difficult to forecast.

traffic. Analysis of noise impacts from construction traffic trips are considered for two potential construction haul routes:

1. Primary heavy haul truck trip access during Phase 1, much of Phase 2 and all of Phase 4 would be through the main Project site entry at LOVR and Auto Park Way, via LOVR. Trucks would use internal Local Road "C" or an interim road along this alignment to access the site and the Upper Terrace during rough grading, but not after the occupancy of units in the Lower Area of Villaggio in the later stages of Phase 2. Construction traffic for the Madonna Froom Ranch residential and commercial development would use the main Project entrance off LOVR.

2. Deliveries of construction materials and heavy equipment along with cement trucks for foundation pours at the Upper Terrace would use the Mountainbrook Church access route.

Construction noise levels were estimated using data published by the FHWA regarding the noise-generating characteristics of typical construction equipment (see Table 3.10-11). Construction noise levels diminish rapidly with distance, at a rate of approximately 6 dBA per doubling of distance as equipment is generally stationary or confined to specific area or access routes during construction. For example, a noise level of 86 dBA measured at 50 feet from the noise source would be reduced to 80 dBA at 100 feet from the source, and by another 6 dBA (to 74 dBA) at 200 feet from the source. The noise levels from construction at the offsite sensitive uses can be determined with the following equation from the High-Speed Ground Noise and Vibration Impact Assessment, Final Report:

$$L_{max} \text{ at sensitive use} = L_{max} \text{ at 50 feet} - 20 \text{ Log}(D/50)$$

Where: L_{max} = noise level of noise source, D = distance from the noise source to the receiver, and L_{max} at 50 feet = noise level of source at 50 feet (U.S. Department of Transportation 2012).

Table 3.10-11. Noise Ranges of Typical Construction Equipment

Construction Equipment	Noise Levels in dBA L_{eq} at 50 Feet
Back Hoe	73–95
Backup Alarm	88
Compressors	75–87
Concrete Mixer	75–88
Concrete Mixer Truck	79
Concrete Pump Truck	81
Concrete Pumps	81–85
Cranes (derrick)	86–89
Cranes (moveable)	75–88
Forklift	80
Generators	71–83
Haul Trucks (operation)	82–95
Haul Trucks (transportation)	85
Jackhammers	81–98
Paver	85–88
Pneumatic Tools	85
Pumps	68–72
Saws	72–82
Scraper/Grader	80–93
Semi-truck	85
Tractor	77–98
Vacuum Street Sweeper	82
Vibrator	68–82

Note: Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of noise emissions as that shown in this table.
Sources**:** U.S. Department of Transportation 2013; FHWA 2006.

As set forth in the City Municipal Code, Section 9.12.050, construction activities within the City are generally permissible between 7:00 AM and 7:00 PM on weekdays and Saturdays. During these hours, the City permits long-term construction noise (in excess of 10 days) up to 70 dBA for commercial sensitive receptors, and 65 dBA for residential sensitive receptors (refer to Table 3.10-9) or up to 20 dBA above normally acceptable levels for any instantaneous noise event (refer to Table 3.10-8). Construction noise in excess of these levels would be considered significant.

Vibration Levels Associated with Construction Equipment

Construction-related groundborne vibration levels were estimated using the 2013 Caltrans Transportation and Construction Vibration Guidance Manual. Caltrans provides thresholds of significance for vibration and a methodology for calculating vibration levels at a certain distance from the generating source. Table 3.10-12 indicates vibration levels at which humans would be affected. Table 3.10-13 identifies anticipated vibration velocity levels in inches per second (in/sec) for standard types of construction equipment based on distance from the receptor. Vibration impacts are assessed by estimating the vibration levels of Project construction equipment and the distance of sensitive receptors to the vibration source. Vibration impacts include those from excavation and other onsite construction activities, as well as those associated with heavy haul trucks and concrete trucks.

Vibration levels at sensitive uses are determined using the following equation:

$$PPV_{Projected} = PPV_{Ref} (25/D)^{n}$$

Where: PPVRef = reference Peak Particle Velocity (in/sec) at 25 feet; D = distance from equipment to the receiver in feet; n = 1.1 (a recommended conservative value pertaining to attenuation rate of vibration through ground).

Table 3.10-12. Caltrans Vibration Annoyance Potential Criteria

Human Response Condition	Maximum Vibration Level (in/sec) for Transient Sources[1]	Maximum Vibration Level (in/sec) for Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

[1] Transit sources are defined as temporary sustained vibration of a mechanical system.
Source: Caltrans 2013.

Table 3.10-13. Vibration Source Levels for Construction Equipment

Construction Equipment	Vibration Level (in/sec) at 25 feet	Vibration Level (in/sec) at 50 feet	Vibration Level (in/sec) at 100 feet
Large Bulldozer	0.089	0.031	0.011
Loaded Trucks (e.g., cement truck)	0.076	0.035	0.017
Jackhammer	0.035	0.016	0.008
Small Bulldozer	0.003	0.001	0.0004

Source: Caltrans 2013.

Operational Roadway Noise

Policy 1.4 of the City's General Plan NE sets maximum noise exposure standards for noise-sensitive land use specific to transportation noise sources (refer to Table 3.10-5). Noise in excess of these levels would be considered significant. Project-generated increases in roadway noise levels are considered in terms of potential to increase traffic volumes above existing conditions. Project implementation would increase traffic and traffic-generated noise on nearby roadways. In addition, future Project residents could be exposed to noise generated on adjacent roadways.

Analysis of mobile source noise impacts includes review of LUCE Update EIR estimated roadway noise levels in the Project vicinity for U.S. 101 and LOVR, and the Acoustics Assessment prepared for the Project for existing and future roadway noise level estimates within the Project site (Appendix I). As discussed in Section 3.10.1.2, *Existing Noise Environment*, the LUCE Update EIR noise modeling does not account for physical features, such as the Mountainbrook Church hill or hotels along Calle Joaquin, and therefore overstates onsite noise levels from U.S. 101. The Acoustics Assessment appears to most accurately reflect roadway noise levels from LOVR and is therefore used for assessment of those impacts.

Stationary Noise Sources

Commercial operation noise levels are estimated using data regarding the noise-generating characteristics of typical commercial equipment published by the FHWA, Environmental Health Perspectives, and the U.S. Department of Transportation (see Table 3.10-14). The City's Municipal Code (Section 9.12.060) specifies noise exposure standards for future uses within the Project site (Table 3.10-7). Noise generated from residential or other non-commercial uses within and adjacent to the Project site are estimated based on the typical dBA levels generated from urban uses, such as heating, ventilation, and air conditioning (HVAC) equipment, delivery trucks, and other common uses, as well as the distance of major adjacent noise generating sources (e.g., loading docks).

Table 3.10-14. Noise Ranges of Typical Commercial Equipment

Construction Equipment	Noise Levels in dBA L_{eq} at 50 Feet
Backup Alarm	88[1]
HVAC	55[2]
Forklift	80
Loudspeakers	89
Pneumatic Tools	85
Semi-truck	85
Vacuum Street Sweeper	82

Note: Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of noise emissions as that shown in this table.
[1]While this represents typical backup alarm levels, alarms are required by law to be audible above ambient noise levels.
[2]This represents noise levels following typical attenuation methods including fitting with noise shielding cabinets or placement on a roof or mechanical equipment room.
Sources**:** U.S. Department of Transportation 2013; FHWA 2006; Holzman 2011.

Assessment of potential impacts to future residents from roadways and adjacent uses accounts for existing measured and mapped noise levels, as well as Project design features intended to minimize impacts to future residents (e.g., inclusion of noise-reducing building materials).

3.10.3.3 Project Impacts and Mitigation Measures

Potentially sensitive uses that could be affected by Project construction noise and vibration, as well as Project operational noise impacts include Mountainbrook Church, hotels along Calle Joaquin, passive recreational uses within the Irish Hills Natural Reserve, and future noise-sensitive Project components, particularly residential uses in Villaggio's Lower Area, which are proposed to be occupied during intensive construction activities associated with later phases. In addition, future Project residents could be exposed to existing and future roadway noise and noise generated from adjacent commercial operations. Noise from aircraft overflights do not generate high noise levels under current and projected airport operations. Short-term construction and long-term operational impacts are analyzed for the existing and future noise environment, and appropriate noise-control mitigation measures are recommended below.

Table 3.10-15. Summary of Project Impacts

Noise Impacts	Mitigation Measures	Residual Significance
NO-1. Project construction, including site grading and heavy truck trips, would generate noise levels that exceed thresholds established in the City's General Plan Noise Element and Noise Guidebook resulting in potentially significant impacts to proximate sensitive receptors.	MM NO-1 MM NO-2 MM NO-3	Less than Significant with Mitigation
NO-2. Project construction activities (e.g., excavation, transportation of heavy equipment) could result in exposure of sensitive receptors and buildings to excessive groundborne vibration.	None Required	Less than Significant
NO-3. Long-term operational noise impacts would include higher roadway noise levels from increased vehicle traffic generated by the Project, Project operational noise, and exposure of future residents to high noise levels that could result in the exceedance of thresholds in the City's General Plan Noise Element and Noise Guidelines.	None Required	Less than Significant
NO-4. Future residents and occupants of the Project could be exposed to periodic high noise levels from nearby commercial uses (e.g., delivery trucks, forklifts, backup alarms) that would exceed City thresholds for residential land uses.	MM NO-4	Less than Significant with Mitigation

Impact NO-1 Project construction, including site grading and heavy truck trips, would generate noise levels that exceed thresholds established in the City's General Plan Noise Element and Noise Guidebook resulting in potentially significant impacts to proximate sensitive receptors (Less than Significant with Mitigation).

Project construction would extend over a five-year period and include approximately 570,000 cy of grading, with 220,000 cy of imported fill for the construction of proposed development within the Project site, including 404 senior housing units within Villaggio and up to 174 multi-family residential units, with over 2 miles of new roads and driveways, utilities, and major drainage improvements, including realignment and widening of Froom Creek. Each phase of construction would involve different equipment and activities that would at times overlap and potentially amplify construction-related noise levels. Utilizing a conservative worst-case approach, it is assumed that Project construction would utilize smaller haul trucks, requiring up to 22,000 heavy haul truck trips for import/export of fill

material.[3] Construction traffic would also include earth and rock export/import, construction material deliveries, and cement trucks. The analysis assumes these trips would occur within the Project site. However, after occupancy of residential units in Villaggio's Lower Area toward the end of Phase 2, construction traffic, including a smaller portion of heavy trucks, would access the proposed stormwater detention basin area from Calle Joaquin and the Upper Terrace via Mountainbrook Church's private roadway.

Construction activities would generate increased noise that could impact surrounding uses, particularly the use of earth moving equipment (e.g., bulldozers) and heavy haul trucks. Construction noise levels vary depending on the amount and types of equipment used, timing, and location of the activity in relation to the receptor (refer to Table 3.10-11).

Site preparation and grading would involve roughly 60 acres and occur in different locations in Phases 1 through 3. Rough grading and transport of excess material within the site, as well as import of more than 220,000 cy of fill and rock by heavy haul trucks during these phases, would generate increased onsite and offsite noise levels. High levels of construction noise would be generated by excavation equipment, internal haul truck trips, and importation of fill from offsite. Grading and importation of fill would initially precede and then be overlapped with construction of roadways, building pads, and utilities.

Rough grading and site preparation during Phases 1 through 3 would generate the highest construction noise levels due to operation of heavy equipment and heavy haul trucks. Specifically, rough grading, heavy truck trips, and construction in areas of the site proximate to sensitive receptors (such as hotels along Calle Joaquin, the Irish Hills Natural Reserve, and Mountainbrook Church) would generate potential impacts. Noise would also occur from sources such as backup warning devices, which would be audible offsite.

Construction activities proximate to Calle Joaquin, including realignment of Froom Creek and construction of the proposed stormwater detention basin and Lower Area of Villaggio could impact sensitive receptors, such as hotel guests. Periodic maximum construction noise levels are estimated to be as high as 85 dB at the nearest hotel building and 81 dB at the nearest hotel pool. Construction close to Mountainbrook Church (e.g., the emergency access road, haul truck trips) could generate noise levels of up to 91 dB (Table 3.1-16).

[3] Estimated trips are based on a worst-case estimate for use of single box trucks. Haul truck capacities typically range from 10 cy with a single box to 20 cy with a double box; use of larger single box trucks with a 14-cy capacity is also common. Although major haul projects typically use larger load 14- to 20-cy load trucks, the final mix of truck sizes cannot be known as it will be based on economics, availability, and access routes, making precise numbers difficult to forecast.

Generally, noise levels generated by construction activities would be reduced by 20 to 30 dB within structures, depending on building materials.

Hikers, mountain bikers, and other users of the trails in the Irish Hills Natural Reserve would also be exposed to noise impacts from all phases of Project construction. Depending upon the phase of the Project, noise levels for trail users could reach 90 dBA with users exposed to such noise levels for 15 to 30 minutes depending upon the trail and mode of use (e.g., walking vs. mountain bike).

In addition, the Project phasing would allow occupancy of the Lower Area of Villaggio to be occupied as early as 2022. Occupancy would precede later construction phases of the Upper Terrace and Madonna Froom Ranch. While grading of the site would be complete by 2022, fine grading and vertical construction of the Upper Terrace and Madonna Froom Ranch would continue between 2022 and 2025, which would generate noise from trucks and heavy construction equipment. Senior independent living residences, the Villaggio Health Care Administration building, and senior assisted living facilities occupied in 2022 would be considered sensitive receptors to noise from Project construction. Grading, onsite transport of cut material between the Upper Terrace and Madonna Froom Ranch areas, and import of offsite fill to the Madonna Froom Ranch Area would potentially generate excessive noise levels from heavy construction equipment and heavy haul trucks.

To protect future residents in Villaggio's Lower Area from excessive construction noise generated during Phases 3 and 4 (see Section 2.0, *Project Description*), the Applicant proposes to strategically schedule grading of the Upper Terrace (Phase 3) to occur at the same time as grading activities associated with Phase 1 and 2. All major grading and earthmoving, including balancing soils within the Project site, would occur prior to occupancy of any units within the Specific Plan area. Once occupancy begins, the Project would reroute construction trips to the Upper Terrace, including any heavy haul or materials delivery trips, along Calle Joaquin to the Mountainbrook Church driveway and parking lot instead of through the local roads constructed to serve the Project. This circulation approach would move sources of substantial construction noise offsite and away from sensitive receptors residing onsite within the Lower Area once it is constructed. This proposed construction phasing would therefore reduce the potential for exposure of sensitive elderly populations to the most intensive construction activities and noise levels associated with development under the Project.

Overall, Project construction maximum noise levels could reach as high as 89 to 92 dBA at surrounding sensitive uses, including hotels along Calle Joaquin, Mountainbrook Church

and within the Irish Hills Natural Reserve (see Table 3.10-16). The City Municipal Code permits construction noise up to 70 dBA for commercial sensitive receptors and up to 20 dBA above normally acceptable levels for any instantaneous noise event. Project construction activities could exceed these thresholds both in peak noise and duration; therefore, impacts are *potentially significant*.

Table 3.10-16. Maximum Estimated Outdoor Construction Peak Noise Levels at Sensitive Receptors (Unmitigated)

	Mountainbrook Church	Nearest Hotel Building	Nearest Hotel Pool	Neil Havlik Way Trail
Minimum distance from construction activity (feet)	60	100	140	70
Construction Noise (dBA L_{max})	91	92	89	90

Note: Noise levels at sensitive uses were determined with the following equation from the High-Speed Ground Noise and Vibration Impact Assessment, Final Report: L_{max} = L_{max} at 50 feet. – 20 Log(D/50), where L_{max} = noise level of noise source, D = distance from the noise source to the receiver, L_{max} at 50 feet = noise level of source at 50 feet. Noise levels represent the lower and upper limits of graders as displayed in Table 3.10-11. Noise levels have been rounded up to the nearest whole number.
Source: U.S. Department of Transportation 2012.

Mitigation Measures

MM NO-1 *Except for emergency repair of public service utilities, or where an exception is issued by the Community Development Department, no operation of tools or equipment used in construction, drilling, repair, alteration, or demolition work shall occur between the hours of 7:00 PM and 7:00 AM, or any time on Sundays, holidays, or after sunset, such that the sound creates a noise disturbance that exceeds 75 dBA for single-family residential uses, 80 dBA for multi-family residential uses, and 85 dBA for mixed residential/commercial land uses, as shown in Table 3.10-9 and Table 3.10-10, across a residential or commercial property line.*

Requirements and Timing. Plans submitted for grading and building permits shall clearly indicate construction hours and shall be submitted to the City for approval prior to grading and building permit issuance for each Project phase. To ensure response to and resolution of potential public noise nuisance complaints, plans submitted for grading and building permits shall clearly identify the Project's construction manager (or similar) and 24-hour contact information. At the pre-construction meeting required for all phases of grading and development, all construction workers shall be briefed on

restricted construction hour limitations. A workday schedule shall be adhered to for the duration of construction for all phases.

Monitoring. The Applicant's permit compliance monitoring staff shall perform periodic site inspections to verify compliance with activity schedules and respond to complaints.

MM NO-2 *For all construction activity at the Project site, noise attenuation techniques shall be employed to ensure that noise levels are maintained within levels allowed by the City of San Luis Obispo Municipal Code, Title 9, Chapter 9.12 (Noise Control). Such techniques shall include:*

- *Sound blankets on noise-generating equipment.*
- *Stationary construction equipment that generates noise levels above 65 dBA at the Project boundaries shall be shielded with a barrier that meets a sound transmission class (a rating of how well noise barriers attenuate sound) of 25.*
- *All diesel equipment shall be operated with closed engine doors and shall be equipped with factory-recommended mufflers.*
- *Temporary sound barriers shall be constructed between construction sites and affected uses.*

Requirements and Timing. The Applicant shall designate the proposed area of operation of stationary construction equipment and depict acoustic shielding around these areas on building and grading plans. Equipment and shielding shall be installed prior to construction and remain in the designated location throughout construction activities. Construction plans shall identify Best Management Practices (BMPs) to be implemented during construction. All construction workers shall be briefed at a pre-construction meeting on how, why, and where BMP measures are to be implemented. BMPs shall be identified and described for submittal to the City for review and approval prior to building or grading permit issuance. BMPs shall be adhered to for the duration of the Project. Construction plans shall include truck routes and shall be submitted to the City prior to grading and building permit issuance for each Project phase.

Monitoring. City staff shall ensure compliance throughout all construction phases. The Applicant's permit compliance monitoring staff shall perform periodic site inspections to verify compliance with activity schedules.

MM NO-3 *The Applicant shall inform landowners and business operators at properties within 300 feet of the Project site of proposed construction timelines and noise complaint procedures to minimize potential annoyance or nuisance complaints related to construction noise no less than 10 days prior to initiation of any grading and construction activity for any Phase. The notice shall include the name and contact information of the Project's construction manager and contact information for the City's Community Development Department.*

Requirements and Timing. The Applicant shall provide and post signs stating these restrictions and the Project's construction manager's name and contact information at construction site entries. Signs shall be posted prior to commencement of construction and maintained throughout construction of any Phase. The construction schedule and mailing list shall be submitted to the City Community Development Department 10 days prior to initiation of any earth movement.

Monitoring. City staff shall ensure compliance throughout all construction phases. The Applicant's permit compliance monitoring staff shall perform periodic site inspections to verify compliance with activity schedules and respond to complaints.

Residual Impact

Noise from construction activities associated with Impact NO-1 would be reduced with implementation of MM NO-1 through -3. These measures require that the Applicant limit certain construction activities, provide noise attenuation measures to reduce perceived interior and exterior noise levels, and notice nearby landowners of construction activities and establish methods for addressing complaints. These measures, particularly MM NO-2, would ensure construction noise levels are reduced to levels acceptable under City standards. Therefore, residual impacts to Impact NO-1 would be *less than significant.*

Impact NO-2 Project construction activities (e.g., excavation, transportation of heavy equipment) could result in exposure of sensitive receptors and buildings to excessive groundborne vibration (Less than Significant).

Project construction could increase exposure of sensitive receptors to excessive vibration levels. Based on Caltrans vibration criteria in Table 3.10-12 and Table 3.10-13, sensitive receptors within 100 feet of construction activities could be subject to excessive vibration from construction equipment. Sensitive receptors would include Mountainbrook Church and hotels along Calle Joaquin.

Based on the distance and type of anticipated construction equipment and activities, these sensitive receptors could experience periodic vibrations up to 0.047 in/sec. As construction would be a frequent source of vibration for extended periods, this would be distinctly perceptible. However, vibration levels experienced by offsite sensitive receptors would not exceed the threshold of 0.10 in/sec. These vibrations would be temporary and intermittent due to the nature of construction, and would only occur during the hours of construction, generally 7:00 AM to 7:00 PM except for Sundays and holidays.

With regard to onsite sensitive receptors, as discussed above, to protect future residents in Villaggio's Lower Area from excessive construction noise and vibrations generated during Phases 3 and 4 (see Section 2.0, *Project Description*), the Applicant proposes to strategically schedule grading of the Upper Terrace (Phase 3) to occur at the same time as grading activities associated with Phase 1 and 2, to avoid construction-related impacts of later phases on Lower Area Villaggio occupants. Once occupancy begins, the Project would reroute construction trips to the Upper Terrace via Calle Joaquin to the Mountainbrook Church driveway and parking lot instead of through the local roads constructed to serve the Project. This circulation approach would move sources of construction vibration offsite and away from sensitive receptors residing onsite within the Villaggio Lower Area once it is constructed. This proposed construction approach would reduce potential for exposure of sensitive elderly populations to the most intensive construction activities and groundborne vibrations associated with development under the Project.

Because anticipated vibration levels would be substantially lower than thresholds established by Caltrans (See Table 3.10-12), vibration impacts to offsite sensitive receptors as a result of construction would be *less than significant*.

Impact NO-3 Long-term operational noise impacts would include higher roadway noise levels from increased vehicle traffic generated by the Project, Project operational noise, and exposure of future residents to high noise levels that could result in the exceedance of thresholds in the City's General Plan Noise Element and Noise Guidelines (Less than Significant).

Increased Roadway Noise

The Project would increase traffic on U.S. 101 and LOVR and could contribute to increased noise levels from traffic. Under typical circumstances, projected traffic volumes generally need to double over existing volumes in order for associated noise levels to increase by approximately 3 dBA – the increase in noise level that is generally perceptible to the human ear. As depicted in Table 3.10-17, projected ADT on LOVR are estimated to increase by approximately 16.7 percent as a result of this Project, with an associated increase of less than 1.0 dBA along this roadway. Project generated trips on U.S. 101 are expected to increase by approximately 2.4 percent, which is similarly associated with a less than 1.0 dBA increase. Increased traffic ADTs along Calle Joaquin would be negligible with no perceptible increase in noise levels. Given marginal Project-generated increases in traffic and associated roadway noise levels along U.S. 101, LOVR, and Calle Joaquin, the Project would not result in a significant contribution to the existing noise environment which would result in exceedance of noise standards at nearby offsite receptors. Further, given the Project would not expose future residents to unacceptable noise levels generated at nearby roadways, traffic-related noise impacts are considered *less than significant.*

Table 3.10-17. Projected Traffic and Noise Level Increases along Adjacent Roadways

Roadway Segment	Existing ADT	Projected ADT (% increase)	Projected Noise Level Increase (dBA)
LOVR	31,000	5,183 (16.7%)	< 1
U.S. 101	80,000	1,555 (2.4%)	< 1

Notes: Projected noise level increases were estimated from projected increases in ADT based on the following formula: $dBA=10Log_{10}$ (Projected ADT/Existing ADT).
Source: Caltrans 2017; City of San Luis Obispo 2016.

Exposure of Future Project Residents to High Noise Levels

Roadways near the Project site experience high levels of traffic that could result in noise impacts to future sensitive receptors onsite. The portion of U.S. 101 adjacent to the Project

site carries up to 80,000 ADTs and is located approximately 940 feet from the nearest proposed residential building (in the Lower Area of Villaggio). LOVR also lies adjacent to the Project site and carries approximately 31,000 ADTs. LOVR is located approximately 170 feet from the nearest residential unit in Villaggio's Lower Area, approximately 300 feet from proposed health care facilities within Villaggio's Lower Area, and approximately 170 feet from the nearest proposed multi-family residential unit in Madonna Froom Ranch.

Maximum allowable noise exposure resulting from transportation sources for residences, hotels, and office buildings within the City is 60 dBA in exterior areas and 45 dBA within interior spaces (See Table 3.10-5). Maximum allowable exposure of neighborhood parks within the City is 65 dBA. The Acoustics Assessment prepared for the Project site modeled the 60 dBA noise contour to be outside of these residential areas and proposed neighborhood park and estimates that residential land uses would be approximately 42 to 57 dBA. Noise levels at the proposed neighborhood park are estimated to be 42 to 51 dBA (Appendix I). Therefore, roadway noise levels would not exceed City standards for exterior and interior noise levels under implementation of the Project. Associated impacts are considered *less than significant.*

Operational Activities

Under the Project, long-term operational noise impacts would include noise from operation of HVAC systems, landscaping and maintenance activities, and other typical residential and commercial noise-generating uses.

Noise levels from commercial HVAC equipment can reach 100 dBA at a distance of 3 feet U.S. EPA 1971); however, these units are typically fitted with noise shielding cabinets, placed on the roof or in mechanical equipment rooms to reduce noise levels. Noise from mechanical equipment associated with operation of the Project is required to comply with the CBC requirements pertaining to noise attenuation. Therefore, with the application of these noise reduction techniques, noise from these pieces of equipment does not typically exceed 55 dBA at 50 feet, and would not exceed 45 dBA CNEL in any habitable room as required by Title 24 of the CBC. As such, the operation of HVAC systems would not exceed City exterior noise limits (see Table 3.10-7).

Landscaping and maintenance activities may include the use of equipment such as noise-compliant leaf blowers or hedge trimmers, which would reach levels of 65 dBA at 50 feet. Maximum permissible noise levels for nonscheduled, intermittent, short-term operation of mobile equipment on multi-family residential properties from 7:00 AM to 7:00 PM,

excepting Sundays and holidays, ranges from 80 to 85 dBA (see Table 3.10-9). Expected noise levels of equipment would be further reduced due to the fact that the nearest noise-sensitive receptor is located 100 feet away.

The noise impacts from operation of the proposed development would be typical of similar uses and would not constitute a substantial increase in ambient noise levels at offsite locations and therefore would not exceed interior or exterior ambient noise thresholds at offsite locations. Therefore, impacts related to the operation of stationary equipment and site maintenance activities resulting from the Project would be *less than significant*.

Impact NO-4 Periodic high noise levels from nearby commercial uses (e.g., delivery trucks, forklifts, backup alarms) may exceed City thresholds for residential land uses (Less than Significant with Mitigation).

Residential uses of the Madonna Froom Ranch neighborhood could be exposed to periodic high noise levels from commercial operations in the Irish Hills Plaza Shopping Center, particularly from loading dock operations. Commercial facilities within the Irish Hills Plaza support regular deliveries by large semi-trucks that can occur from 6:00 AM to 9:00 PM and generate noise from semi-trucks, refrigeration units, forklifts, and loudspeakers. Additionally, backup alarms are required and would also create intermittent high noise levels. General maintenance activities for the Irish Hills Plaza, including vacuum street sweeping and dump truck circulation, would also generate intermittent peak noise. Sensitive receptors that would be potentially affected by intermittent high noise levels from adjacent commercial uses include the proposed neighborhood park, hotel, retail/office spaces, and residents in the Madonna Froom Ranch neighborhood. Proposed residences along the northwestern Project boundary and the proposed park would be located within 80 to 220 feet of the Home Depot loading dock and garden shop. The proposed hotel and retail and office spaces are located within 175 to 250 feet of the TJ Maxx and Whole Foods loading docks, while proposed multi-family residences are within 440 feet. Given these intervening distances and noise levels from commercial operations, intermittent exterior noise levels could reach up to 76 dBA at some of the proposed Madonna Froom Ranch residences, 85 dBA within the proposed public park, 77 dB at the proposed hotel, and 74 dB at the proposed retail and office spaces (see Table 3.10-18). While noise levels from HVAC equipment for offsite commercial facilities can reach up to 100 dBA, units compliant with CBC noise attenuation requirements do not typically exceed 55 dBA at 50 feet and would not have a notable impact on the Project site.

Automobile dealerships and associated automobile repair facilities located across LOVR also have the potential to generate noise impacts. Noise sources resulting from these facilities include outdoor loudspeakers and automobile service activities (e.g., pneumatic air guns). Future onsite sensitive receptors potentially impacted by automobile dealership generated noise would include the proposed Villaggio Lower Area health care facilities located approximately 550 feet away and Madonna Froom Ranch multi-family housing located approximately 370 feet away. Given intervening distances and maximum equipment noise levels, periodic exterior noise levels from these sources could reach up to 68 dBA at the proposed Health Care Administration Building and 72 dBA at the proposed multi-family housing units. However, given its intermittent nature and distance from the site, automobile dealership noise would be considered a nuisance, but *less than significant*.

Irish Hills Plaza loading dock receives regular deliveries by large semi-trucks, as well as deliveries from smaller vendors with variable schedules and frequency. Approximately 82 average weekly deliveries via semi-trucks to loading docks adjacent to future sensitive receptors, as well as multiple smaller deliveries (e.g., UPS, FedEx) could lead to substantial noise impacts in excess of adopted City standards. In addition to the noise resulting from operation of semi-trucks, deliveries generate additional noises from equipment such as refrigeration units, forklifts, loudspeakers and backup alarms. As presented in Table 3.10-18, typical noise generated by such activities could range from 68 to 85 dB throughout the Madonna Froom Ranch development. While noise generated by loading dock operations would be heard in exterior areas of the proposed hotel, retail/office uses, and health care facilities, the maximum noise level is not projected to exceed City standards. However, loading dock operational noise could exceed exterior noise standards for the public park and multi-family residential uses. Given the potential for these noise activities to exceed exterior noise limits for park and residential uses within Madonna Froom Ranch, impacts are considered *potentially significant*.

Table 3.10-18. Maximum Noise Level Estimates and Thresholds Resulting from Nearby Commercial Activities

	Park	Hotel	MFR R-3-SP Residences	MFR R-4-SP Housing	Health Care Facilities	Retail/ Office
Maximum Noise Level (dB)	85	77	76	72	68	74
City Exterior Noise Limit – 30 minutes or more[1] (dBA)	60	65	60	55	55	60
City Exterior Noise Limit – 1 minute[2] (dBA)	75	80	75	70	70	75

[1] Noise Standard for Land Use within Section 9.12.060 of the City Municipal Code. Levels not to be exceeded more than 30 minutes in any hour.
[2] Noise Standard for Land Use within Section 9.12.060 of the City Municipal Code. Levels not to be exceeded for more than one minute in any hour.
MFR - Madonna Froom Ranch

Mitigation Measures

MM NO-4. *Prior to approval of park and residential development within the Madonna Froom Ranch area of the Specific Plan, the Applicant shall submit a project-specific noise study that evaluates the potential for noise exposure from adjacent commercial uses and identifies project-specific design measures to attenuate exterior and interior noise consistent with the City's Noise Element and Noise Ordinance. If necessary to reduce noise within acceptable levels, noise reduction measures may include a planted earthen berm, sound wall, or similar noise attenuating feature along the site boundary with Irish Hills Plaza, consistent with Policy 1.8.2 of the Noise Element.*

Requirements and Timing. The Applicant shall incorporate the above mitigation within the final FRSP prior to adoption.

Monitoring. City staff shall ensure compliance with required site design and noise reduction measures within the final FRSP prior to adoption and shall confirm any required noise attenuation measures are shown on construction plans prior to issuance of building permits.

Residual Impact

MM NO-4 would attenuate noise from adjacent commercial deliveries and loading areas, ensuring that proposed residential and park uses would not be exposed to noise exceeding

levels identified within Section 9.12.060 of the Municipal Code. Therefore, residual impacts would be *less than significant with mitigation*.

3.10.3.4 Cumulative Impacts

Development of the Project in conjunction with future cumulative projects would potentially result in an increase in construction-related and traffic-related noise sources in the City.

Construction Impacts

The potential for cumulative construction-related impacts to occur is increased with the Project's five-year construction period. Construction-related noise and groundborne vibration associated with the Project would potentially overlap with some cumulative projects within Table 3.0-1 (that have not yet been approved or constructed). This includes development of two automobile dealerships along Auto Park Way, Towne place Suites, and the San Luis Ranch Specific Plan area. Construction noise generated by the Project and other future development would be localized within the vicinity of the proposed development areas. Project-related construction noise and vibration would be removed from other construction activities and proposed projects pending in the vicinity. The Project, along with other cumulative development projects, would be required to implement site-specific measures to reduce construction-related noise to reduce impacts on surrounding development. Implementation of such measures would ensure noise generated from an individual site is adequately attenuated and would not contribute to cumulatively significant impacts on surrounding uses. Larger cumulative development projects such as the San Luis Ranch Specific Plan project, located approximately 1,800 feet north of the Project site, are located far enough from the Project site that concurrent development activities would not contribute to a cumulative substantial increase in ambient noise due to distance of the noise generators and attenuation from intervening development. Therefore, the Project's construction-related noise and vibration impacts would not considerably contribute to cumulative noise and vibration impacts from construction activities. Cumulative impacts would be *less than significant*.

Operational Impacts

The Project, in combination with approved, pending, and proposed development within the City, would contribute to an increase of long-term traffic and associated traffic noise, as well as operational noise from the proposed new development. The Project does not

propose any uses that would generate noise which would result in a perceptible increase in ambient noise levels offsite, and the Project contribution to the cumulative noise environment would be negligible. Implementation and buildout of the LUCE Update and pending projects in the vicinity would increase traffic volumes and associated noise levels along major transportation routes. The Project would also increase traffic and associated noise levels with approximately 5,183 additional ADT along surrounding roadways such as LOVR, Calle Joaquin, and U.S. 101, although these increases in ambient noise levels would not result in a noticeable increase in noise levels (less than 1 dBA increase). As discussed above, a perceptible increase in roadway noise levels would require traffic volumes to nearly double over existing volumes. Cumulative projects in the area would increase traffic levels and subsequent noise levels primarily on arterials and major roadways by approximately 20 percent (Appendix J); therefore, the noise-related impacts to residential and local streets would be nominal. Development of the Project and implementation of the LUCE Update could cumulatively increase stationary source noise levels; however, the City's Noise Element and Municipal Code contain policies and programs that would address and mitigate potential site-specific impacts for individual projects in the future, including Noise Guidebook Policy 1.4 which requires noise created by all new development be individually mitigated by each project so as not to exceed acceptable outdoor noise levels. Due to requirement for compliance with existing regulations, implementation of project-specific noise mitigation measures, and nominal increases in the ambient noise environment from proposed cumulative development, this cumulative impact would be considered *less than significant*.