14 Noise & Vibration

14.1 Introduction

This chapter describes the existing setting of the proposed project site as it relates to noise and vibration; identifies associated regulatory conditions and requirements; presents the criteria used to evaluate potential impacts on noise and vibration; and identifies mitigation measures to reduce or avoid each significant impact. The significance of each impact after the incorporation of identified mitigation measures is included at the end of this chapter.

Information used to prepare this chapter came from the following sources:

- Brentwood Golf Course Redevelopment Project – Noise Technical Memorandum, 2017 (See Appendix G)
- City of Brentwood General Plan Update, 2014
- City of Brentwood General Plan EIR, *Draft Program Environmental Impact Report* for the 2014 Brentwood General Plan Update, 2014

14.2 Scoping Issues Addressed

Written comments and suggestions were provided by members of the public, organizations, and government agencies during the Notice of Preparation (NOP) scoping period conducted from August 4, 2017 through September 5, 2017. The following comments reflect the key issues identified during the NOP comment period regarding noise and are addressed in this section:

- Noise generated from daily project operations
- Noise generated from emergency medical and fire services to the project site
- Nosie generated from public use areas, such as open space or parks
- Existing lack of trees to block noise for existing area residents from new State Route 4 interchange

14.3 Noise Criteria and Definitions

Sound. Sound is a vibratory disturbance created by a moving or vibrating source and that is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired, and may be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance and, in the extreme, hearing impairment. Excessive noise levels may also affect performance and learning processes through distraction, reduced accuracy and increase fatigue, annoyance and irritability, and the ability to concentrate.

Decibels and Frequency. In its most basic form, a continuous sound can be described by its frequency or wavelength (pitch) and its amplitude (loudness). Sound pressure levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Therefore, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease.

Groundborne vibration consists of oscillatory waves that propagate from the source through the ground to adjacent structures. The frequency of a vibrating object describes how rapidly it is oscillating. The number of cycles per second of oscillation is the vibration frequency, which is described in terms of hertz (Hz). The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz.

Perception of Noise. The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Therefore, the "A-weighted" noise scale is used for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are written dB(A) or dBA.

Human perception of noise has no simple correlation with acoustical energy. The perception of noise is not linear in terms of dBA or in terms of acoustical energy. Two noise sources do not "sound twice as loud" as one source. It is widely accepted that the average healthy ear can barely perceive changes of a 3 dBA increase or decrease; that a change of 5 dBA is readily perceptible; and that an increase or decrease of 10 dBA sounds twice or half as loud, respectively.

As noise travels from the source to the receiver, noise changes both in level and frequency. The most obvious change is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance (noise attenuation) depends on a number of factors. Ground absorption, atmospheric effects, and shielding (as by natural and man-made barriers) also affect the rate of noise attenuation.

Perception of Vibration. While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings caused by construction activities may be perceived as motion of building surfaces or rattling of windows, items on shelves, and pictures hanging on walls. Vibration of building components can also take the form of an audible low-frequency rumbling noise, which is referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when the structure and the construction activity are connected by foundations or utilities, such as sewer and water pipes.

The primary concern from vibration is the ability to be intrusive and annoying to nearby residents and other vibration-sensitive land uses. Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High frequency vibrations reduce much more rapidly than low frequencies, so that low frequencies tend to dominate the spectrum at greater distances from the source.

Noise and Vibration Rating Scales. Several rating scales exist to analyze effects of noise on a community. These scales include the equivalent noise level (L_{eq}), the community noise equivalent level (CNEL), and the day-night average sound level (L_{dn}). Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, which is the equivalent noise level for that period of time. The period of time averaging may be specified; for example, $L_{eq(3)}$ would be a three-hour average. When no period is specified, a one-hour average is assumed. It is important to understand that noise of short duration (i.e., a time period substantially less than the averaging period) is averaged into ambient noise during the period of interest. Therefore, a loud noise lasting many seconds or a few minutes may have minimal effect on the measured sound level averaged over a one-hour period.

To evaluate community noise impacts, a descriptor was developed that accounts for human sensitivity to nighttime noise. The descriptor is called the L_{dn}, which represents the 24-hour average sound level with a penalty for noise occurring at night. The L_{dn} computation divides the 24-hour day into two periods: daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM). The nighttime sound levels are assigned a 10 dBA "penalty"" prior to averaging with daytime hourly sound levels. CNEL is similar to L_{dn} except that it separates a 24-hour day into 3 periods: daytime (7:00 AM to 7:00 PM), evening (7:00 PM to 10:00 PM), and nighttime (10:00 PM to 7:00 AM). The evening and nighttime sound levels are assigned a 5 and 10 dBA penalty respectively, prior to averaging with daytime hourly sound levels. Several statistical descriptors are also often used to describe noise, including L_{max}, L_{min}, and L_x. L_{max} and L_{min} are respectively the highest and lowest A-weighted sound levels that occur during a noise event. The L_x signifies the noise level that is exceeded x percent of the time; for example, L_{10} denotes the level that was exceeded 10 percent of the time.

Vibration levels are usually expressed as a single-number measure of vibration magnitude, in terms of velocity or acceleration, which describes the severity of the vibration without the frequency variable. The peak particle velocity (ppv) is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in inches per second (in/sec). Since it is related to the stresses that are experienced by buildings, ppv is generally used to assess vibration to structures.

14.4 Environmental Setting

14.4.1 Project Setting

The 355-acre project area includes relatively flat portions as well as gently sloping hills. Site elevations range from approximately 200 feet above mean sea level (msl) in the south (Deer

Ridge) to approximately 250 feet above msl to the north (Shadow Lakes). The approximately 32-acre project site is located in the southwest portion of Brentwood and includes small portions of both the Deer Ridge Golf Club and the Shadow Lakes Golf Club. The Shadow Lakes portion of the site is located directly north of Balfour Road. The project site is within the existing PD-20 and PD-18 zoning districts, respectively, which is comprised entirely of single-family residential and golf course uses. The Shadow Lakes site (PD-18) also encompasses a small portion of neighborhood commercial uses on the western portion of the site. Heritage High School is located directly west of Proposed Village One, whereas the John Muir Medical Center as well as the R. Paul Krey Elementary School are located directly east. Residential uses dominate the greater proximity of the project site.

14.4.2 Sensitive Receptors

Noise-sensitive receptors are generally considered to be those people engaged in activities or utilizing land uses that may be subject to the stress of significant interference from noise. Activities usually associated with sensitive receptors include, but are not limited to, talking, reading, and sleeping. Land uses often associated with sensitive receptors include residential dwellings, hotels, hospitals, day care centers, and educational facilities. Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. While the City's General Plan Noise Element does not specifically define noise sensitive uses in the city, sensitive land uses are defined in the General Plan (Action COS 2c) as "schools, day care facilities, and medical facilities."

Typically, noise sensitive uses, also referred to as sensitive noise receptors, are defined as those which include residential, public and private educational facilities, schools, churches, hotels, libraries, hospitals, convalescent homes, and day cares. The primary sensitive receptors within the city of Brentwood are residential. The noise exposure of these sensitive uses varies from low, in quiet residential areas, to high, in areas adjacent to the busy roadways or State Route 4 (SR 4). The nearest sensitive receptors to the Deer Ridge site include the existing residences approximately 25 feet to the southeast, with the nearest sensitive receptors to the Shadow Lakes site being the existing residences approximately 25 feet to the north.

The city of Brentwood is impacted by various noise sources. Mobile sources of noise, especially cars and trucks, are the most common and significant sources of noise in most communities. Other sources of noise are the various land uses (i.e., residential, commercial, institutional, and recreational and parks activities) throughout the city that generate stationary-source noise. The nearest public airports to the project site are the Buchanan Field Airport, located approximately 16 miles northwest and the Livermore Municipal Airport, located approximately 15 miles southwest.

14.4.3 Existing Ambient Noise Measurements

In order to quantify existing ambient noise levels in the project area, Michael Baker International conducted two short-term noise measurements on March 14, 2017 (see Appendix G). The noise measurement sites were representative of typical existing noise exposure within and immediately adjacent to the project site. The 10-minute measurements were taken between 9:15 and 10:30 AM. Short-term (Leq) measurements are considered representative of the noise levels throughout the day. The average noise levels and sources of noise measured at each location are listed in Table 14-1 (Existing Noise Measurements).

Table 14-1: Existing Noise Measurements

Site No.	Location	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Time
1	Cul-de-sac of Stirling Court adjacent to walking trail	40.9	36.8	49.0	9.22 AM
2	Sidewalk adjacent to park's parking lot	50.1	40.6	61.7	9.36 AM
3	Pebble Beach Drive adjacent to golf cart path	50.9	38.4	67.5	9.51 AM
4	At the bend of Augusta Drive	50.7	37.6	67.8	10:07 AM

Source: Michael Baker International, 2017c. See Appendix **G** of EIR for noise measurement data.

As shown in Table 14-1, the ambient recorded noise levels ranged from 40.9 dBA to 50.9 dBA Leq near the project site. The noise most commonly present in the project vicinity is produced by automotive vehicles (cars, trucks, buses, and motorcycles). Traffic moving along streets and freeways produces a sound level that remains relatively constant and is therefore a component of the City's minimum ambient noise level. Vehicle noise varies with the volume, speed, and type of traffic. Slower traffic produces less noise than fast moving traffic. Trucks typically generate more noise than cars. Infrequent or intermittent noise also is associated with some vehicles, including sirens, vehicle alarms, slamming of doors, garbage and construction vehicle activity, and honking of horns. These noises add to urban noise and are regulated by a variety of agencies.

14.4.4 Existing Roadway Noise Levels

Existing roadway noise levels were calculated for the roadway segments in the project vicinity. This task was accomplished using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and existing traffic volumes from the project traffic impact analysis (Kimley-Horn 2017). The noise prediction model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (also referred to as energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by the California Department of Transportation (Caltrans). The Caltrans data indicates that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. The average daily noise levels

along roadway segments in proximity to the project site are included in Table 14-2 (Existing Traffic Noise).

As depicted in Table 14-2, the existing traffic-generated noise level on project-vicinity roadways currently ranges from 49.6 to 63.6 dBA CNEL. As previously described, CNEL is 24-hour average noise level 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.

Table 14-2: Existing Traffic Noise

Roadway Segment	ADT	CNEL at 100 Feet from Centerline of Roadway (dBA)
Balfour Road between Foothill Drive and John Muir Pkwy	18,772	63.6
American Ave between Balfour Rd. and Heritage High School	10,119	54.5
Foothill Drive between Balfour Road and Eagle Rock Avenue	5,180	51.5
Eagle Rock between Foothill Drive and John Muir Pkwy	3,330	49.6
Fairview Avenue between Balfour Road and Arlington Way	7,522	56.8

Notes:
ADT = average daily trips; dBA = A-weighted decibels; CNEL = community noise equivalent level.
Data source: Based on traffic data within the Traffic Impact Analysis, prepared by Kimley-Horn, 2017. Refer to Appendix B of the Noise Technical Memorandum (EIR Appendix G) for traffic noise modeling assumptions and results.
Noise Source: Michael Baker International, 2017.

14.4.5 General Information on Vibration

Vibration is an oscillatory motion through a solid medium, in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (Vdb) is commonly used to measure RMS. The decibel notation acts to compress the range of numbers required to describe vibration. Typically, groundborne vibration generated by heavy equipment or traffic on rough roads attenuates rapidly with distance from the source of the vibration so that potential impact areas are confined to short distances (i.e., within 200 feet or less) from the source (FTA, 2006). The general human response to different levels of groundborne vibration velocity levels is described in Table 14-3 (Human Response to Different Levels of Groundborne Vibration).

Table 14-3: Human Response to Different Levels of Groundborne Vibration	
Vibration Velocity Level	**Human Reaction**
65 Vdb	Approximate threshold of perception for many people.
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.
90 Vdb	Difficulty with tasks such as reading computer screens.
Source: Federal Transit Administration. Transit Noise and Vibration Impact Assessment. May 2006.	

14.5 Applicable Regulations, Plans, and Standards

14.5.1 Federal

Occupational Safety and Health Administration

Under the Occupational Safety and Health Act of 1970 (29 U.S.C. Section 651 et seq.), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) adopted regulations (29 CFR Section 1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations identify limits on noise exposure levels as a function of the amount of time during which the worker is exposed. The regulations further specify requirements for a hearing conservation program (Section 1910.95(c)), a monitoring program (Section 1910.95(d)), an audiometric testing program (Section 1910.95(g)), and hearing protection (Section 1910.95(i)). There are no Federal laws governing community noise.

U.S. Department of Transportation Federal Transit Administration

The U.S. Department of Transportation Federal Transit Administration (FTA) has recommended noise criteria related to traffic-generated noise. Recommendations contained in the May 2006 Transit Noise and Vibration Impact Assessment prepared by FTA can be used as guidance to determine whether or not a change in traffic would result in a substantial permanent increase in noise. Under the FTA standards, the allowable noise exposure increase is reduced with increasing ambient existing noise exposure, such that higher ambient noise levels have a lower allowable noise exposure increase. Table 14-4 (Significance of Changes in Operational Roadway Noise Exposure) shows the significance thresholds for increases in traffic-related noise levels. These standards are applicable to project-impacts on existing sensitive receptors.

Table 14-4: Significance of Changes in Operational Roadway Noise Exposure	
Existing Noise Exposure (dBA Ldn or Leq)	**Allowable Noise Exposure Increase (dBA Ldn or Leq)**
45-50	7
50-55	5
55-60	3
60-65	2
65-74	1
75+	0
Source: Federal Transit Administration. Transit Noise and Vibration Impact Assessment. May 2006.	

The FTA also recommends vibration impact thresholds to determine whether groundborne vibration would be "excessive." According to FTA, groundborne vibration impact criteria for residential receptors are 72 Vdb for frequent events, 75 Vdb for occasional events, and 80 Vdb for infrequent events (FTA, 2006). The FTA recommends an 80 Vdb threshold for infrequent events at residences and buildings where people normally sleep and 83 Vdb threshold at institutional buildings with primarily daytime uses. In terms of groundborne vibration impacts on structures, the FTA states that groundborne vibration levels in excess of 100 Vdb would damage fragile buildings, and levels in excess of 95 Vdb would damage extremely fragile historic buildings. The threshold for the proposed project is 80 Vdb for infrequent events at residences and buildings where people normally sleep (e.g., residential neighborhoods).

14.5.2 State

California Building Code

Title 24 of the California Code of Regulations contains standards for allowable interior noise levels associated with exterior noise sources. The standards apply to new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family residences, which are specifically excluded from the municipal code. The standards require interior noise level attributable to exterior sources not exceed 45 dBA CNEL in any habitable room. Multi-family residential structures proposed where the CNEL would exceed 60 dBA requires an acoustical analysis showing that the proposed building design would achieve the prescribed allowable interior noise standard.

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act, find that excessive noise is a serious hazard to public health and welfare, and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The Act also finds that there is a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians that is free from noise that jeopardizes their health or welfare.

California Noise Insulation Standards (CCR Title 24, Part 2, Chapter 2-35)

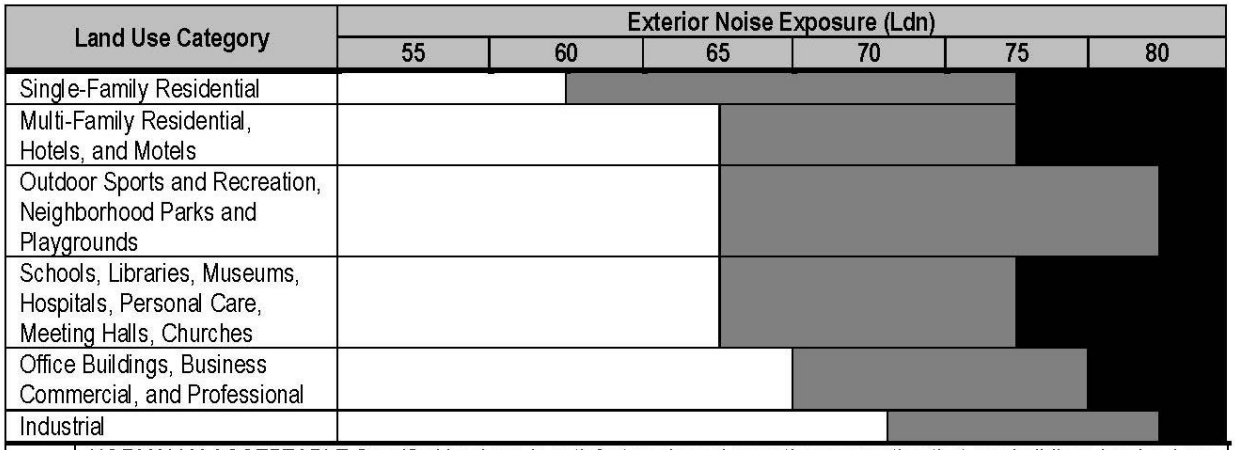
In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for multi-family residential buildings (Title 24, Part 2, California Code of Regulations). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The regulations also specify that acoustical studies must be prepared whenever a multi-family residential building or structure is proposed to be located near an existing or adopted freeway route, expressway, parkway, major street, thoroughfare, rail line, rapid transit line, or industrial noise source, and where such noise source or sources create an exterior CNEL (or Ldn) of 60 dBA or greater. Such acoustical analysis must demonstrate that the residence has been designed to limit intruding noise to an interior CNEL (or Ldn) of at least 45 dBA.

14.5.3 Local

City of Brentwood General Plan Noise Element

California Government Code Section 65302 encourages each local government entity to implement a noise element as part of its general plan. In addition, the California Governor's Office of Planning and Research has developed guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. Figure 14-1 (Land Use Compatibility for Community Noise Environment) shows the land use compatibility for community noise environment as shown in the Brentwood General Plan Noise Element.

Figure 14-1: City of Brentwood Land Use Compatibility for Community Noise Environment



Source: City of Brentwood General Plan, Noise Element

Project relevant General Plan policies for noise are addressed in this section. Where inconsistencies exist, if any, they are addressed in the respective impact analysis below.

Noise Goal 1: Preserve a pleasant noise environment and enhance the quality of existing and future land uses by minimizing exposure to harmful and excessive noise.

- Policy N 1-1: Ensure the noise compatibility of existing and future development when making land use planning decisions.
- Policy N 1-2: Require development and infrastructure projects to be consistent with the Land Use Compatibility for Community Noise Environments standards indicated in Table N-1 to ensure acceptable noise levels for existing and future development.
- Policy N 1-3: Require new development to mitigate excessive noise through best practices, including building location and orientation, building design features, placement of noise-generating equipment away from sensitive receptors, shielding of noise-generating equipment, placement of noise tolerant features between noise sources and sensitive receptors, and use of noise-minimizing materials such as rubberized asphalt.
- Policy N 1-6: Require acoustical studies for new developments and transportation improvements that affect noise-sensitive uses such as schools, hospitals, libraries, group care facilities, convalescent homes, and residential areas.
- Policy N 1-7: For projects that are required by the California Environmental Quality Act (CEQA) to analyze noise impacts, the following criteria shall be used to determine the significance of those impacts:

  Stationary and Non-Transportation Noise Sources:

  - A significant impact will occur if the project results in an exceedance of the noise level standards contained in this element, or the project will result in an increase in ambient noise levels by more than 3 dB, whichever is greater.

  Transportation Noise Sources:

  - Where existing traffic noise levels are less than 60 dB Ldn at the outdoor activity areas of noise-sensitive uses, a +5 dB Ldn increase in roadway noise levels will be considered significant;
  - Where existing traffic noise levels range between 60 and 65 dB Ldn at the outdoor activity areas of noise-sensitive uses, a +3 dB Ldn increase in roadway noise levels will be considered significant; and
  - Where existing traffic noise levels are greater than 65 dB Ldn at the outdoor activity areas of noise-sensitive uses, a + 1.5 dB Ldn increase in roadway noise levels will be considered significant.

- Policy N 1-9: Local truck traffic, including loading and unloading, shall be limited to specific routes, times, and speeds appropriate to each zoning district.
- Policy N 1-11: Ensure that existing development is protected, to the greatest extent feasible, from noise impacts due to construction on adjacent or nearby properties.
- Policy N 1-13: Control non-transportation related noise from site specific noise sources to the standards shown in Table N-2 of the General Plan Noise Element.
- Policy N 1-14: Ensure that new development does not result in indoor noise levels exceeding 45 dBA Ldn for residential uses.
- Policy N 1-15: Require construction activities to comply with standard best practices (see Action N 1e).

City of Brentwood Municipal Code

Noise regulations listed in the City of Brentwood's Municipal Code are designed for the sole purpose of securing and promoting the public health, comfort, safety, and welfare of its residents. The goal is to maintain and preserve the quiet atmosphere of the city, and to implement programs and enact legislation consistent with the objectives and goals set forth in the Noise Element of the General Plan and aimed at retaining noise levels throughout the city acceptable values established in the General Plan.

Section 9.32.030 of the City's Municipal Code provides exterior and interior standards for the City. Table 14-5 (City of Brentwood Exterior Noise Standards) depicts the City's exterior noise standards for residential, commercial, and industrial uses.

Table 14-5: City of Brentwood Exterior Noise Standards

Zones #	Designated Zone	Time Interval	Exterior Noise Levels
Zone I	Residential	7:00 am to 10:00 pm	60
		10:00 pm to 7:00 am	45
Zone II	Commercial	7:00 am to 10:00 pm	60
		10:00 pm to 7:00 am	45
Zone II	Commercial	7:00 am to 10:00 pm	65
		10:00 pm to 7:00 am	60

Source: City of Brentwood Municipal Code, Section 9.32.030.

Table 14-6 (City of Brentwood Interior Noise Standards) lists interior noise levels that shall apply within all receiving multi-family residential units within noise Zone I and Zone II (residential and commercial).

Table 14-6: City of Brentwood Interior Noise Standards		
Zones #	**Time Interval**	**Interior Noise Levels**
Multi-family residential	10:00 pm to 7:00 am	60
	7:00 am to 10:00 pm	45
Source: City of Brentwood Municipal Code, Section 9.32.030.		

In addition, Brentwood Municipal Code Section 9.32.050 sets forth the following construction noise standards in the City.

A. Outside Heavy Construction (that exceeds noise limits). Monday through Friday between the hours of 7:00 AM and 3:30 PM, or until 5:30 PM with the express written approval of the City Engineer or designee, 8:00 AM and 5:00 PM on Saturdays with City Engineer approval only, and never on Sunday or City holidays.

B. Outside Carpentry Construction. Outside carpentry construction is restricted to the hours of 7:00 AM and 7:00 PM Monday through Friday, 9:00 AM and 5:00 PM on Saturdays, and never on Sunday or City holidays. If construction is required during other hours, it cannot exceed the exterior residential noise level standards of 60 dBA from 7:00 AM to 10:00 PM or 45 dBA from 10:00 PM to 7:00 AM. No person in a residential zone shall operate or permit the operation of any mechanically powered saw, sander, drill, grinder or similar tools, so as to create any noise which exceeds the noise level limits of this article unless it is within a completely enclosed structure. These specified domestic activities are permitted between the hours of 7:00 AM and 7:00 PM Monday through Friday, and 9:00 AM and 5:00 PM on Saturdays, and never on Sunday or City holidays.

Noise due to construction activities is usually considered to be less than significant in terms of CEQA compliance if the construction activity is temporary and the use of heavy construction equipment and noisy activities are limited to daytime hours.

14.5.4 Significance Criteria

According to the State CEQA Guidelines, implementation of the project would result in significant noise impacts if it would:

- Expose persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Expose persons to or generation of excessive groundborne vibration or groundborne noise levels.
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

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

14.5.5 Impacts Assessment Methodology

Construction

Construction noise estimates are based upon noise levels reported by FTA Office of Planning and Environment (Hanson, Towers, and Meister, May 2006) in the *Transit Noise and Vibration Impact Assessment*, as well as the distance to nearby sensitive receptors. Reference noise levels from the FTA document are used to estimate noise levels at nearby sensitive receptors based on a standard noise attenuation rate of 6 dB per doubling of distance (line-of-sight method of sound attenuation for point sources of noise).

Construction noise level estimates do not account for the presence of intervening structures or topography, which may reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a conservative, reasonable worst-case estimate of actual temporary construction noise.

Operational

Based on the City's General Plan Noise Element, Policy N 1-6 (Stationary and Non-Transportation Noise Sources), a significant noise impact would occur if a project results in an exceedance of the noise level standards contained in this element, or the project will result in an increase in ambient noise levels by more than 3 dB, whichever is greater.

14.5.6 Impacts of the Proposed Project

Impact N-1: Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Short-Term Construction

Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., land clearing, grading, excavation, paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 to 4 minutes at lower power settings. Other primary sources of acoustical disturbance would be random incidents, which would last less than one minute, such as dropping large pieces of equipment or the hydraulic movement of machinery lifts.

Table 14-7 (Typical Construction Equipment Noise Levels) shows typical noise levels associated with activities during various phases of construction at a distance of 50 feet from the noise source. Typical construction noise levels range from about 81 to 85 dBA at this distance. Noise levels typically attenuate (or drop off) at a rate of 6 dB per doubling of distance from point sources, such as industrial machinery.

Table 14-7: Typical Construction Equipment Noise Levels

Equipment Onsite	Typical Noise Level (dBA) 50 Feet from Source	Typical Noise Level (dBA) 400 Feet from Source	Typical Noise Level (dBA) 800 Feet from Source	Typical Noise Level (dBA) 1,000 Feet from Source	Typical Noise Level (dBA) 1,600 Feet from Source
Air Compressor	78	60	54	52	48
Backhoe	78	60	54	52	48
Bobcat Tractor	78	60	54	52	48
Concrete Mixer	79	61	55	53	49
Bulldozer	82	64	58	56	52
Jack Hammer	89	71	65	63	59
Pavement Roller	80	62	56	54	50
Street Sweeper	82	64	58	56	52
Man Lift	75	57	51	49	45
Dump Truck	76	58	52	50	46

Notes:
1) The distances shown in this table represent minimum distances at which sources can be located from construction activity before a potentially significant impact would occur.
2) Noise levels based on actual maximum measured noise levels at 50 feet (Lmax).
3) Noise levels assume a noise attenuation rate of 6 dBA per doubling of distance.

Source: FHWA Roadway Construction Noise Model (2006) Users Guide Table 1.

As shown in Table 14-7 (Typical Construction Equipment Noise Levels), the loudest piece of equipment (jack hammer) would reach maximum noise levels of 89 dBA at 50 feet from the source. The nearest sensitive receptors are 25 feet from the project site. Since construction noise levels drop off at a rate of about 6 dBA per doubling of distance between the noise source and receptor, the loudest piece of equipment would reach maximum noise levels of 95 dBA at 25 feet from the source.

Grading and excavation phases of project construction tend to be the shortest in duration and create the highest construction noise levels due to the operation of heavy equipment required to complete these activities. It should be noted that only a limited amount of equipment can operate near a given location at a particular time. Equipment typically used during this stage includes heavy-duty trucks, backhoes, bulldozers, excavators, front-end loaders, and scrapers. Operating cycles for these types of construction equipment may involve one or two minutes of full-power operation followed by three to four minutes at lower power settings. Other primary

sources of noise would be shorter-duration incidents, such as dropping large pieces of equipment or the hydraulic movement of machinery lifts, which would last less than one minute.

Per Section 9.32.050 of the City's Municipal Code, the City allows heavy construction activities that exceeds the noise standards to occur between 7:00 AM and 3:30 PM, or until 5:30 PM with the express written approval of the City Engineer or designee Monday through Friday. Construction on Saturday is allowed between 8:00 AM and 5:00 PM on Saturdays with City Engineer approval only, and never on Sunday or City holidays. Outside carpentry construction is restricted to the hours of 7:00 AM and 7:00 PM Monday through Friday, 9:00 AM and 5:00 PM on Saturdays, except with engineering approval, and never on Sunday or City holidays. If construction is required during other hours, it cannot exceed the exterior residential noise level standards of 60 dBA from 7:00 AM to 10:00 PM or 45 dBA from 10:00 PM to 7:00 AM.

The State establishes noise limits for vehicles licensed to operate on public roads using a pass-by test procedure. Pass-by noise refers to the noise level produced by an individual vehicle as it travels past a fixed location. The pass-by procedure measures the total noise emissions of a moving vehicle with a microphone. When the vehicle reaches the microphone, the vehicle is at full throttle acceleration at an engine speed calculated for its displacement.

For heavy trucks, the State pass by standard is consistent with the Federal limit of 80 decibels (dB). The State pass by standard for light trucks and passenger cars (less than 4.5 tons gross vehicle rating) is also 80 dB at 15 meters from the centerline. According to the FHWA, dump trucks typically generate noise levels of 76 dBA and flatbed trucks typically generate noise levels of 74 dBA, at a distance of 50 feet from the truck (FHWA, 2006). As such, noise from truck trips associated with the proposed project would not be expected to exceed FTA threshold levels of 90 dBA (one-hour Leq) or 80 dBA (eight-hour Leq) (FTA, 2006).

Sensitive uses surrounding the project site include residential uses approximately 25 feet southeast of the Deer Ridge site and approximately 25 feet to the north of the Shadow Lakes site. These sensitive uses may be exposed to elevated noise levels during project construction. As noted above, the City's Municipal Code does not establish quantitative construction noise standards, but instead establishes allowable hours of construction, of which the proposed project would adhere.

Based on the discussion above, noise levels at the nearest residence during construction activities would be expected to reach levels of 96 dBA at the closest point of the project to the sensitive receptor. As a result, standard construction noise measures would be required to ensure that impacts are reduced to the maximum extent feasible. Mitigation Measure MM N-1 would reduce construction noise by requiring compliance with the City's allowable hours, equipment to be muffled, locating stationary equipment away from sensitive receptors, and requiring a noise disturbance coordinator to respond to noise complaints to reduce construction-related noise. However, construction noise impacts would not be reduced to a less than significant level.

Despite the implementation of MM N-1, short-term construction impacts would remain significant and unavoidable.

Mitigation Measures

MM N-1: **The applicant shall require the construction contractor to implement construction noise reduction procedures to minimize construction-related noise impacts on nearby receptors to the extent feasible.**

To reduce the effects of construction-related noise, the project applicant shall include the following requirements in all construction contracts for the proposed project:

N-1a: Heavy Construction Activities. Per City Municipal Code 9.32.050, heavy construction activities shall be restricted to the hours of 7:00 AM and 3:30 PM, or until 5:30 PM with the express written approval of the City Engineer or designee Monday through Friday, 8:00 AM and 5:00 PM on Saturdays with written approval of the City Engineer or designee, and never on Sunday or City holidays. Outside carpentry construction shall be restricted to the hours of 7:00 AM and 7:00 PM Monday through Friday, 9:00 AM and 5:00 PM on Saturdays and never on Sunday or City holidays.

N-1b: Construction Equipment. Properly maintain construction equipment and ensure that all internal combustion engine driven machinery with intake and exhaust mufflers and engine shrouds (if the equipment had such devices installed as part of its standard equipment package) that are in good condition and appropriate for the equipment. Equipment engine shrouds shall be closed during equipment operation. Contractor, shall maintain and tune-up all construction equipment to minimize noise emissions.

N-1c: Vehicle and Equipment Idling. Construction vehicles and equipment shall not be left idling for longer than five minutes when not in use.

N-1d: Stationary Equipment. All noise-generating stationary equipment such as air compressors or portable power generators shall be located as far as possible from sensitive receptors. Temporary noise barriers shall be constructed to screen stationary noise generating equipment when located near adjoining sensitive land uses. Temporary noise barriers could reduce construction noise levels by 10 dBA.

N-1e: Construction Route. All construction traffic to and from the project site shall be routed using designated truck routes where feasible. All construction-related heavy truck traffic in residential areas shall be prohibited where feasible.

N-1f: Workers' Radios. All noise from workers' radios shall be controlled to a point that they are not audible at sensitive receptors near the construction activity.

N-1g: Construction Plan. Prior to issuance of any grading and/or building permits, the contractor shall prepare and submit to the City of Brentwood for approval a detailed construction plan identifying the schedule for major noise-generating construction activity.

N-1h: Disturbance Coordinator. A "noise disturbance coordinator" shall be designated by the contractor. The noise disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The noise disturbance coordinator shall determine the cause of the noise complaint (e.g. starting too early, bad muffler, etc.) and shall require that reasonable measures warranted to correct the problem be implemented. The coordinator shall post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

MM N-1a specifies the hours in which heavy construction can occur. MMs N-1b through N-1d includes requirements for the proper maintenance and use of equipment; specifies the locations of stationary equipment; and places limits on engine idling. MM N-1e through N-1g require the use of a designated truck route when feasible; limits workers radio volumes; and requires a detailed construction plan be prepared prior to construction. MM N-1h requires that a disturbance coordinator be designated for the project.

Implementation of MMs N-1a through N-1h would reduce construction noise levels; however, this temporary noise increase would be considered a significant and unavoidable short-term noise impact.

Long-Term Operations

Stationary Noise Sources

Implementation of the proposed project would create new sources of noise in the project vicinity. The major noise sources associated with the project that would potentially impact existing and future nearby residences include the following:

- Emergency Medical Response Noise;
- Mechanical equipment (i.e., trash compactors, air conditioners, etc.);
- Slow moving delivery/supply trucks on the project site, approaching and leaving the loading areas;

- Activities at the loading areas (i.e., maneuvering and idling trucks, banging and clanging of equipment);
- Parking areas (i.e., car door slamming, car radios, engine start-up, and car pass-by); and
- Landscape maintenance activities.

Implementation of the proposed project would result in construction of two age-restricted housing communities within the project site and the reconfiguration of the golf course/development of open space and construction of a golf cart bridge. As the project site is currently developed for golf course uses, new noise sources would be introduced as a result of project implementation. The golf cart bridge would be located more than 200 feet west of the closest receptors, across Country Club Drive. At this distance, golf carts operations would not be audible due to intervening barriers and existing roadway noise. Although several noise sources would be introduced, many of them would operate for very brief time periods, such as delivery truck movements. Other noise sources, such as air conditioning equipment, parking lot traffic, and loading area activities, operate for comparatively longer periods of time. Further, it is noted that the projected noise levels presented below do not account for any noise attenuation due to walls, berms, trees, intervening structures, or topography.

Residential Areas

Noise that is typical of high-density residential areas (including senior housing) includes group conversations, pet noise, vehicle noise (see discussion below) and general maintenance activities. Noise from residential stationary sources would primarily occur during the "daytime" activity hours of 7:00 AM to 10:00 PM. Furthermore, the residences would be required to comply with the noise standards set forth in the City's General Plan and Municipal Code.

Emergency Medical Response Noise

Due to the nature of the use proposed for the residential component of the project site, there will periodically be ambulances or emergency vehicles that arrive or leave the project site with their sirens on. Ambulance sirens are designed to be clearly audible and highly noticeable to all other drivers on a roadway, who are required by law to pull over to make way for an ambulance with its siren on. Because the nearest sensitive receptors (residences) are located along Stirling Court, Wakefield Court, and Lakeview Drive (Shadow Lakes - Village Two, and along Foothill Drive and August Drive (Deer Ridge - Village One), and ambulances accessing the project site would pass the surrounding residences, sensitive receptors would briefly experience elevated noise levels from emergency vehicle sirens. However, noise from this source would also be of short duration. Emergency vehicles would turn off their sirens after accessing each site. Typical operational policy for emergency vehicles is to limit the use of sirens and horns, as practical, when traveling past noise sensitive areas. Additionally, noise for the purpose of alerting persons to the existence of an actual emergency is exempt from the City's noise standards pursuant to Section 9.32.070 (Exemptions) of the City's Municipal Code. As emergency vehicle noise would

occur occasionally and intermittently, are required occasionally under emergency conditions, and are exempt from City noise standards, impacts would be less than significant.

Mechanical Equipment

Mechanical equipment (heating, ventilation, and air conditioning [HVAC] units) would be located within the project site. HVAC units typically generate 55 dBA at 50 feet from the source. Noise generated by mechanical equipment on the project site could exceed the City's noise standards unless mitigated. Compliance with the General Plan policies and Municipal Code would reduce noise impacts from mechanical equipment. Noise levels from mechanical equipment would be further reduced with implementation of the recommended mitigation requiring orientation of equipment away from any sensitive receptors, proper selection of equipment, and installation of equipment with proper acoustical shielding.

Mitigation Measure

MM N-2: **Prior to the issuance of any building permit, the applicant shall demonstrate compliance with the City's Municipal Code pertaining to the types and placement of mechanical equipment.**

Prior to issuance of any building permit, the applicant shall demonstrate, to the satisfaction of the Community Development Department, compliance with the following:

- To the extent possible, all mechanical equipment shall be oriented away from the nearest noise sensitive receptors; and
- All mechanical equipment shall be screened and enclosed to minimize noise or the equipment shall be factory rated at a noise level that would comply with the noise limits set forth in the City's Municipal Code.

Implementation of Mitigation Measure N-2 would reduce impacts associated with mechanical equipment to a less-than-significant level.

Slow-Moving Trucks (Deliveries) and Loading Areas

Noise sources at truck loading areas may include maneuvering and idling trucks, truck refrigeration units, forklifts, banging and clanging of equipment (i.e., hand carts and roll-up doors), and voices of truck drivers and employees. The maximum noise levels of slow-moving heavy and small trucks range between 70 and 73 dBA at 50 feet. Based on the inverse square law of sound propagation (i.e., a standard attenuation rate of 6 dBA per doubling of distance), noise levels would be reduced to 59.0 dBA at 250 feet. Sensitive receptors within 250 feet would potentially experience noise levels above the City's 60 dBA exterior standard.

The final location of loading areas has not been determined. To mitigate noise levels resulting from activities in these areas, loading areas established within 250 feet of a residential use shall be designed to have either a depressed (i.e., below grade) loading area; an internal bay area (i.e., within a building); or a wall to break the line of sight between residential land uses and other noise sensitive uses, and loading activities. Prior to issuance of any building permits, an acoustical analysis shall be performed to demonstrate that operation of potential loading areas does not result in noise levels that exceed the City's Municipal Code standard of 60 dBA at the exteriors of nearby residences' living areas or other sensitive uses.

Mitigation Measure

MM N-3: **The applicant shall demonstrate compliance with the City's Municipal Code pertaining to the placement and operation of delivery truck loading and delivery areas.**

The applicant shall ensure that where a loading/delivery area is located within 250 feet of a residential use, all deliveries of goods and supplies; trash pick-up; and the operation of machinery or mechanical equipment which emits noise levels in excess of 60 dBA, as measured from the closest property line to the equipment, shall only be allowed between the hours of 7:00 AM and 10:00 PM, unless otherwise specified in a separate approval. The separate approval shall require a detailed acoustical study based on architectural plans to demonstrate that loading/delivery noise levels do not exceed the City's 60 dBA standard. If necessary, the acoustical study shall incorporate noise reduction measures to meet the City's standard. Approval of the detailed acoustical study shall be required prior to the issuance of any building permits.

Implementation of Mitigation Measure N-3 would reduce impacts associated with delivery truck loading and delivery areas to less-than-significant levels.

Parking Areas

Traffic associated with parking lots is typically not of sufficient volume to exceed community noise standards, which are based on a time-averaged scale such as the CNEL scale. However, the instantaneous maximum sound levels generated by a car door slamming, engine starting up, and car pass-bys may be an annoyance to adjacent noise-sensitive receptors. Conversations in parking areas may also be an annoyance to adjacent sensitive receptors.

Parking lot noise levels at or beyond the property line of the specified use could exceed the City's noise standards within the Municipal Code. This impact would be considered potentially significant unless mitigated.

Mitigation Measure

MM N-4: **The applicant shall ensure that the design and placement of all parking areas incorporate all feasible sound attenuation methods. This shall be reviewed by the City and approved by the Planning Commission in conjunction with any future design review application for senior housing facilities on the project site.**

Prior to the issuance of any building permit, the applicant shall ensure all feasible sound attenuation shall be incorporated into the parking areas (i.e., landscaping and brushed driving surfaces), such that noise from parking area has been minimized to the greatest extent practicable such that parking lot noise would not exceed the standards indicated in Brentwood Municipal Code Section 9.32.030 (Designated Noise Zones).

Following implementation of Mitigation Measure N-4, noise generated by project parking areas would not be expected to exceed the Municipal Code noise standards. Therefore, impacts would be reduced to less than significant levels.

Landscape Maintenance

Development and operation of the proposed project would introduce new landscaping requiring periodic maintenance. Noise generated by a gasoline-powered lawnmower is estimated to be approximately 70 dBA at a distance of five feet. However, maintenance activities would operate during daytime hours for brief periods of time as allowed by the City Municipal Code and would not permanently increase ambient noise levels in the project vicinity. Therefore, with adherence to the City's Municipal Code, impacts associated with landscape maintenance would be less than significant.

Conclusion

Overall, with mitigation and/or adherence to Municipal Code requirements, noise impacts associated with stationary noise impacts from mechanical equipment, deliveries, loading/unloading activities, parking lot noise, and landscape maintenance would be reduced to a less-than-significant level.

Mobile Noise Sources

As described above, ambulances or emergency vehicles would be expected to arrive or leave the project site with their sirens on an intermittent basis. Emergency vehicles are required under emergency conditions, and though they can be perceived as temporarily disruptive as they pass by, they are a life-saving resource and are exempt from City noise standards. Therefore, impacts associated with long-term mobile operations of the project would be less than significant.

Impact N-2: Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Short-Term Construction

Project construction would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the construction operations involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Since there are no established vibration standards in the City of Brentwood, this evaluation uses the Federal Transit Administration (2006) recommended standard of 0.2 inches per second peak particle velocity with respect to the prevention of structural damage for normal buildings. This measurement is also the level at which vibrations may begin to annoy people inside buildings (Caltrans 2013). Typical construction equipment vibration levels are included in Appendix G.

The nearest structures to Village One (Deer Ridge) include the existing residences located approximately 25 feet to the southeast along Augusta Drive. The nearest structures to Village Two (Shadow Lakes) include the existing residences located approximately 25 feet to the north along Stirling Court, Wakefield Court, and Lakeview Drive. The nearest sensitive receptors to the golf cart bridge would be approximately 200 feet to the west of the proposed bridge location. Based on typical vibration levels, ground vibration generated by heavy-duty equipment could reach levels of 0.089 inches per second peak particle velocity at 25 feet. However, the use of construction equipment would not result in a groundborne vibration velocity level above the State standard of 0.2 inches per second at the nearest off-site structure. As a result, impacts associated with excessive groundborne vibration during construction would be less than significant.

Long-Term Operations

As proposed, the project would result in construction and operation of two new age-restricted housing communities (Village One and Village Two). These communities would not generate groundborne vibration that could be felt at surrounding uses. The project would not involve railroads or substantial heavy truck operations, with the exception of delivery vehicles to the project site once facilities are operational. As a result, impacts from vibration associated with project operation would be less than significant.

Impact N-3: Would the project result in a substantial permanent increase in ambient noise levels.

Implementation of the proposed project would create new sources of permanent noise in the project vicinity. As discussed in the operational noise analysis in Impact N-1, although several noise sources would be introduced, many of them would operate for very brief time periods, such as delivery truck movements. Other noise sources, such as air conditioning equipment, parking lot traffic, and loading area activities, operate for comparatively longer periods of time.

There would be no additional impacts beyond those already discussed for Impact N-1. As described above, Mitigation Measures MM N-2 through N-4 would be required to reduce impacts associated with mechanical equipment, loading docks, and parking areas to less than significant levels. Please see impact discussion and required mitigation measures for Impact N-1. Impacts would be less than significant with the implementation of Mitigation Measures MM N-2 through N-4.

Impact N-4: Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Refer to the analysis within Impact N-1. There would be no additional impacts beyond those already discussed for Impact N-1. Impact N-1 determined that construction noise would potentially expose persons to or generation of noise levels in excess of City standards.

The noise measurements depicted in Table 14-1 indicate that the existing ambient levels range between 40.9 dBA to 50.9 dBA Leq. The noise most commonly present in the project vicinity is traffic noise from the surrounding roadways and maintenance and landscaping activities on the golf course. As discussed in the construction noise analysis in Impact N-1, project construction would generate short-term noise due to the operation of heavy equipment. The heavy equipment would primarily be used during the grading phase and would involve the use of graders and rollers (i.e., non-impact equipment). It should be noted that only minor cuts and fills are necessary for the perimeter areas of the project site that are in proximity to sensitive receptors.

During construction, the equipment typically travels around the project site. From the perspective of a sensitive receptor, the equipment approaches, passes by, and then recedes into the distance. Peak noise levels would thus be periodic, intermittent, and temporary during brief pass-by periods when construction equipment operates at the far extent of the grading limits. Ambient noise levels are measured over a long-term period and consider noise levels during the daytime (i.e., 7:00 a.m. to 10:00 p.m.) and nighttime (i.e., 10:00 p.m. to 7:00 a.m.). Noise standards for changes in ambient conditions (such as CNEL) are also designed to consider the level of noise over a long duration such as 24 hours. As such, construction activities would not produce sustained changes in ambient noise levels.

Instead, construction equipment would travel throughout the site and would be focused on the interior of the site, thus not occurring near sensitive receptors for extended periods of time. Accordingly, the construction activities have limited ability to the influence the ambient noise levels. Furthermore, the project would implement noise-attenuating measures that would further minimize potential short-term construction noise impacts (refer to Mitigation Measure MM N-1). The project is not considered a new development that can materially increase ambient CNEL. Finally, even if the project could create substantial increase in ambient noise levels (which it cannot) the City's noise ordinance limit construction noise activity to be performed within

certain hours. As described above, Mitigation Measure MM N-1 would reduce construction noise by requiring compliance with the City's allowable hours, equipment to be muffled, locating stationary equipment away from sensitive receptors, and requiring a noise disturbance coordinator to respond to noise complaints to reduce construction-related noise. Mitigation Measure MM N-1 mandates that the project adhere to the construction hour limitations. Therefore, the project would not create a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project and impacts would be less than significant with the implementation Mitigation Measure MM N-1.

Impact N-5: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

The nearest public airports to the project site are the Byron Airport located approximately 8.5 miles southeast, Buchanan Field Airport located approximately 16 miles northwest, and the Livermore Municipal Airport, located approximately 15 miles southwest. As such, the proposed project is not located within an airport land use plan nor is it located within two miles of a public airport. Therefore, no impacts would occur.

Impact N-6: For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

The nearest private airstrip to the project site is the Funny Farm airstrip, located approximately 5.4 miles northeast of the project site in Brentwood. Additionally, the Byron Airport is located more than 8 miles south of the project. As such, the nearest private airstrip is not within the vicinity of the project site. Therefore, no impacts would occur.

14.5.7 Cumulative Impacts

The geographic area for the analysis of cumulative impacts to noise is the City of Brentwood.

Impact N-7: Would the project contribute to cumulatively considerable noise impacts.

The project's construction activities would result in a substantial temporary increase in ambient noise levels. There would be periodic, temporary, unavoidable significant noise impacts that would cease upon completion of construction activities. The project would contribute to and construction noise impacts should other development proximate to the project site occur concurrent with the proposed project.

Cumulative Stationary Noise

Implementation and buildout of the project would introduce the use of stationary equipment that would increase noise levels within the area. Based on the long-term stationary noise analysis, impacts from sources such as mechanical equipment, delivery trucks, parking lots, residential

uses, landscape maintenance, and recreational uses would be less than significant with adherence to the Municipal Code and Mitigation Measures N-1 through N-4.

Because noise dissipates as it travels away from its source, noise impacts from on-site stationary sources would be limited to each of the respective sites and their vicinities. Therefore, it is anticipated that future sensitive receptors would not be exposed to stationary noise levels in excess of the Municipal Code standards from the project in combination with other foreseeable stationary noise sources. Future development proposals within the City of Brentwood would also require separate discretionary approval and CEQA assessment, which would require the study of potential noise impacts. Therefore, in conjunction with cumulative projects, the project would not have the potential to result in cumulatively significant stationary noise impacts.

Cumulative Operational Noise

Cumulative noise impacts describe how much noise levels are projected to increase over existing conditions with the development of the proposed project and other foreseeable projects. Cumulative noise impacts would occur primarily as a result of increased traffic on local roadways due to buildout of the proposed project and other projects in the vicinity. Cumulative increases in traffic noise levels were estimated by comparing the Existing Plus Project and Opening Year scenarios to existing conditions**.** The traffic analysis considers cumulative traffic from future growth assumed in the traffic mode, as well as cumulative projects identified by the City of Brentwood.

A project's contribution to a cumulative traffic noise increase would be considered significant when the combined effect exceeds the perception level (i.e., auditory level increase) threshold. The following criteria is used to evaluate the combined effect of the cumulative noise increase.

- *Combined Effect.* The cumulative with project noise level ("Cumulative With Project") would cause a significant cumulative impact if a 3.0 dB increase over "Existing" conditions occurs and the resulting noise level exceeds the applicable exterior standard at a sensitive use. Although there may be a significant noise increase due to the proposed project in combination with other related projects (combined effects), it must also be demonstrated that the project has an incremental effect. In other words, a significant portion of the noise increase must be due to the proposed project.

The following criteria have been used to evaluate the incremental effect of the cumulative noise increase.

- *Incremental Effects*. The "Cumulative With Project" causes a 1.0 dBA increase in noise over the "Cumulative Without Project" noise level.

However, based on the noise analysis in the above section, noise impacts from the proposed project would be less than significant with mitigation incorporated. Further, based on the fact that noise dissipates as it travels away from its source, noise impacts from on-site activities and other stationary sources would be limited to the project site and nearby vicinity. Thus, cumulative

operational noise impacts from related projects, in conjunction with project-specific noise impacts, would not be cumulatively significant.

14.5.8 Level of Significance after Mitigation

Table 14-8 (Summary of Impacts and Mitigation Measures – Noise & Vibration) summarizes the environmental impacts, significance determinations, and mitigation measures for the proposed project with regard to noise.

Table 14-8: Summary of Impacts and Mitigation Measures – Noise & Vibration Impacts

Impact	Impact Significance	Mitigation
Impact N-1: Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	Significant and Unavoidable Impact	MM N-1a through N1h: Construction Noise Reduction Measures MM N-2: Compliance with City Municipal Code for Mechanical Equipment MM N-3: Compliance with City Municipal Code for Truck Delivery Areas MM N-4: Design and Placement of Parking Areas
Impact N-2: Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.	Less than Significant	None required
Impact N-3: Result in a substantial permanent increase in ambient noise levels.	Less than Significant with Mitigation	MM N-2: Compliance with City Municipal Code for Mechanical Equipment MM N-3: Compliance with City Municipal Code for Truck Delivery Areas MM N-4: Design and Placement of Parking Areas
Impact N-4: Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.	Less than Significant with Mitigation	MM N-1a through N1h: Construction Noise Reduction Measures
Impact N-5: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.	No Impact	None required
Impact N-6: For a project within the vicinity of a private airstrip,	No Impact	None required

Table 14-8: Summary of Impacts and Mitigation Measures – Noise & Vibration Impacts		
Impact	**Impact Significance**	**Mitigation**
would the project expose people residing or working in the project area to excessive noise levels.		
Impact N-7: Contribute to cumulatively considerable noise impacts.	Less than Significant with Mitigation	MM N-1a through N1h: Construction Noise Reduction Measures MM N-2: Compliance with City Municipal Code for Mechanical Equipment MM N-3: Compliance with City Municipal Code for Truck Delivery Areas MM N-4: Design and Placement of Parking Areas

14.6 References

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