APPENDIX I

NOISE

PARAISO SPRINGS RESORT ENVIRONMENTAL NOISE ASSESSMENT

Monterey County, California

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INTRODUCTION

This report provides an assessment of noise resulting from the proposed Paraiso Springs Resort in Monterey County. The project site consists of about 235 acres nestled in the mouths of the Paraiso Springs Valley and Indian Valley and extending westward into the foothills between the crest of the Sierra De Salinas Foothills and the Salinas Valley. The site and is bordered to the east by grazing and farm land, and to the north, south and west by the Santa Lucia Mountains. This report includes a summary of applicable noise regulations, the results of a noise monitoring survey conducted for the project, and an assessment of noise impacts and mitigation measures necessary to meet the applicable County standards at adjacent noise sensitive land uses. Persons not familiar with environmental noise analysis are referred to Appendix A for additional discussion.

PROJECT DESCRIPTION

The proposed project is envisioned to be a spa resort providing both overnight and day guests with a "wellness" treatment program typically found at European spas. In combination with the wellness treatments, the proposed project will provide an educational component, fitness program, and culinary experience. The proposed project will include a series of single and two-story clustered buildings consisting of a hotel, a day-use "hamlet," a spa and fitness center, and timeshare residences. A graphic rendering of the proposed project is shown in Figure 1, (Project Site Plan) and project components are identified in Figure 2 (Preliminary Vesting Tentative Map). Each component of the proposed project is described in more detail below.

Hotel: A proposed 146,878 square foot hotel will consist of 103 guest rooms, three restaurants (totaling 7,570 square feet), meeting and conference facilities (14,016 square feet), lobby, administration and "back of house" facilities (including on-site laundry service) and 110 parking spaces. The hotel would be located near the center of the project site. The three restaurants will provide dining facilities for all guests. A garden and greenhouse will be located near the restaurants, offering herbs and produce grown on the resort property. The restaurant would also incorporate a culinary training facility.

Hamlet: Adjacent to the hotel will be an 18,550 square foot "hamlet" which will accommodate day users and include a 2,500 square foot day spa, 3,500 square feet of retail, seven artist studio and stores (6,300 square feet), wine and garden center (6,200 square feet), and 86 parking spaces.

Spa and Fitness Center**:** The spa and fitness center, located just northeast of the hotel, will offer massage, beauty, therapeutic services, and lectures by wellness professionals. Conference facilities will offer seminar and meeting spaces. An outdoor/indoor fitness center will integrate outdoor activities with indoor physical wellness and training facilities. Facilities will include two tennis courts, a basketball court, a racquetball pavilion, and a golf school.

Residential: Seventeen single-family timeshare villa lots will be created and 60 two-and-three bedroom timeshare condominiums will be constructed as part of the residential portion of the project. Associated with these residential areas will be construction of 114 surface parking spaces. The timeshare villas will be larger units overlooking the project site that provide family-style living for the guests. The timeshare condominium units, located to the north of the hotel, will include small kitchens, a small dining area, a living room and two/three bedroom suites.

Other Amenities**:** The proposed project will also include a wine pavilion/vineyard, an outdoor amphitheater, new landscaping, pedestrian pathways, gardens and pergolas, and walking

trails with scenic lookouts. Additionally the project will include: 1) A large amphitheater lawn with pavilion and stage; 2) A Day Spa Pool and Pavilions; 3) Ornamental streams; 4) A Hiking Center, trailheads and hiking trails through natural area; 5) A Nursery Center; 6) An ornamental Therapy stream and swimming pool; 7) Solarium Sundecks and Spas; and 8) An Activity Terrace with Croquet and Bocce Courts.

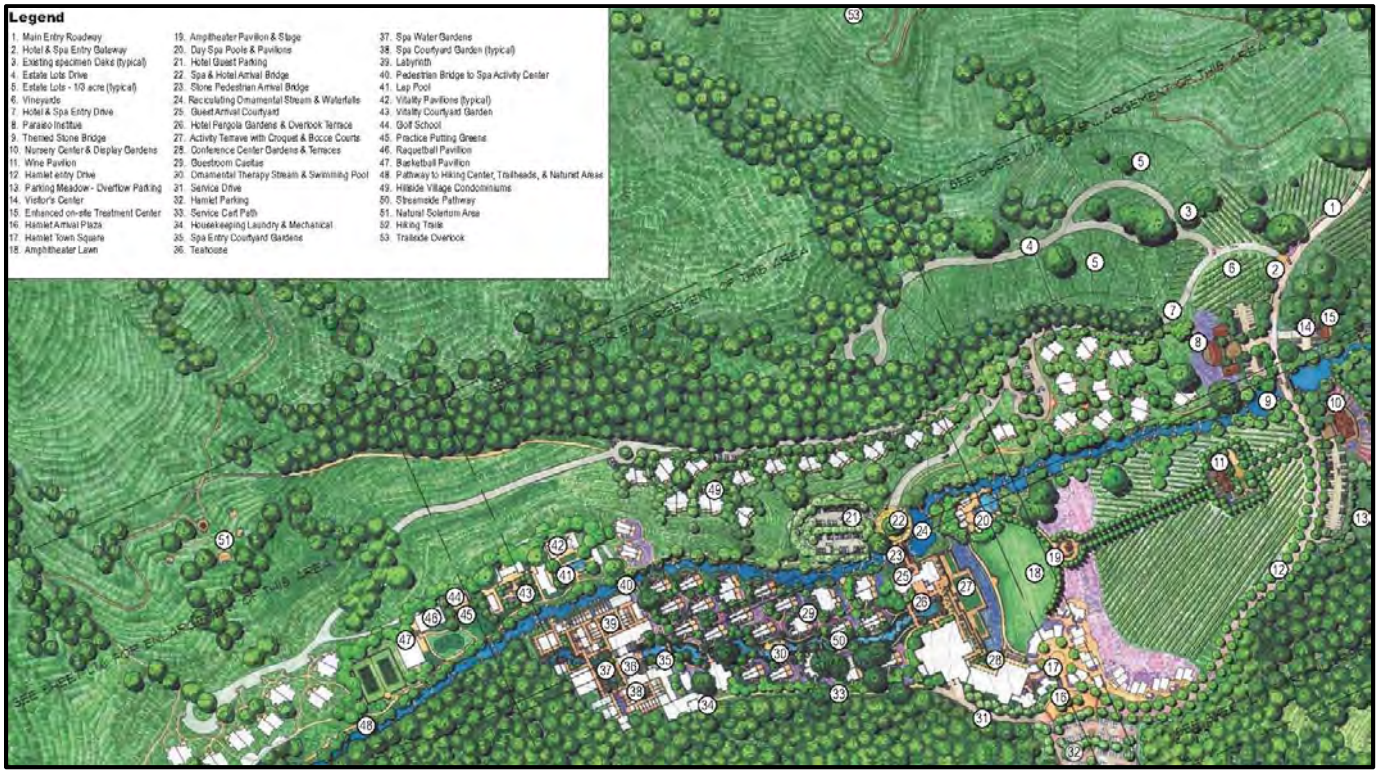


Figure 1: Project Site Plan

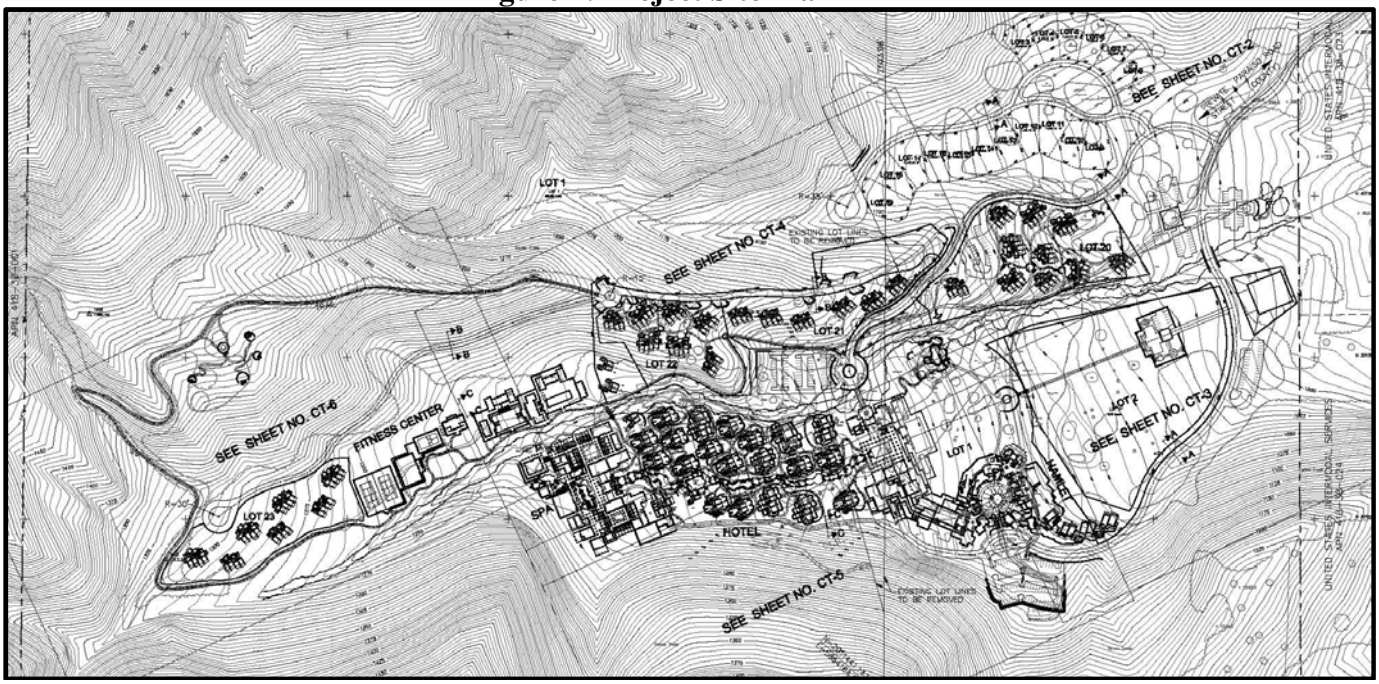


Figure 2: Preliminary Vesting Tentative Map

REGULATORY BACKGROUND

The State of California and Monterey County have established plans and policies that are designed to limit noise exposure at noise sensitive land uses. Plans and policies applicable to the proposed project include: (1) the State CEQA Guidelines, Appendix G; (2) Title 24, Part 2 of the State Building Code; (3) the Monterey County General Plan Noise Element and Noise Ordinance; and (4) Caltrans Construction Vibration Criteria.

State CEQA Guidelines

The CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) 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;

(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

(e) 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, if the project would expose people residing or working in the project area to excessive noise levels; or

(f) For a project within the vicinity of a private airstrip, if the project would expose people residing or working in the project area to excessive noise levels.

Checklist items (a), (b), (c), and (d) are relevant to the proposed project. The project is not located in the vicinity of a public or private airstrip; therefore, checklist items (e) and (f) are not carried forward in this analysis. Because on the nature of this project, it is not expected to generate any significant groundborne noise (such impacts are more typical of rail or major roadway projects), and therefore the groundborne noise component of checklist item (b) is also not carried forward in this analysis.

CEQA does not define what noise level increase would be considered substantial. Typically, project-generated noise level increases of 3 dBA L_{dn} or greater would be considered significant where exterior noise levels would exceed the normally acceptable noise level standard (60 dBA L_{dn} for residential land uses). Where noise levels would remain at or below the normally acceptable noise level standard with the project, noise level increases of 5 dBA L_{dn} or greater would be considered significant.

In December 2015, the California Supreme Court determined that an analysis of the impacts of the environment on a project – known as "CEQA-in-reverse" – is only required under two limited circumstances: (1) when a statute provides an express legislative directive to consider such impacts; and (2) when a proposed project risks exacerbating environmental hazards or conditions that already exist (Cal. Supreme Court Case No. S213478). The Supreme Court reversed the Court of Appeal's decision and remanded the matter back to the appellate court to reconsider the case in light of the Supreme Court's ruling. Accordingly, the case is currently pending back in the Court of Appeal. Because the Supreme Court's holding concerns the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment), and not the science behind the thresholds, the four (4) CEQA checklist items

(items a, b, e, and f) regarding non-project generated noise exposure increases (e.g., exposure of the project residents to exterior or interior noise levels, as well as groundborne vibration and aircraft noise), are not required analysis under CEQA since these items involve the surrounding environment's impact on the project residents. Such analysis contained herein of Impacts A and B and any suggested measures to address noise or vibration exposure on project residents, are included in this report for compliance with the Monterey County General Plan and Code requirements and Title 24, Part 2 of the California Building Code as opposed to CEQA.

2013 California Building Code, Title 24, Part 2

The current (2013) California Building Code (CBC) does not place limits on interior noise levels attributable to exterior environmental noise sources. The July 1, 2015 Supplement to the 2013 California Building Code (CBC) corrects this omission, reinstating limits on interior noise levels attributable to exterior environmental noise sources which had been contained in all prior versions of the CBC dating back to 1974. In keeping with the provisions of the 2015 supplement, this report considers interior noise levels attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn} in any habitable room for new dwellings other than detached single-family dwellings.

Monterey County General Plan

The Monterey County General Plan was adopted by the Board of Supervisors in 1982. Goal 22 in the Monterey County General Plan aims to "maintain an overall health and quiet environment by trying to achieve living and working conditions free from annoying and harmful sounds." The following polices support this goal and are applicable to the proposed project:

Policy 22.2.1 The County shall require new development to conform to the noise parameters established by Table 6, Land Use Compatibility for Exterior Community Noise Environments.

Policy 22.2.2 The County shall require the appropriate standards of soundproofing construction in all multiple-residential structures as specified in the Building Code.

Policy 22.2.5 The County, in accordance with Table 6, should require ambient sound levels to be less at night (10 p.m. to 7 a.m.) than during the day.

The Monterey County General Plan exterior noise-exposure standards are based on parameters established by the California Department of Health, Office of Noise Control and summarized in Table 1; County of Monterey Exterior Community Noise Land Use Compatibility. Based on these standards, noise levels of 60 dBA L_{dn} or CNEL or less at various noise-sensitive receptor locations, including single- and multi-family residences, schools, hospitals, churches, and nursing homes are considered "normally acceptable" and noise levels of 60 to 70 dBA L_{dn} or CNEL are considered "conditionally acceptable" with the incorporation of noise insulation and mitigation features.

Although 70 dBA L_{dn} or CNEL may be considered compatible under these conditions, Monterey County policy as stated in the *Monterey County General Plan* is to mitigate exterior exposure in noise-sensitive land uses to 65 dBA L_{dn} or CNEL, where feasible.

Table 1: County of Monterey Exterior Community Noise Land Use Compatibility

Land Use Category	Noise Ranges; L_{dn} or CNEL dBA			
	I	II	III	IV
Passively used open spaces	50	50-55	55-70	70+
Auditoriums, concert halls, amphitheatres	45-50	50-65	65-70	70+
Residential- low density single family, duplex, mobile home	50-55	55-70	70-75	75+
Residential – multi-family	50-60	60-70	70-75	75+
Transient lodging – motels, hotels	50-60	60-70	70-80	80+
Schools, libraries, churches, hospitals, nursing homes	50-60	60-70	70-80	80+
Actively used open spaces – playgrounds, neighborhood parks	50-67	-	67-73	73+
Golf courses, riding stables, water recreation, cemeteries	50-70	-	70-80	80+
Office buildings, business commercial and professional	50-67	67-75	75+	-
Industrial, manufacturing, utilities, agriculture	50-70	70-75	75+	-

Noise Range I - Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Noise Range II - Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Noise Range III - Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Noise Range IV - Clearly Unacceptable: New construction or development should generally not be undertaken.

Source: Monterey County 1982

Monterey County Noise Ordinance

The Monterey County Noise Control Ordinance prohibits the operation of any device within 2,500 feet of any occupied residential dwelling that produces a noise level exceeding 85 dBA at a distance of 50 feet from the source (County Code, Chapter 10.60, County of Monterey 1988).

Though the project application was deemed complete prior to its adoption in 2014, section 10.60.040 of the County Code applies to nighttime noise, in which it is prohibited to make, assist in making, allow, continue, create, or cause to be made any loud and unreasonable sound any day of the week from 10:00 p.m. to 7:00 a.m. the following morning within the unincorporated area of the County of Monterey. During this time period, a loud and unreasonable sound includes any sound that exceeds the exterior noise level standards set forth in Table 2 below:

Table 2: Exterior Noise Level Standards (Nighttime Only)

Nighttime hourly equivalent sound level (L_{eq})	45 dBA
Nighttime Maximum level (L_{max})	65 dBA

Noise levels shall be measured at or outside the property line of the property from which noise is emanating. Commercial agricultural operations, emergency vehicles, bells and chimes used for religious purposes or services, and specified outdoor gatherings are exempt from these requirements. This noise standard, while not strictly applicable to the proposed project has been included in the noise analysis to conduct a conservative evaluation of project impacts.

California Department of Transportation – Groundborne Vibration.
Caltrans recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards. A conservative vibration limit of 0.25 to 0.30 in/sec PPV has been used for older buildings that are found to be structurally sound but cosmetic damage to plaster ceilings or walls is a major concern. For historic buildings or buildings that are documented to be structurally weakened, a conservative limit of 0.08 in/sec PPV is often used to provide the highest level of protection. All of these limits have been used successfully and compliance to these limits has not been known to result in appreciable structural damage due to groundborne vibration from construction activities, along with equipment, roadway or transit operations. All vibration limits referred to herein apply on the ground level and take into account the response of structural elements (i.e. walls and floors) to ground-borne excitation.

EXISTING NOISE ENVIRONMENT
The project site is nestled in the mouths of the Paraiso Springs Valley and Indian Valley and extends westward into the foothills between the crest of the Sierra De Salinas Foothills and the Salinas Valley. The site and is bordered to the east by grazing and farm land, and to the north, south and west by the Santa Lucia Mountains. Happy Valley is located on the other side of the ridge to the south of the site. The surrounding land is currently used for agriculture and vineyards with grazing in the steeper areas. Existing single-family homes and farm residences are located along Paraiso Springs Road and Arroyo Seco Road north and ea~~we~~st of the site. The noise environment at the project site and the general vicinity is characteristic of undeveloped woodlands and rural farmlands, with local roadway traffic being the greatest noise influence near these roadways and distant roadway, highway and agricultural related noise influencing the background noise environment. Away from local roadways agricultural and woodland sounds are the primary influence on the noise environment. To evaluate the existing noise environment on the project site and at representative residential uses in the area, three (3) long term noise measurements were conducted. These measurements were conducted simultaneously over a 24-hour weekday period between 12:00 p.m. on Wednesday, August 10th and 12:00 p.m. on Thursday, August 11th, 2016. To evaluate noise levels in other site development areas and at other representative noise sensitive residential in the site vicinity a series of seven (7) short term, 10 minute duration noise measurements were conducted simultaneously with measurements at the long term positions. The approximate location of these measurements relative to the site and vicinity are shown in Figure 3.

The noise measurements were made with Larson Davis Model 820 and 831 Integrating Sound Level Meters set at "slow" response. The sound level meters were equipped with ½ - inch random incidence microphones fitted with windscreens. All instrumentation used meets the requirements of the American National Standards Institute (ANSI) SI.4-1983 for Type 1 use. The sound level meters were calibrated prior to the noise measurements using a Larson Davis Model CAL200 acoustical calibrator. During the measurement period the weather was clear with no precipitation.

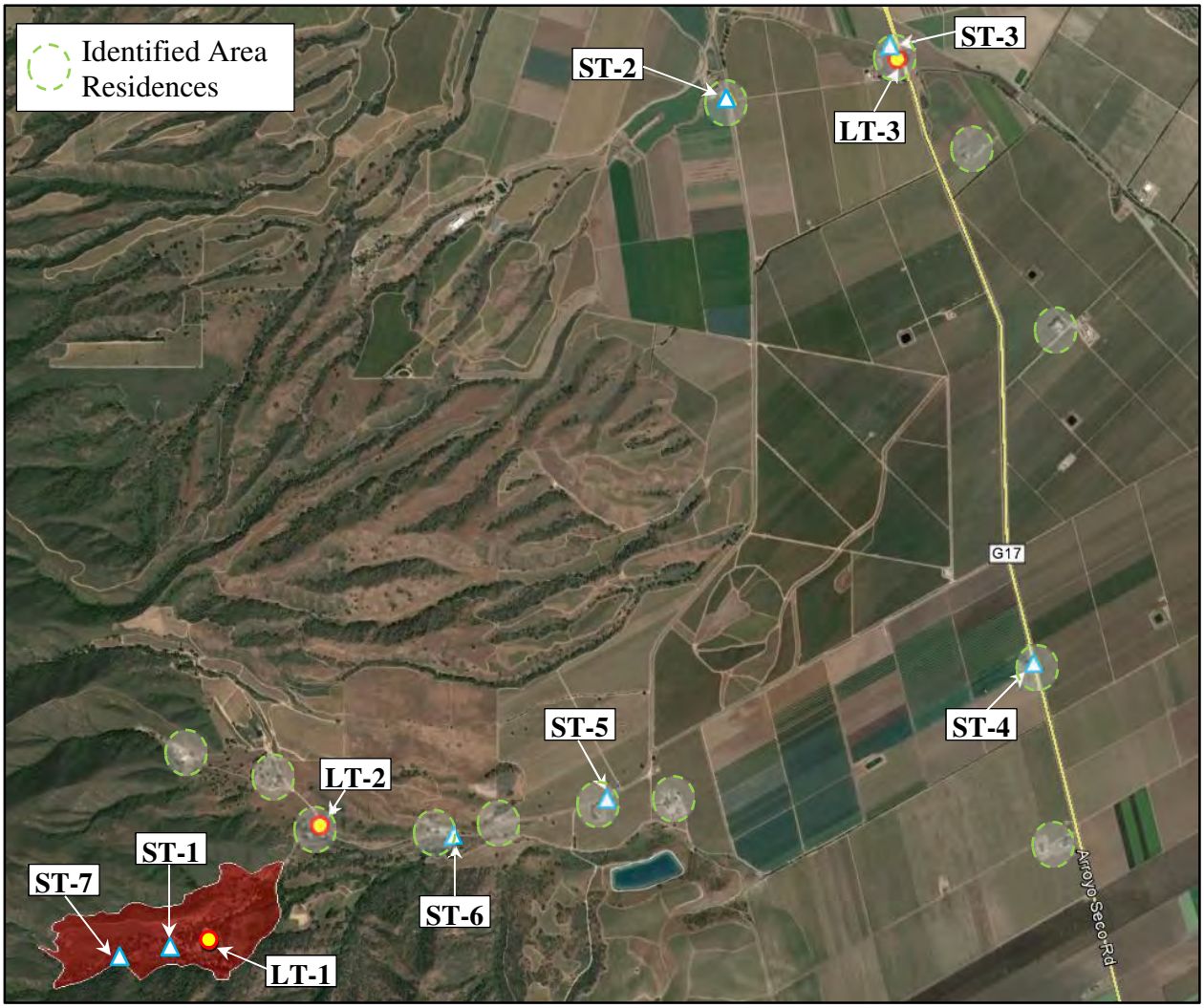
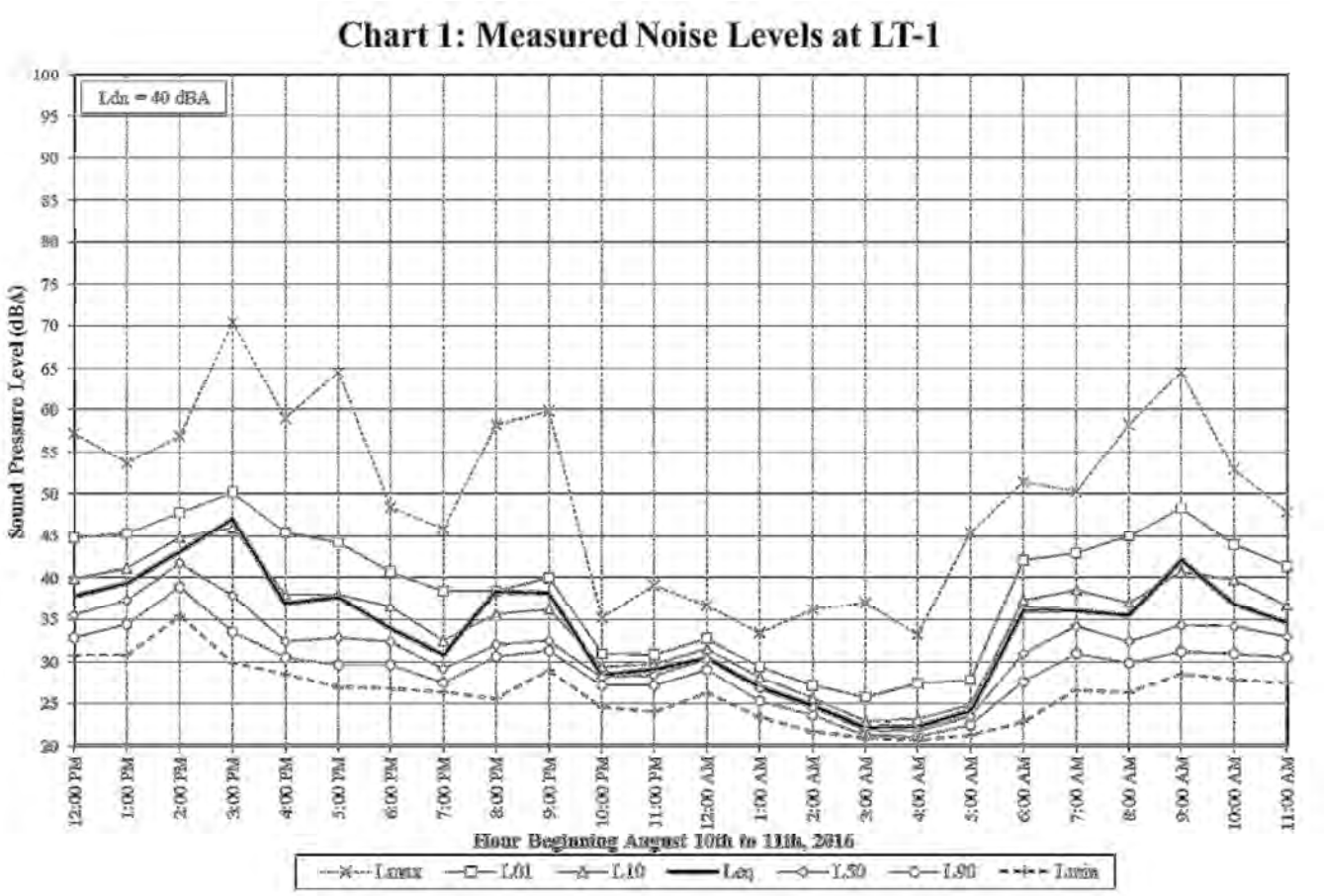


Figure 3: Site Vicinity, Measurement Locations and Adjacent Uses

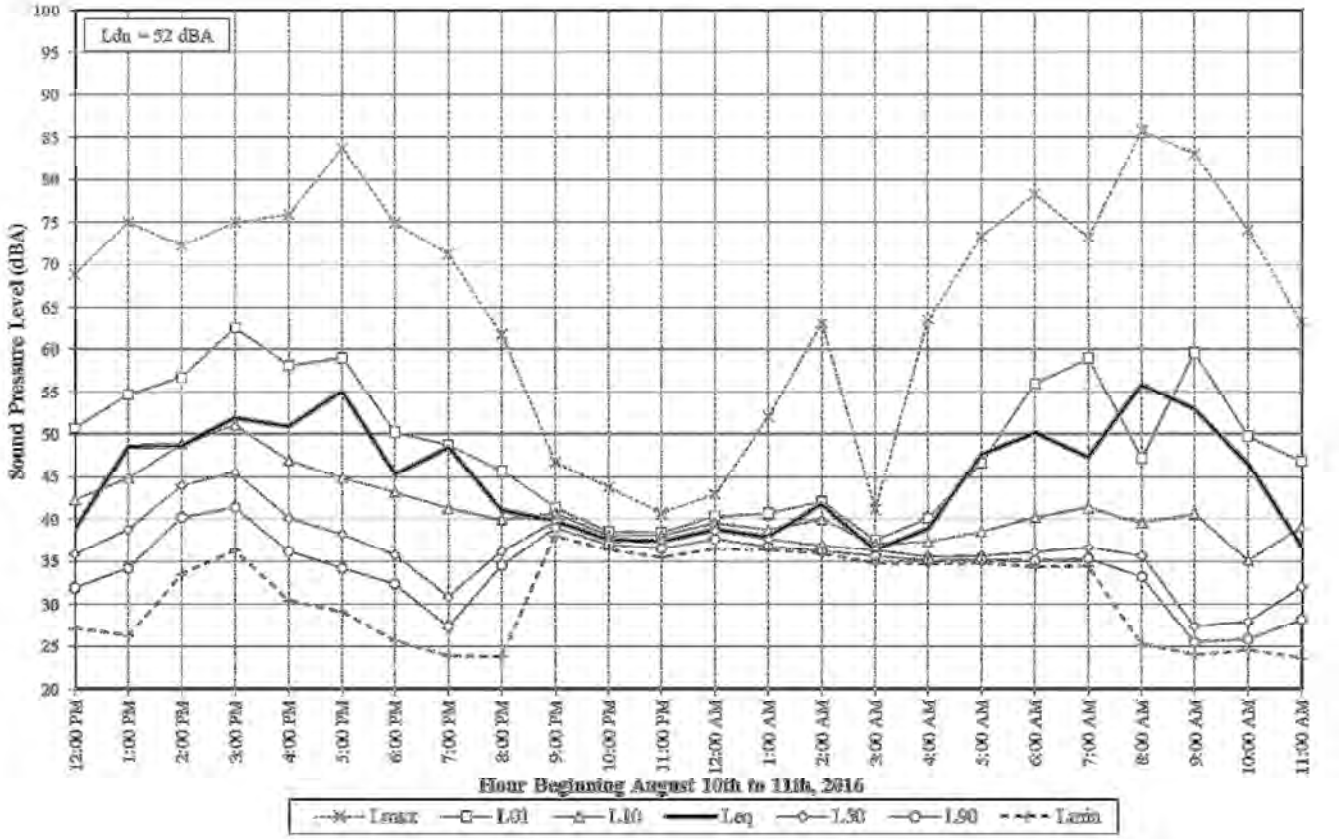
The first long-term sound level measurement (LT-1) was on the project site on an existing flag pole at approximate positon of the project amphitheater lawn. Noise levels measured at this site were primarily the result of sounds from activities of the on-site caretaker along with natural site sounds such as wind in trees, bird chirps, insects, and other noise associated with wooded areas. The hourly trend in noise levels at this location, including the energy equivalent noise level (L_{eq}), maximum (L_{max}), minimum (L_{min}), and the noise levels exceeded 1, 10, 50, and 90 percent of the time (indicated as L_{01}, L_{10}, L_{50}, and L_{90}) are shown on Chart 1.



The average noise levels at this location ranged from 28 to 47 dBA L_{eq} during the day, and 22 to 36 dBA L_{eq} at night. The calculated average day/night noise level (L_{dn}) was 40 dBA.

The second long-term sound level measurement (LT-2) was conducted on a utility pole on the opposite side of Paraiso Springs Road from the closest residence to the project site. Noise levels measured at this site were produced by occasional traffic on Paraiso Springs Road, sounds from activities at the adjacent residence along with natural site sounds such as wind in trees, bird chirps, insects, and other noise associated with wooded areas. The hourly trend in noise levels at this location, including the energy equivalent noise level (L_{eq}), maximum (L_{max}), minimum (L_{min}), and the noise levels exceeded 1, 10, 50, and 90 percent of the time (indicated as L_{01}, L_{10}, L_{50}, and L_{90}) are shown on Chart 2.

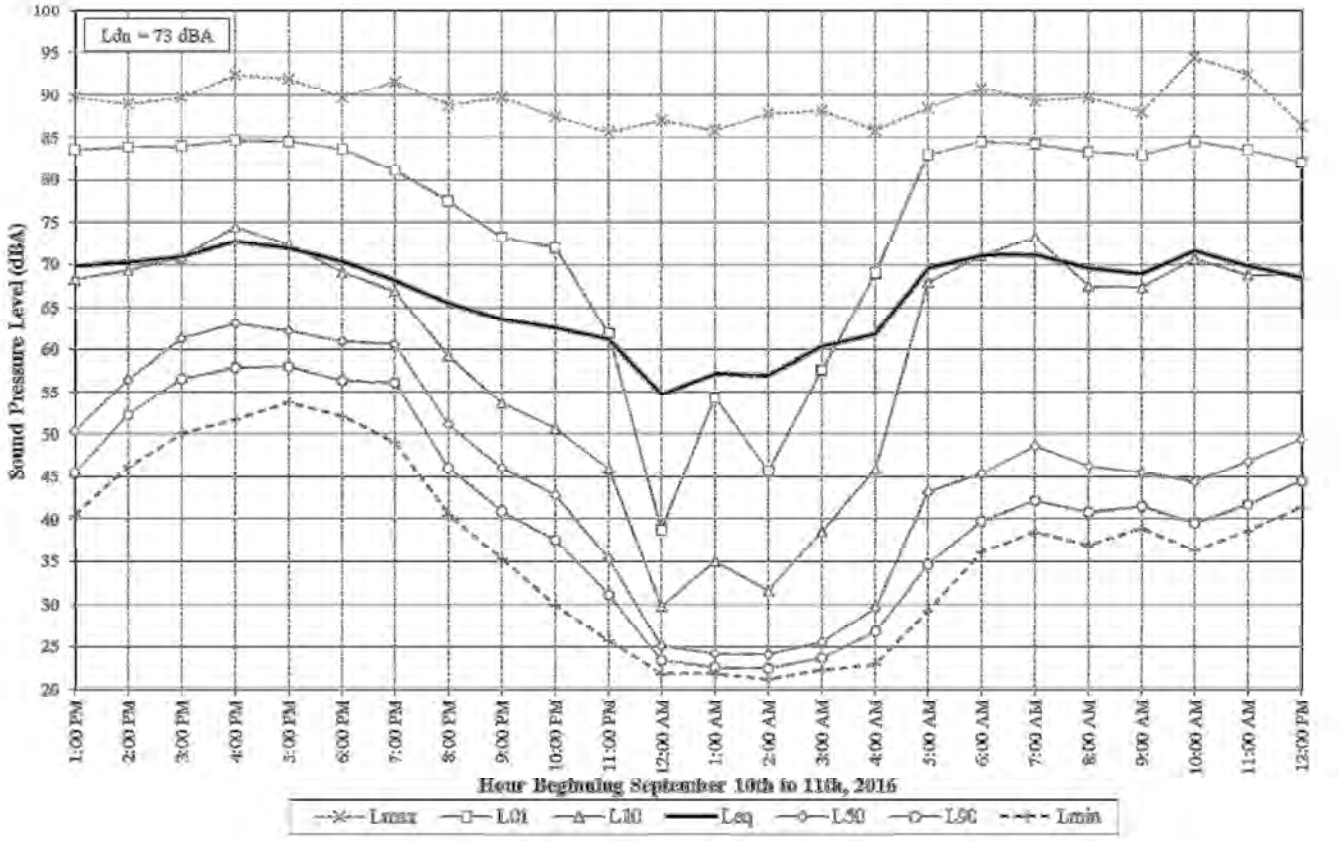
Chart 2: Measured Noise Levels at LT-2



The average noise levels at this location ranged from 37 to 56 dBA L_{eq} during the day, and 36 to 50 dBA L_{eq} at night. The calculated average day/night noise level (L_{dn}) was 52 dBA. A review of this chart also shows a fairly constant noise source between about 9 pm and ending at 7 am. This sound, which begins at about 40 dBA and ends at about 35 dBA, is judged to be a result of insect, frog, or other natural noise sources based on experience with similar wooded and rural sites.

The third long-term sound level measurement (LT-3) was conducted on a utility pole at approximately 25 feet from the centerline of Arroyo Seco Road on a residential property line frontage north of Clark Road. Noise levels measured at this site were primarily produced by traffic on Arroyo Seco Road, with noise associated with agricultural activities, birds in tress and on power lines, and distant highway also contributing to the noise environment. The hourly trend in noise levels at this location, including the energy equivalent noise level (L_{eq}), maximum (L_{max}), minimum (L_{min}), and the noise levels exceeded 1, 10, 50, and 90 percent of the time (indicated as L_{01}, L_{10}, L_{50}, and L_{90}) are shown on Chart 3.

Chart 3: Measured Noise Levels at LT-3



The average noise levels at this location ranged from 63 to 73 dBA L_{eq} during the day and 55 to 71 dBA L_{eq} at night. The calculated average day/night noise level (L_{dn}) was 73 dBA. Maximum noise levels produced in each of the 24 hours were due to passing heavy trucks on Arroyo Seco Road. During the late night and early morning hours, these truck passbys continued to strongly influence the average hourly (L_{eq}) and day/night average (L_{dn}) levels, but showed lesser influence on statistical and minimum noise levels.

The short-term noise measurements were made simultaneously with the long-term measurements on a 10-minute basis at seven locations to determine the change in the ambient noise environment over the breadth of the site development area and at other representative noise sensitive uses in the project area. The measurement locations are described as follows:

- Measurement ST-1 was made on the project site in the vicinity of the future Guestroom Casitas between 12:10 and 12:20 pm on August 10th, 2016.
- Measurement ST-2 was made at approximately 45 feet from the centerline of Paraiso Springs Road in front of the closest residential property to the site along this roadway north of the Clark Road intersection. The measurement was made between 9:50 & 10:00 am on August 11th, 2016.
- Measurement ST-3 was made in the vicinity of long term measurement location LT-3, at approximately 100 feet from the centerline of Arroyo Seco Road in front of the closest residential property to the site along this roadway north of the Clark Road intersection. The measurement was made between 10:10 & 10:20 am on August 11th, 2016.

- Measurement ST-4 was made at approximately 40 feet from the centerline of Arroyo Seco Road in front of the closest residential property to the site along this roadway south of the Clark Road intersection. The measurement was made between 10:30 & 10:40 am on August 11th, 2016.
- Measurement ST-5 was made at approximately 35 feet from the centerline of Paraiso Springs Road in front of the first residential property along this roadway west of the Clark Road intersection. The measurement was made between 10:50 & 11:00 am on August 11th, 2016.
- Measurement ST-6 was made at approximately 25 feet from the centerline of Paraiso Springs Road in front of the third residential property along this roadway west of the Clark Road intersection. The measurement was made between 11:10 & 11:20 am on August 11th, 2016.
- Measurement ST-7 was made on the project site in the vicinity of the future Spa and Fitness Center between 11:40 and 11:50 am on August 11th, 2016.

The measurement results at each of the short term measurement positions are shown in Table 3. The average day-night noise level (L_{dn}) at each short-term measurement location was estimated at this site by correlating the short-term measurement data to the data gathered during the corresponding time period at the long-term measurement sites.

Table 3: Summary of Short-Term Noise Measurement Data, dBA

Noise Measurement Location	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}	L_{dn}[1]
ST-1: On the project site in the vicinity of the future Guestroom Casitas. (8/10/16, 12:10 - 12:20 pm)	53	46	39	37	35	32	29	**40**
ST-2: 45 ft. the centerline of Paraiso Springs Road at the closest residential property north of the Clark Road intersection. (8/11/16, 9:50 - 10:00 am)	58	52	42	41	38	36	35	**52**
ST-3: 100 ft. the centerline of Arroyo Seco Road at the closest residential property north of the Clark Road intersection. (8/11/16, 10:10 - 10:20 am)	80	75	55	60	38	37	37	**63**
ST-4: 40 ft. the centerline of Arroyo Seco Road at the closest residential property south of the Clark Road intersection. (8/11/16, 10:30 - 10:40 am)	84	78	62	64	40	36	35	**65**
ST-5: 35 ft. the centerline of Paraiso Springs Road at the first residential property west of the Clark Road intersection. (8/11/16, 10:50 - 11:00 am)	43	40	35	33	33	31	30	**42**
ST-6: 25 ft. the centerline of Paraiso Springs Road at the third residential property on west of the Clark Road intersection. (8/11/16, 11:10 - 11:20 am)	45	40	34	32	31	29	27	**46**
ST-7: On the project site in the vicinity of the future Spa and Fitness Center. (8/11/16, 11:40 - 11:50 am)	55	51	39	38	33	29	25	**41**

Notes: 1. The L_{dn} at the short term positions is approximated by correlation to the corresponding measurement period at the long-term sites.

NOISE ASSESSMENT

Estimating the expected noise produced by, and impacts from, the proposed project at adjacent noise sensitive uses requires three elements; the first is an assessment of what noise producing operations are likely to occur, the second is typical noise source levels for those operations, and the third is to determine the temporal nature of the operations.

I. Identification of Noise Producing operations/uses

There are a number of operations associated with the operation and use of the proposed project that will produce noise. These include:

1. Day use and overnight guest related activities,
2. Project related mechanical equipment noise,
3. Outdoor Amphitheater event noise,
4. Project traffic and,
5. Project construction.

II. Typical Noise Source Levels

To estimate the noise levels associated with project operations, some attention must be given to the temporal nature of the noise produced. Below each of the project related noise producing operations, as outlined above, are discussed:

Day use and overnight guest related activities

The spa, pools and outdoor sports areas proposed at the project are expected to be used for used for daytime recreation with the highest noise levels from these uses being loud voices and shouting of guests in the pools and the proposed activity areas. Measurements made at community pools, indicate that noise levels of 65 to 70 dBA L_{eq} typically occur at 50 feet during the boisterous daytime recreation and water play, and that noise levels during outdoor court sport and basketball activities are similar, typically range from 66 to 68 dBA L_{eq} at a distance of 50 feet.

Beyond the outdoor activity and spa related noise, the use of the hotel and other residential facilities on the project site are not expected to generate significant noise, since the use would be similar to common residential sources with normal and sometimes raised occupant voices being the primary source of daytime, evening and occasional nighttime sounds. However, raised voices of multiple groups outside of the guest facilities may occur concurrently during the daylight hours. After dark (i.e. nighttime hours) guest activities are expected to largely occur within the hotel and other residential facilities. Considering this, sound levels associated with hourly daytime residential facility use are expected to result in levels of 51 to 53 dBA L_{eq} at 50 feet, while nighttime hourly nighttime residential noise would result in levels of 39 to 41 dBA L_{eq} at 50 feet.

Project related mechanical equipment noise

The proposed project is expected to include heating, ventilation and cooling (HVAC) equipment for the proposed resort and spa facilities. Based on noise measurements made at comparable facilities, the kitchen and laundry exhaust equipment may produce constant noise levels between 58 to 63 dBA L_{eq} at 50 feet, and the air conditioning system outdoor condensing units may produce constant sound levels of 55 to 58 dBA L_{eq} at 50 feet. This type of equipment may run continuously during both daytime and nighttime hours.

Outdoor Amphitheater event noise

The proposed outdoor amphitheater will reportedly be used for open air lectures and/or presentations to onsite guests, however given its form and presence on the site, future uses for the amphitheater and the surrounding lawn may include non-concert type live amplified music for weddings and celebration/party events, and film screenings in addition to the proposed

lectures and presentations. Given the primary emphasis of the resort on providing a therapeutic environment for wellness treatment and education, we do not expect that the amphitheater will be used for concert type amplified music. Based on this understanding Table 1 lists typical average noise levels generated by the range of expected events on the site at distances of 50 feet from the source.

Table 4: Typical Noise Source Levels for Events (A-Weighted L_{eq} Levels)

Event or Activity	Typical Noise Level @ 50 ft.
Amplified wedding (or similar type event) Music[1]	72 dBA
Amplified Speech	71 dBA
Non-amplified (acoustic) Music	67 dBA
200 Guests in Raised Conversation with Background Music	68 dBA
Films – Voices/Music	64 dBA
80 Guests in Raised Conversation with Background Music	58 dBA

[1]Amplified concert type music events are not proposed, such events would increase outdoor L_{50} sound levels to 80 dBA @ 50 feet.

Project Traffic

Traffic on the site and to and from the project on area roadways would produce the following type and range of traffic noise levels:

- Automobile and light vehicle traffic accessing the tasting room would occur during the daytime hours and noise produced is expected to include the sounds of vehicles traveling on the access road maneuvering in parking areas, engine starts, door slams. Automobile and other light vehicle traveling at 15 to 25 mph typically produce sound levels of between 51 to 59 dBA at 50 feet. Parking lot activities such as engine starts, door slams and low speed vehicle movements typically produce maximum sounds levels ranging from 53 dBA to 63 dBA at 50 feet.

- Truck traffic on the project site will access the winery via the reoriented Dry Creek Road Entrance. Due to the grades and turn radii of the access road, heavy duty (semi-tractor trailer type) trucks, will not be used. Trucks entering or exiting the winery will thus be limited to medium body trucks, such as box trucks, flat beds, and delivery vans. Noise levels generated by truck traffic are dependent on the size and speed of trucks, with typical noise levels generated by medium body trucks ranging from 65 to 70 dBA when traveling at constant speeds and up to 70 to 75 dBA when stopping/starting and maneuvering at a distance of 50 feet.

Construction Noise

The construction of the project would generate noise and may temporarily increase noise levels at adjacent residential receivers. Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment operating on site, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction of the project would involve site improvements, excavation, and to construct foundations, building framing, paving, and landscaping. The hauling of excavated material and construction materials would generate truck trips on local roadways. Construction activities for individual projects are typically carried out in stages. During each stage of construction, there would be a different mix of equipment operating. Construction noise levels would vary by stage and vary within stages based on the amount of equipment in operation and location where the equipment is operating. Table 5 shows average noise level ranges by

construction phase at 50 feet. Most demolition and construction noise is in the range of 80 to 90 dBA at a distance of 50 feet from the source

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TABLE 5: Typical Ranges of Energy Equivalent (L_{eq}) Construction Noise Levels at 50 Feet, dBA

	Parking Garage, Religious, Amusement & Recreation, Store,		Public Works Roads & Highways, Sewers, and Trenches	
	I	**II**	**I**	**II**
Ground Clearing	84	83	84	84
Excavation	89	71	88	78
Foundations	77	77	88	88
Erection	84	72	79	78
Finishing	89	74	84	84

I - All pertinent equipment present at site, **II** - Minimum required equipment present at site.
Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

III. Propagation of sound

The final step in estimating the project noise levels is assessing the propagation of sound to the sensitive receptors. To do this, it is necessary to assume some rate of sound attenuation between the operations and receiver locations. Typically, the most dominant physical effect is due to the spreading out of sound waves with distance. Sound from localized sources, such as the ~~winery production and~~ tasting room areas at the project, spreads out (diverges) as it travels away from the source with the sound level (acoustic energy) dropping off with distance according fundamental geometric relationships. This type of sound loss occurs independent of the barrier or terrain losses. Other effects can modify these fall-off rates such as partial shielding from buildings or topography, atmospheric attenuation of sound, ground absorption, and meteorological effects. If present, these effects reduce the noise in addition to that due to sound divergence.

Sound sources may be treated as a "point source" when the distance from the source to the receiver is large compared to the dimension of the source. For the size to distance relationships present for this project, it can be assumed that sound at the adjacent residences from sources at the production and hospitality facilities would be considered as a point source. With point sources sound levels are reduced with distance in accordance with the "inverse square law", which yields a six (6) dB sound level reduction for each doubling of the distance[1] from the source. For moving sources of noise, such as auto traffic or truck movements, which are considered linear sources of noise, the divergence of the sound wave is cylindrical in nature producing a reduction of 3 to 4 ½ dB with each doubling of distance.

[1] Mathematically expressed as $L_{rec} = L_{source} - 20xLog(D_{rec}/D_{source})$

NOISE IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

Paraphrasing from Appendix G of the CEQA Guidelines, a project would normally result in significant noise impacts if noise levels generated by the project conflict with adopted environmental standards or plans, if the project would expose people to or generate excessive ground borne vibration levels, or if ambient noise levels at sensitive receivers would be substantially increased over a permanent, temporary, or periodic basis.

The following criteria were used to evaluate the significance of environmental noise and vibration resulting from the project (corresponding to the CEQA checklist items):

A. **Noise and Land Use Compatibility:** A significant noise impact would result if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the Monterey County General Plan. Based on these standards, noise levels of 60 dBA L_{dn} or less at noise-sensitive receptor locations in the project vicinity are considered normally acceptable. Implementation of the proposed project would be considered significant if the proposed project resulted in a substantial contribution to projected future noise levels at either existing or proposed noise-sensitive receptors that exceed the applicable County noise criteria for land use compatibility of 60 dBA L_{dn}.

B. **Groundborne Vibration:** A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.25 in/sec PPV would have the potential to result in "architectural" damage to normal buildings.

C. **Substantial Permanent Increase in Ambient Noise Levels:** A significant impact would be identified if traffic or operational noise generated by the project created a substantial increase in ambient noise levels that exceed the County's General Plan Land Use standards of 60 dBA L_{dn} at noise sensitive single family residential uses in the site vicinity. A substantial increase would occur at the residences if: a) the noise level increase is 5 dBA L_{dn} or greater, with a future noise level at the residence of less than 60 dBA L_{dn}, or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level at the residence of 60 dBA L_{dn} or greater.

D. **Substantial Temporary Increase in Ambient Noise Levels:** A significant noise impact would be identified if construction related noise would result in a substantial temporarily increase ambient noise levels or to exceed standards adopted by the County of Monterey. The County Code restricts noise from mechanical equipment to 85 dB at 50 feet from the source if it operates within 2,500 feet of an occupied residence. Construction noise would be also considered significant if -noise from construction activities would exceed 60 dBA L_{eq} and the ambient noise environment by at least 5 dBA L_{eq} for a period of greater than one year or more at exterior areas of noise sensitive uses in the project area.

As discussed in the Regulatory Section under CEQA, based on the CBIA vs. BAAQMD decision impacts a and b are included in this report for compliance with the County of Monterey General Plan and/or Municipal Code requirements and Title 24, Part 2 of the California Building Code as opposed to CEQA.

Impact A: **Noise and Land Use Compatibility.** Residential land uses proposed on the project site would be exposed to exterior noise levels of less than 60 dBA L_{dn} and adjacent noise sensitive uses would be exposed to exterior noise levels of less than 60 dBA L_{dn} due to on site project operational noise. **This is a less than significant impact.**

The project proposes the construction of residential uses on project site as shown in Figures 1 and 2. Based on measurements of the existing noise environment in this area and a review of the overall project plans the proposed residential uses are expected to be exposed to an L_{dn} of less than 55 dBA under existing and future conditions. Based on this determination the project site would be considered "Normally Acceptable" for residential use by the County Noise and Land Use Compatibility guidelines. Therefore, this is a less-than-significant impact.

Mitigation Measure A: None required.

Impact B: Exposure to Groundborne Vibration. Vibration levels resulting from project construction and operations activities on the project site and off-site project traffic would not exceed 0.25 in/sec PPV at the nearest residential land uses. **This is a less-than-significant impact.**

A significant impact would be identified if the construction of the project would generate groundborne vibration levels at adjacent structures exceeding 0.25 in/sec PPV because these levels would have the potential to result in "architectural" damage to normal buildings.

Construction activities would include demolition, excavation, site preparation work, foundation work, new building framing and finishing, and paving on the project site. Pile driving is not expected to be needed for project construction. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity of the work area. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 6 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. The nearest existing structures to the project construction area are more than 1,300 feet from closest site work areas.

TABLE 6 Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec)
Pile Driver (Impact) upper range[1]	1.158
Pile Driver (Impact) typical[1]	0.644
Pile Driver (Sonic) upper range[1]	0.734
Pile Driver (Sonic) typical[1]	0.170
Clam shovel drop	0.202
9-ton Vibratory Roller[2]	0.55
2-ton Vibratory Roller[2]	0.14
Hoe Ram[1]	0.089
Large bulldozer[1]	0.089
Caisson drilling[1]	0.089
Loaded Trucks[1]	0.076
Jackhammer[1]	0.035
Small bulldozer[1]	0.003

1. Source: Federal Transit Administration, 2006
2. Source: Dowding, C.S., Construction Vibrations, Prentice Hall, 1996

Considering the levels shown in Table 6, vibration levels produced by heavy equipment (vibratory rollers, clam shovel drops) during construction are calculated to be less than 0.002

in/sec PPV or less at a distance of 1,300 feet.[2] Pile driving is not expected for project construction, but even at the upper range, the use of impact pile driving would be below the accepted threshold of perception of 0.006 in/sec at the closest residence. Vibration levels would be lower at structures located further from the construction and as construction moves away from the closest adjacent residence. Based on these findings, vibration levels from the project construction are not expected to be perceptible at any adjacent residences. This is a less-than-significant impact.

On-site operations and activities are expected to include day use and overnight guest related activities, internal project traffic, and the operation of mechanical equipment. None of these uses would generate significant groundborne vibration, and thus vibration levels produced by on-site from the project operation would not be perceptible at any adjacent residences. This is a less-than-significant impact.

Off-site project traffic would include heavy equipment and trucks during construction and passenger vehicles and trucks once the project in built and in operation. Based on controlled ground vibration testing of vehicles traveling on roadways with irregular surfaces, the groundborne vibration levels at 5 feet from the edge of the travel lane is 0.002 in/sec PPV for passenger cars at 25 mph, 0.003 in/sec PPV for light trucks at 25 mph, and 0.008 in/sec and 0.014 in/sec PPV for heavy trucks traveling at respective speeds of 10 and 25 mph[3]. Based on distance information obtained via Google Earth, homes on Paraiso Springs Road are situated as close as 30 feet from the edge of the roadway. Based on this distance and source levels at 5 feet, passenger cars and light trucks ~~Heavy~~ trucks traveling at 3~~2~~5 mph would be expected to produce groundborne vibration levels of ~~less than~~ 0.001 in/sec PPV and heavy trucks traveling at 35 mph would be expected to produce groundborne vibration levels of 0.005 in/sec PPV. Based on these findings, groundborne vibration levels from the project construction and operations traffic are not expected to be perceptible at any adjacent residences. This is a less-than-significant impact.

Mitigation Measure B: None required.

Impact C: Operational Noise. The operation of the proposed project would not generate noise levels exceeding the noise limits established in the Monterey County General Plan or Noise Ordinance. **This is a less than significant noise impact.**

On-site Operational Noise

The closest adjacent residential receiver to the project site is the single family home on Paraiso Springs Road east of the site. This home is located approximately 1,300 feet from the easternmost (closest) project facility[4], and 2,300 feet from the proposed amphitheater stage and pavilion. Other residences to the east and north are significantly further distant from the project facilities, with the next closest noise sensitive uses are a home located over a ridge line to the north which is located approximately 1900 feet from the easternmost project facilities, and a home further down Paraiso Springs Road which is located approximately 3,000 feet from the

[2] These levels are based on calculations assuming normal propagation conditions, using a standard equations of $PPV_{eqmt}=PPV_{ref} * (refD/recD)^{1.5}$, from FTA, May 2006.

[3] Henwood J T & Haramy K Y, 2002, Vibrations induced by Construction Traffic: A historic Case Study, Federal Highway Administration, Denver CO

[4] This facility is identified as the Enhanced On-Site Treatment Center on project drawings.

easternmost project facilities. Figure 4 shows the locations of these residences relative to the project site.

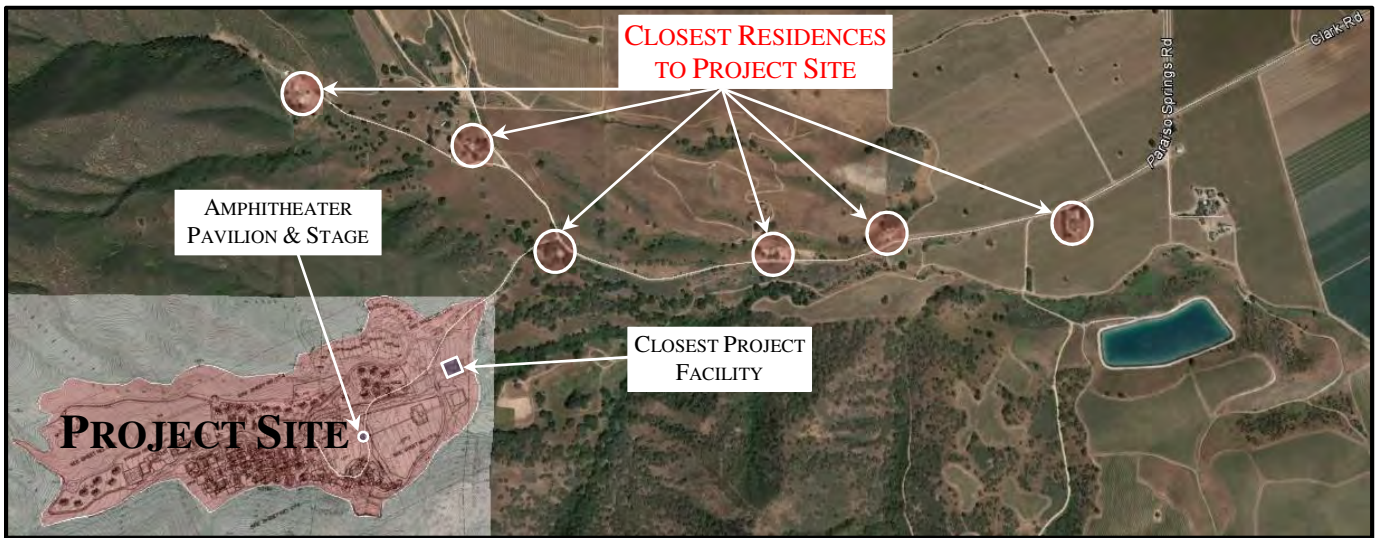

Figure 4: Project Site and Closest Noise Sensitive Receptors

As discussed in the preceding section, operational noise on the project site may involve day use and overnight guest related activities, project related mechanical equipment noise and outdoor amphitheater event noise. Day use and overnight guest activities may produce sound levels of up to 70 dBA at 50 feet, while mechanical equipment may produce sound levels of up to 63 dBA at 50 feet. Using these source noise levels and noise reduction due distance attenuation only from the closest project facility without considering possible attenuation from intervening foliage to terrain, day use and overnight guest activities would produce sound levels of 42 dBA or less at the nearest residential receiver. This level of noise would not cause noise levels at any adjacent residential uses to exceed the Monterey County General Plan or Noise Ordinance standards.

Project use and operation will also include events at the outdoor amphitheater on the project site. As stated above the amphitheater stage will be approximately 2300 feet from the closest residence. Though events in other areas of the site are not proposed, it is possible that events may occur in other areas of the site such as the wine pavilion, the day spa, or in the various garden areas on the site. Some of these areas may be closer to adjacent residential uses than the amphitheater. Considering this possibility, the minimum distances (i.e. setbacks) from events needed to allow for compliance with the County's (2014) hourly noise ordinance limit of 45 dBA have been calculated considering the sound level reduction due distance attenuation only. The results of this analysis are presented in Table 7 below:

Table 7: Minimum Event Area Setbacks to allow Noise Ordinance Compliance

Event or Activity	Noise Level @ 50 ft.	Distance Needed to Attenuate Noise Level to 45 dBA
Amplified wedding (or similar type event) Music	72 dBA	1125 feet
Amplified Speech	71 dBA	1000 feet
Non-amplified (acoustic) Music	67 dBA	625 feet
200 Guests in Raised Conversation w/Bkgd. Music	68 dBA	725 feet
Films – Voices/Music	64 dBA	450 feet
80 Guests in Raised Conversation w/Bkgd. Music	58 dBA	225 feet

A review of the minimum event setback distances shown in Table 7, and a consideration that the distance from the closest project facility to the nearest residence is 1,300 feet shows that noise from outdoor events held at the project would not exceed, and would thus comply with, the Monterey County Noise Ordinance standards.

Off-site operational Noise (i.e. traffic)

Access to the project site would be via Paraiso Springs Road, with the all traffic to and from the site traversing the section of this roadway between the project entrance and the Clark Road intersection. The four homes on this section of Paraiso Springs Road have the most potential to experience traffic noise impacts from the project. Based on distance information obtained via Google Earth, are situated between 50 and 60 feet from centerline of the roadway. A review of the traffic analysis report for the project (Hatch, Mott, MacDonald, June 2016) shows that the AM, PM and Saturday peak hour project related traffic volumes on this section of Paraiso Springs Road will, respectively, be 7, 9 and 46 vehicles. Considering an average vehicle speed of 35 mph (per the traffic report), highest average noise levels due to automobile and light vehicles passing the four homes on this section of Paraiso Springs Road would be between 64 and 65 dBA[5], with each passing vehicle producing noise levels which exceed 54 and 55 dBA (10 dBA below the peak level)[6] for approximately 10 seconds. Allowing for the peak hour traffic volumes and speeds from the project traffic report, the total duration of time per hour where noise levels would exceed 54 dBA and 55 dBA would be about 7 minutes/hour during peak Saturday traffic, and 1 minute/hour during daily peak AM and PM traffic .

On an hourly basis the projected peak hour Saturday traffic would result in an L_{eq} of 56 dBA at 50 feet and an L_{eq} of 55 dBA at 60 feet, while the daily AM and PM traffic would result in respective L_{eq} levels of 48 and 49 dBA at 50 feet and respective L_{eq} levels of 47 and 48 dBA at 60 feet. The typical relationship of peak hour L_{eq} to L_{dn} in rural areas, where there is little or no nighttime traffic, is that the peak hour L_{eq} is often 3 to 4 points higher than the L_{dn} value for the roadway. Considering this and that this area is very rural and that our ambient noise level survey indicates that there is negligible nighttime traffic, we would expect the calculated project related peak hour L_{eq}'s to be 4 decibels above the traffic related L_{dn} values at the four homes on this section of Paraiso Springs Road between the project entrance and Clark Road.

Based on the above discussion, we estimate that noise produced by project traffic may result in weekend L_{dn} levels at the four homes on this section of Paraiso Springs Road between the project entrance and Clark Road residences of between 51 to 52 dBA, and weekday L_{dn} levels at the four homes on this section of Paraiso Springs Road between the project entrance and Clark Road residences of between 43 to 45 dBA. Our existing noise survey of the environmental noise environment in the vicinity of these homes indicated that they are currently exposed to ambient noise levels of between 42 and 52 dBA L_{dn}. Considering the existing conditions project traffic would be expected to result either no change or an up to 3 dBA in the existing noise environment at the homes along Paraiso Springs Road. Because residences along this roadway are currently exposed to an L_{dn} of less than 60 dBA, noise from traffic on the roadways serving the project site would not be considered produce a substantial increase in noise at off-site sensitive uses under CEQA. Additionally, the sound levels produced by project traffic would not exceed the

[5] Reported sound levels are calculated using California Vehicle Noise Reference Energy Mean Emissions Levels (REMELS), Cal Trans Technical Advisory, Noise TAN 95-03, page 2.

[6] A 10 dBA sound level reduction represents an approximate halving of a given sound level and is commonly considered the point where the noise has diminished to a point of irrelevance.

levels considered normally acceptable for residential use by the Monterey County General Plan. Therefore, this is a less-than-significant impact.

Mitigation Measure C: **None required.**

Impact D: **Temporary Construction Noise.** Though site construction is expected to occur for more than one building season, existing noise-sensitive residential land uses in the project vicinity would not be exposed to on-site construction noise levels in excess of the 60 dBA L_{eq} significance threshold. **This is a less-than-significant impact**.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Noise generating construction activities for individual projects are typically carried out in stages and phases. During each stage or phase of construction, there would be a different mix of equipment operating. Construction noise levels would vary by stage and vary within stages based on the amount of equipment in operation and location where the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Table 8. This table shows the average noise level ranges by phase for residential and institutional construction. Most demolition and construction noise is in the range of 80 to 90 dBA at a distance of 50 feet from the source. On-site construction activities would occur at distances of 1,300 feet or more from the nearest residence.

Table 8: Typical Ranges of L_{eq} Construction Noise Levels at 50 Feet, dBA

Construction Stage	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works	
	I	II	I	II
Ground Clearing	83	83	84	84
Excavation	88	75~~7~~	89	79
Foundations	81	81	78	78~~9~~
Erection	81	65	87	75
Finishing	88	72~~69~~	89	75
I - All pertinent equipment present at site, **II** - Minimum required equipment present at site.				

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

As indicated in Table 7, construction noise levels during excavation and finishing work could reach 88 to 89 dBA L_{eq} at a distance of 50 feet with all pertinent equipment on site. Based on distance attenuation alone, this loudest excavation and finishing work occurring at the closest project facility to the near residence would reach but would not be expected to exceed a level of 60 dBA L_{eq}. Additionally, since construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor, as construction moves away from the eastern edge of the site, away from the nearest residence or noise exposures would be lower.

Further the project developer/applicant is expected to adhere to Monterey County's requirements for construction activities with respect to hours of operation, muffling of internal combustion engines, and other factors which affect construction noise generation and its effects on noise sensitive land uses. Therefore following controls are assumed to be included in the project:

- Limit noise-generating construction operations to between the least noise-sensitive periods of the day (e.g., 7:00 am. to 7:00 pm) Monday through Saturday; no construction operations on Sundays or holidays
- Ensure that construction equipment is properly maintained and equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Locate stationary noise generating equipment (e.g., compressors) and equipment staging areas a~~s far as possible from adjacent residential receivers.~~t the furthest distance possible from nearby noise-sensitive land uses, and in no case closer than 1400 feet to the eastern property boundary.

Additionally, it is recommended, but not required, that the project developer/applicant designate a "disturbance coordinator" responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Implementation of the controls outlined above measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance.

With the implementation of these controls, and the limited duration of the noise generating construction period, the substantial temporary increase in ambient noise levels associated with construction activities would be less-than-significant.

Mitigation Measure D: No additional measures required

APPENDIX A:
FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL ACOUSTICS

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound may be caused by either its *pitch* or its loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales that are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. For lesser increases of sound from the same or similar sources, a 6 dB change is perceived to be a "noticeable" change and a 3 dB change to be just perceptible. Technical terms are defined in Table A1. There are several methods of characterizing sound. The most common in California is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table A2.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The Day/Night Average Sound Level, Ldn, is a measure of the cumulative noise exposure in a community, with a 10 dB penalty added to nighttime (10:00 pm - 7:00 am) noise levels. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels.

TERM	DEFINITIONS
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Day/Night Noise Level, L_{dn}	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels in the night between 10:00 pm and 7:00 am.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Definitions Of Acoustical Terms **Table A1**

ILLINGWORTH & RODKIN, INC./*Acoustical Engineers*

Noise Source (Given Distance)	A-Weighted Sound Level	Noise Environments	Subjective Impression
	140		
Civil Defense Siren (100')	130		
Jet Takeoff (200')	120		Pain Threshold
	110	Rock Music Concert	
Diesel Pile Driver (100')	100		Very Loud
	90	Boiler Room	
Freight Cars (50')		Printing Press Plant	
Pneumatic Drill (50')	80		
Freeway (100')		In Kitchen With Garbage	
Vacuum Cleaner (10')	70	Disposal Running	Moderately Loud
	60	Data Processing Center	
Light Traffic (100')	50	Department Store	
Large Transformer (200')			
	40	Private Business Office	Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
	0		

Typical Sound Levels in the Environment & Industry **Table A2**

ILLINGWORTH & RODKIN, INC./*Acoustical Engineers*

Effects of Noise

Sleep and Speech Interference: The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise of sufficient intensity; above 35 dBA, and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses.

Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need windows with special glass.

Annoyance: Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 55 dBA Ldn. At an L_{dn} of about 60 dBA, approximately 2 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 12 percent of the population. There is, therefore, an increase of about 1 percent per dBA between an Ldn of 60-70 dBA. Between an L_{dn} of 70-80 dBA, each decibel increase increases by about 2 percent the percentage of the population highly annoyed.