DR20-0001
EXHIBIT V - PROJECT NOISE ASSESSMENT

March 4, 2020

Jim Davies
El Dorado Senior Housing, LLC
854 Diablo Road
Danville, CA 95426

Subject: Changes in noise levels associated with revised site design for the proposed El Dorado Senior Housing Development in El Dorado County, California.

Dear Jim,

Bollard Acoustical Consultants, Inc. (BAC) previously prepared a noise and vibration assessment for the El Dorado Senior Housing Development (project) in El Dorado County, California (dated August 22, 2018). On February 7, 2020, it was brought to the attention of BAC that the project had revised the site design and updated the project description. In response to those changes, BAC has prepared this letter that summarizes the changes in noise and vibration levels associated with the revised project details.

The analyses and conclusions contained in the August 2018 noise and vibration assessment prepared by BAC were based on a project site plan dated March 2018. A revised project site design and project description were obtained from Sycamore Environmental Consultants, Inc. (plans dated January 2020). The revised site design is provided as Attachment A. Based on the revised project site design, it was determined that the proposed changes to the site design include revised building orientations, the inclusion of street level parking spaces (previously underground), and the re-orientation of common outdoor areas. After a review of those specific changes, BAC determined that the current site design would not result in noise levels appreciably higher than those previously presented or change the conclusions presented in BAC's August 2018 noise study regarding those areas.

Furthermore, it is our understanding that the results from a supplementary traffic evaluation prepared by the project traffic consultant (Kimley-Horn & Associates, Inc.) indicate an increase of approximately 100 daily trips per day to the project site. Noise levels associated with an increase of 100 daily trips would not be appreciable and would not change the conclusions regarding traffic noise impacts presented in BAC's August 2018 noise and vibration study.

Finally, the revised January 2020 site plan indicates that refuse collection areas and a pickleball court are currently proposed closer to existing residential property lines along the southern and western project boundaries than in the previous design. As a result, it is likely that noise from trash collection and pickleball court activities would be higher than would have occurred under the previous plan, and could result in concerns being expressed by nearby off-site residences. Thus,

should adverse reaction or complaints be received from adjacent residential neighbors regarding those activities, those concerns would need to be addressed.

This concludes BAC's assessment of changes in noise levels associated with revisions to the project site design and project description for the El Dorado Senior Housing Development. Please contact me at (916) 663-0500 or dariog@bacnoise.com if you have any questions or require additional information.

Sincerely,

Dario Gotchet
Senior Consultant

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DR20-0001

Legend

Project Area Boundaries

N

Scale (Feet)

0 80 160

El Dorado Senior Housing Development, Site Plan (Wright Architecture Studio, January 15, 2020)

El Dorado Senior Housing Development
El Dorado County, California

Project Site Plan

Attachment A

BOLLARD Acoustical Consultants

Environmental Noise and Vibration Assessment

El Dorado Senior Resort

El Dorado County, California

BAC Job # 2018-134

Prepared For:

Sycamore Environmental Consultants, Inc.

Attn: Ms. Paris Krause
6355 Riverside Boulevard, Suite C
Sacramento, CA 95831

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard, President

August 22, 2018

BOLLARD
Acoustical Consultants

Table of Contents

Executive Summary

The proposed El Dorado Senior Resort (project) is located south of California State Route 49 (SR-49) and west of Koki Lane in El Dorado County, California. The project proposes the development of a 74-unit assisted living facility, 64-unit independent apartments, 9 single-family residences, 2 commercial buildings (1 containing a restaurant), and a community center. Due to the proximity of the proposed development to adjacent existing residential uses, and the potential for elevated Highway 49 traffic noise levels at the project site, Bollard Acoustical Consultants, Inc. (BAC) was contracted by Sycamore Environmental Consultants, Inc. to complete an environmental noise and vibration assessment. The purposes of this analysis are to quantify the existing noise and vibration environments, identify potential noise and vibration impacts due to and upon the project, identify appropriate mitigation measures, and provide a quantitative and qualitative analysis of impacts associated with the project.

The project site contains undeveloped land consisting of natural vegetation. Existing land uses in the project vicinity include residential in all directions. After review of the project description and site plans, BAC determined that the potentially significant noise impacts as a result of the project consist of increases in off-site traffic, noise generated by proposed commercial mechanical (HVAC) equipment, and noise generated by construction-related activities, Potential impacts from project-generated construction vibration levels were also identified. To quantify the existing ambient noise environments in the project vicinity, a continuous (24-hour) noise measurement survey was conducted at the project site on July 26, 2018. To quantify predicted noise environments as a result of the project, Federal Highway Administration (FHWA) traffic data was utilized in analysis. During a site visit on July 25, 2018, vibration levels were below the threshold of perception at the project site and in the immediate project vicinity.

In the assessment of exterior and interior traffic noise levels at the project site, it was determined that predicted future traffic noise exposure at the proposed primary common outdoor areas and interior areas of the residential uses constructed within the development would result in a less than significant impact. In the assessment of changes related to existing, near-term, and future (cumulative) off-site traffic noise levels in the project vicinity, a less than significant project impact was determined. In the assessment of vibration exposure, it was determined that the project would not result in the exposure of persons to or generation of excessive groundborne vibration levels (less than significant impact). However, in the assessment of off-site non-transportation noise exposure, it was determined that commercial mechanical equipment (HVAC) noise levels could potentially exceed the El Dorado County evening and nighttime noise level standards at the nearest existing residences. Similarly, it was determined that noise from project-construction activities could also potentially exceed the applicable El Dorado County noise criteria at the nearest existing residences. Therefore, the impacts related to commercial mechanical equipment and construction noise are considered to be potentially significant. Mitigation measures to reduce mechanical equipment and construction generated noise levels to a state of compliance with the applicable El Dorado County noise standards are included in this report.

CEQA Checklist

NOISE AND VIBRATION – **Would the Project Result in:**	**NA – Not Applicable**	**Potentially Significant Impact**	**Less than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
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?			**X**		
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				**X**	
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				**X**	
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above level existing without the project?			**X**		
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, would the project expose people residing or working in the project to excessive noise levels?					**X**
f) 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?					**X**

Introduction

The proposed El Dorado Senior Resort (project) is located south of California State Route 49 (SR-49) and west of Koki Lane in El Dorado County, California. The project proposes the development of a 74-unit assisted living facility, 64-unit independent apartments, 9 single-family residences, 2 commercial buildings (1 including a restaurant), and a community center. Existing land uses in the project vicinity include residential in all directions. The project area and site plan are shown on Figures 1 and 2, respectively.

Due to the proximity of the proposed development to adjacent existing residential uses, and the potential for elevated Highway 49 traffic noise levels at the project site, El Dorado County has requested an environmental noise and vibration assessment to ensure that the applicable noise standards are satisfied. In response to this request, the project applicant has retained Bollard Acoustical Consultants, Inc. (BAC) to prepare this noise and vibration assessment. The purposes of this analysis are to quantify the existing noise and vibration environments, identify potential noise and vibration impacts due to and upon the project, identify appropriate mitigation measures, and provide a quantitative and qualitative analysis of impacts associated with the project. Specifically, impacts are identified if project-related activities would cause a substantial increase in ambient noise or vibration levels at existing sensitive land uses in the project vicinity, or if traffic or project generated noise or vibration levels would exceed applicable El Dorado County standards at the residences proposed within this development.

Noise and Vibration Fundamentals

Noise

Noise is simply described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. Discussing sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel (dB) scale was devised. The decibel scale uses the hearing threshold (20 micropascals of pressure), as a point of reference, defined as 0 dB. Other sound pressures are compared to the reference pressure and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB.

To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. There is a strong correlation between the way humans perceive sound and A-weighted sound levels. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment for community exposures. All sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise. Definitions of acoustical terminology are provided in Appendix A.

Community noise is commonly described in terms of the “ambient” noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise

descriptors, day-night average level (L_{dn}) and the community noise equivalent level (CNEL), and shows very good correlation with community response to noise for the average person. The median noise level descriptor, denoted L_{50}, represents the noise level which is exceeded 50% of the hour. In other words, half of the hour ambient conditions are higher than the L_{50} and the other half are lower than the L_{50}.

The L_{dn} is based upon the average noise level over a 24-hour day, with a +10 dB weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment. Where short-term noise sources are an issue, noise impacts may be assessed in terms of maximum noise levels, hourly averages, or other statistical descriptors.

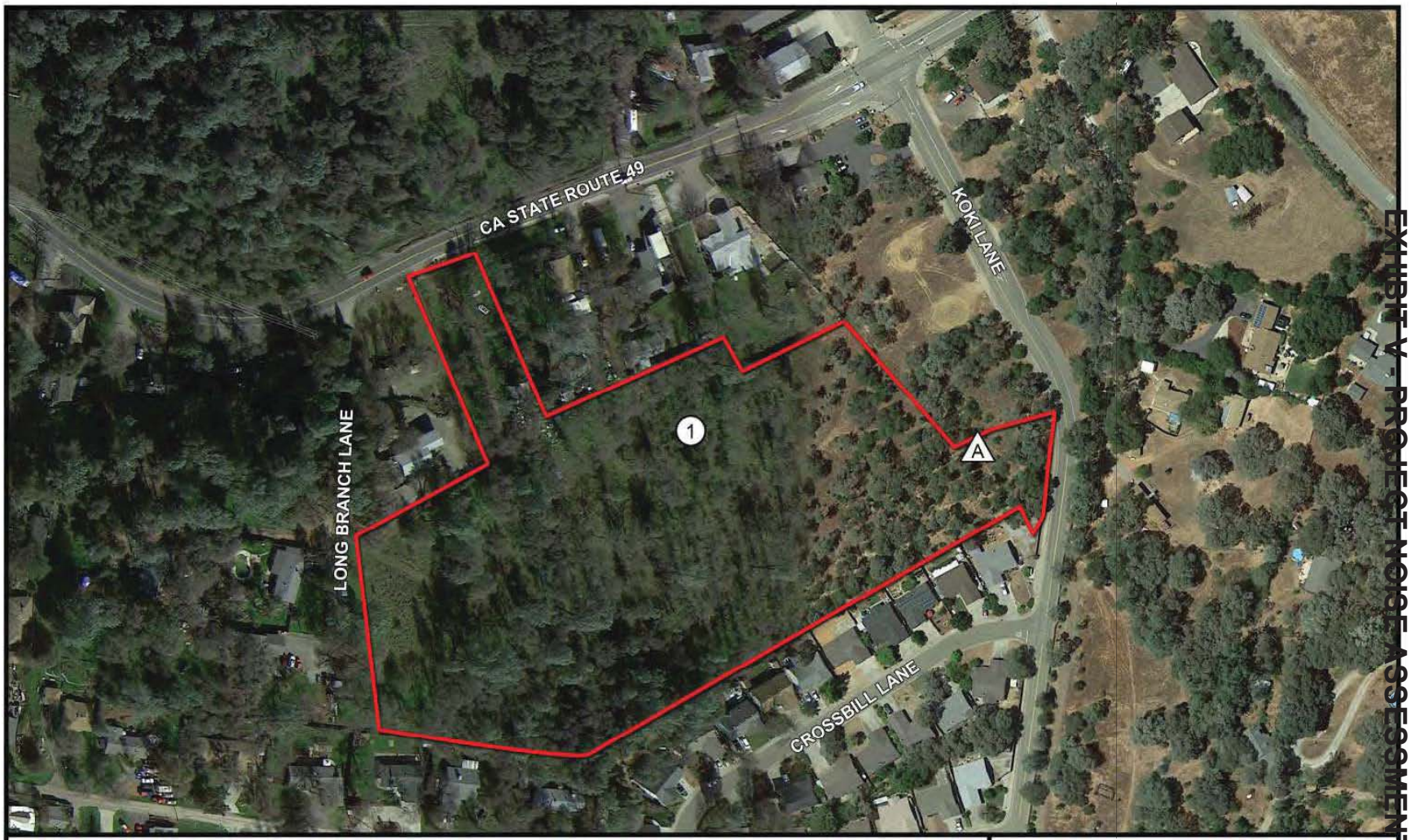
The perceived loudness of sounds and corresponding reactions to noise are dependent upon many factors, including sound pressure level, duration of intrusive sound, frequency of occurrence, time of occurrence, and frequency content. As mentioned above; however, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighing network. Appendix B shows examples of noise levels for several common noise sources and environments.

It is generally recognized that an increase of at least 3 dB of similar sources is usually required before most people will perceive a change in noise levels in the community, and an increase of 5 dB is required before the change will be clearly noticeable. A common practice is to assume that a minimally perceptible increase of 3 dB represents a significant increase in ambient noise levels. This approach is very conservative, however, when applied to noise conditions substantially below levels deemed acceptable in general plan noise elements or in noise ordinances.

Vibration

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, while vibration is usually associated with transmission through the ground or structures. As with noise, vibration consists of an amplitude and frequency. A person's response to vibration will depend on their individual sensitivity as well as the amplitude and frequency of the source.

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of velocity in inches per second or root-mean-square (RMS) in VdB. Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity as well as RMS velocities.



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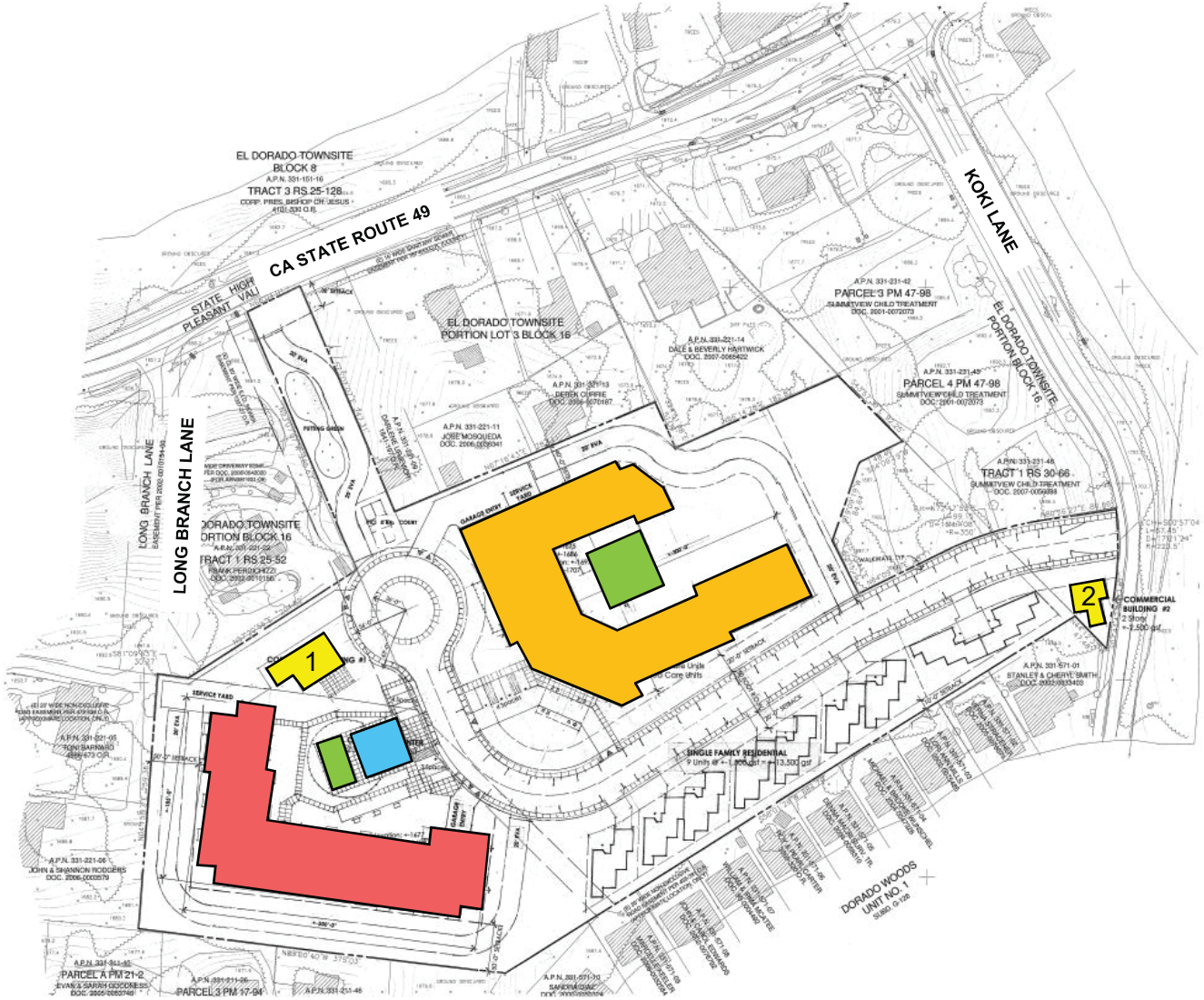

Legend

- Assisted Living and Memory Care Building
- Independent Apartment Building
- Community Center
- Primary Common Outdoor Areas (Courtyards)
- Commercial Buildings

N

Scale (Feet)

0 80 160

El Dorado Senior Resort

El Dorado County, California

Project Site Plan

Figure 2

BOLLARD Acoustical Consultants

As vibrations travel outward from the source, they excite the particles of rock and soil through which they pass and cause them to oscillate. Differences in subsurface geologic conditions and distance from the source of vibration will result in different vibration levels characterized by different frequencies and intensities. In all cases, vibration amplitudes will decrease with increasing distance. The maximum rate, or velocity of particle movement, is the commonly accepted descriptor of the vibration "strength".

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does frequency. Generally, as the duration and vibration frequency increase, the potential for adverse human response increases.

According to the Transportation and Construction-Induced Vibration Guidance Manual (Caltrans, June 2004), operation of construction equipment and construction techniques generate ground vibration. Traffic traveling on roadways can also be a source of such vibration. At high enough amplitudes, ground vibration has the potential to damage structures and/or cause cosmetic damage. Ground vibration can also be a source of annoyance to individuals who live or work close to vibration-generating activities. However, traffic, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage.

Regulatory Setting: Criteria for Acceptable Noise and Vibration Exposure

Federal

There are no federal noise or vibration criteria which would be directly applicable to this project.

State of California

California Environmental Quality Act (CEQA)

The State of California has established regulatory criteria that are applicable to this assessment. Specifically, Appendix G of the State of California Environmental Quality Act (CEQA) Guidelines are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. According to Appendix G of the CEQA guidelines, the project would result in a significant noise or vibration impact if the following occur:

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 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 ALUP or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, the project would expose people residing or working in the project area to excessive noise levels;

F. or a project within the vicinity of a private airstrip, the project would expose people residing or working in the project area to excessive noise levels.

It should be noted that audibility is not a test of significance according to CEQA. If this were the case, any project which added any audible amount of noise to the environment would be considered unacceptable according to CEQA. Because every physical process creates noise, the use of audibility alone as significance criteria would be unworkable. CEQA requires a substantial increase in noise levels before noise impacts are identified, not simply an audible change.

California Department of Transportation (Caltrans)

El Dorado County does not currently have adopted standards for groundborne vibration. As a result, vibration criteria established by the California Department of Transportation (Caltrans 2013) was applied to this project. The Caltrans publication, *Transportation and Construction Vibration Guidance Manual*, provides guidelines for acceptable vibration limits for transportation and construction projects in terms of the induced peak particle velocity (PPV). Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. The Caltrans criteria applicable to human responses to vibration are shown below in Table 1.

Table 1
Human Response to Transient Vibration

Human Response/Structure	Peak Particle Velocity (in/sec)
Barely Perceptible	0.04
Distinctly Perceptible	0.25
Strongly Perceptible	0.90
Severe	2.00
Residential Construction	1.0

Source: Caltrans Transportation and Construction Vibration Guidance Manual, September 2013

As shown in Table 1, a vibration level of 0.25 in/sec PPV is the level at which vibration becomes distinctly to strongly perceptible. As a result, the 0.25 threshold is considered to be a conservative benchmark against which project vibration levels are evaluated in this assessment.

Local

El Dorado County General Plan

The Public Health, Safety, and Noise Element of the El Dorado County General Plan contains the County's noise-related policies. The specific policies which are generally applicable to this project are reproduced below:

Policy 6.5.1.1 Where noise-sensitive land uses are proposed in areas exposed to existing or projected exterior noise levels exceeding the levels specified in Table 2 (GP Table 6-1) or the performance standards of Table 3 (GP Table 6-2), an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design.

Policy 6.5.1.2 Where proposed non-residential land uses are likely to produce noise levels exceeding the performance standards of Table 3 at existing or planned noise-sensitive uses, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design

Policy 6.5.1.3 Where noise mitigation measures are required to achieve the standards of Tables 2 and Table 3, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project and the noise barriers are not incompatible with the surroundings.

Policy 6.5.1.7 Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of Table 3 for noise-sensitive uses.

Policy 6.5.1.8 New development of noise sensitive land uses will not be permitted in areas exposed to existing or projected levels of noise from transportation noise sources which exceed the levels specified in Table 2 unless the project design includes effective mitigation measures to reduce exterior noise and noise levels in interior spaces to the levels specified in Table 2.

Policy 6.5.1.9 Noise created by new transportation noise sources, excluding airport expansion but including roadway improvement projects, shall be mitigated so as not to exceed the levels specified in Table 2 at existing noise-sensitive land uses.

Policy 6.5.1.11 The standards outlined in Tables 3, 4 and 5 (GP Tables 6-3, 6-4, 6-5) shall not apply to those activities associated with actual construction of a project as long as such construction occurs between the hours of 7 am and 7 pm, Monday through Friday, and 8 am and 5 pm on weekends, and on federally-recognized

holidays. Further, the standards outlined in Tables 3, 4, and 5 shall not apply to public projects to alleviate traffic congestion and safety hazards.

Policy 6.5.1.12 When determining the significance of impacts and appropriate mitigation for new development projects, the following criteria shall be taken into consideration:

a) Where existing or projected future traffic noise levels are less than 60 dB L_{dn} at the outdoor activity areas of residential uses, an increase of more than 5 dBA L_{dn} caused by a new transportation noise source will be considered significant.

b) Where existing or projected future traffic noise levels range between 60 and 65 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 3 dBA L_{dn} caused by a new transportation noise source will be considered significant; and

c) Where existing or projected future traffic noise levels are greater than 65 dBA L_{dn} at the outdoor activity areas of residential uses, an increase of more than 1.5 dBA L_{dn} caused by a new transportation noise source will considered significant.

Policy 6.5.1.13 When determining the significance of impacts and appropriate mitigation for new development projects, the following criteria shall be taken into consideration:

a) In areas in which ambient noise levels are in accordance with the standards in Table 3, increases in ambient noise levels caused by new non-transportation noise sources that exceed 5 dBA shall be considered significant; and

b) In areas in which ambient noise levels are not in accordance with the standards in Table 3, increases in ambient noise levels caused by new non-transportation noise sources that exceed 3 dBA shall be considered significant.

Table 2
Maximum Allowable Noise Exposure for Transportation Noise Sources

Land Use	Outdoor Activity Areas[1] Ldn/CNEL, dB	Interior Spaces	
		Ldn/CNEL, dB	Leq, dB[2]
Residential	60[3]	45	--
Transient Lodging	60[3]	45	--
Hospitals, Nursing Homes	60[3]	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls, Schools	60[3]	--	40
Office Buildings	--	--	45
Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

Notes:

1 In Community Regions and Rural Centers, where the location of outdoor activity areas is not clearly defined, the exterior noise level standard shall be applied to the property line of the receiving land use. For residential uses with front yards facing the identified noise source, an exterior noise level criterion of 65 dB L_{dn} shall be applied at the building facade, in addition to a 60 dB L_{dn} criterion at the outdoor activity area. In Rural Regions, an exterior noise level criterion of 60 dB L_{dn} shall be applied at a 100 foot radius from the residence unless it is within Platted Lands where the underlying land use designation is consistent with Community Region densities in which case the 65 dB L_{dn} may apply. The 100-foot radius applies to properties which are five acres and larger; the balance will fall under the property line requirement.

2 As determined for a typical worst-case hour during periods of use.

3 Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

Source: El Dorado County General Plan, Public Health & Safety Element, Table 6-1

Table 3
Noise Level Performance Protection Standards for Noise-Sensitive Land Uses Affected by Non-Transportation Sources

Noise Level Descriptor	Daytime 7 am – 7 pm		Evening 7 pm – 10 pm		Nighttime 10 pm – 7 am	
	Community	Rural	Community	Rural	Community	Rural
Hourly, L_{eq}	55	50	50	45	45	40
Maximum, L_{max}	70	60	60	55	55	50

Notes:

-Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

-The County can impose noise level standards which are up to 5 dB less than those specified above based upon determination of existing low ambient noise levels in the vicinity of the project site.

-In Community Regions the exterior noise level standard shall be applied to the property line of the receiving property. In Rural Areas the exterior noise level standard shall be applied at a point 100' away from the residence. The above standards shall be measured only on property containing a noise-sensitive land use as defined in Objective 6.5.1.

Source: El Dorado County General Plan, Public Health & Safety Element, Table 6-2

Table 4
Maximum Allowable Noise Exposure for Non-Transportation Noise Sources in Community Regions and Adopted Plan Areas – Construction Noise

Land Use Designation	Time Period	Noise Level (dB)	
		L_{eq}	L_{max}
Higher-Density Residential (MFR, HDR, MDR)	7 am – 7 pm	55	75
	7 pm – 10 pm	50	65
	10 pm – 7 am	45	60
Commercial and Public Facilities (C, R&D, PF)	7 am – 7 pm	70	90
	10 pm – 7 am	65	75
Industrial (I)	Any Time	80	90

Notes:
[1] Adopted Plan areas should refer to those land use designations that most closely correspond to the similar General Plan land use designations for similar development.

Table 5
Maximum Allowable Noise Exposure for Non-Transportation Noise Sources in Rural Centers – Construction Noise

Land Use Designation	Time Period	Noise Level (dB)	
		L_{eq}	L_{max}
All Residential (MFR, HDR, MDR)	7 am – 7 pm	55	75
	7 pm – 10 pm	50	65
	10 pm – 7 am	40	55
Commercial, Recreation, and Public Facilities (C, TR, PF)	7 am – 7 pm	65	75
	10 pm – 7 am	60	70
Industrial (I)	Any Time	70	80
Open Space (OS)	7 am – 7 pm	55	75
	7 pm – 7 am	50	65

Table 6
Maximum Allowable Noise Exposure for Non-Transportation Noise Sources in Rural Regions and Adopted Plan Areas – Construction Noise

Land Use Designation	Time Period	Noise Level (dB)	
		L_{eq}	L_{max}
All Residential (LDR)	7 am – 7 pm	50	60
	7 pm – 10 pm	45	55
	10 pm – 7 am	40	50
Commercial, Recreation, and Public Facilities (C, TR, PF)	7 am – 7 pm	65	75
	10 pm – 7 am	60	70
Rural Land, Natural Resources, Open Space, and Agricultural Lands (RR, NR, OS, AL)	7 am – 7 pm	65	75
	7 pm – 7 am	60	70

According to Figure LU-1 (Land Use Diagram) of the El Dorado County General Plan, the project area and adjacent uses are located within a Community Region. As a result, the "Community" noise level performance standards for noise-sensitive uses affected by non-transportation noise sources identified in Table 3 would be applicable to the project.

Environmental Setting – Existing Ambient Noise and Vibration Environment

Noise Environment

The existing ambient noise environment at the project site is primarily defined by traffic on California State Route 49 (SR-49). To quantify the existing ambient noise environment at the project site, BAC conducted continuous (24-hour) noise level measurements on the project site on Thursday, July 26, 2018. The long-term noise measurement location is shown on Figure 1.

A Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter was used for the noise level measurement survey. The meter was calibrated before use with an LDL Model CA200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all specifications of the American National Standards Institute requirements for Type 1 sound level meters (ANSI S1.4). The results of the measurements are shown numerically and graphically in Appendices C and D, and are summarized in Table 7. Photographs of the noise measurement site are provided in Appendix E.

Table 7
Summary of Long-Term Ambient Noise Monitoring Results
El Dorado Senior Resort – El Dorado County, California
July 26, 2018

		Average Measured Hourly Noise Levels (dB)								
		Daytime 7 am – 7 pm			Evening 7 pm – 10 pm			Nighttime 10 pm – 7 am		
Site[1]	L_{dn}, dB	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
1	50	45	43	63	45	43	62	42	38	59

Notes:
[1] Long-term ambient noise monitoring site is identified on Figure 1.
Source: Bollard Acoustical Consultants, Inc. (2018)

The Table 7 data indicate that existing ambient noise levels at the project site comply with the El Dorado County 60 dB L_{dn} exterior traffic noise level standard for residential land uses. The Table 7 data also indicates that measured average maximum (L_{max}) noise levels exceeded the County's evening and nighttime noise level standards for noise-sensitive uses affected by non-transportation noise sources in Community Regions. A detailed analysis of future traffic noise levels was conducted and that analysis is presented in the following section.

In addition to a long-term noise level measurement survey, short-term (4-hour) noise level measurements were also conducted at the project site. The short-term noise measurement location, identified on Figure 1 as Site A, was located approximately 130 feet from the centerline of Koki Lane. Results from the short-term noise survey indicate that measured ambient noise levels ranged from 45 to 47 dB L_{eq} and 57 to 72 dB L_{max}. Based on measurement results from the short-term noise level survey, and taking into consideration existing and worst-case future traffic volumes on the segment of Koki Lane adjacent to the project site, it is expected that future Koki Lane traffic noise exposure will comply with the El Dorado County exterior traffic noise level limits at the project site by a wide margin. As a result, the following analysis focuses on future traffic noise levels at the project site from SR-49.

Vibration Environment

During a site visit on July 25, 2018, vibration levels were below the threshold of perception at the project site and in the immediate project vicinity. Therefore, the existing vibration environment in the immediate project vicinity is considered to be negligible.

Impacts and Mitigation Measures

Methodology

Evaluation of Exterior Traffic Noise Levels at Project Site

The Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used to predict traffic noise levels at the project site. The model is based upon the CALVENO noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free flowing traffic conditions, and is considered to be accurate within 1.5 dB in most situations.

The FHWA Model was used with future (Cumulative Plus Project) traffic data obtained from the El Dorado Senior Resort Traffic Impact Study (2018) prepared by Kimley-Horn & Associates, Inc. to predict future traffic noise levels from SR-49 at the proposed noise-sensitive areas of the development. The FHWA Model inputs and predicted future traffic noise levels at the noise-sensitive locations are shown in Appendix F. The results are summarized in Table 8.

Based on the project site plans, the primary common outdoor areas of the proposed development have been identified as courtyards located at the assisted living building and community center. The locations of the primary common outdoor areas and buildings are shown in Figure 2. The site plans indicate that the courtyards would be shielded from view of SR-49 by proposed intervening buildings. To account for this shielding, the predicted future exterior traffic noise levels at the primary common outdoor areas of the development have been conservatively adjusted by -7 dB.

Table 8
Predicted Future Exterior SR-49 Traffic Noise Levels[1]
El Dorado Senior Resort – El Dorado County, California

Building	Location	Distance from Centerline (ft)[2]	Offset (dB)[3]	L_{dn} (dB)
Assisted Living Building	Courtyard	415	-7	45
	First-floor facades	300		54
	Upper-floor facades	300	+3	57
Apartment Building	First-floor facades	380		53
	Upper-floor facades	380	+3	56
Community Center	Courtyard	480	-7	44

Notes:

[1] A complete listing of FHWA Model inputs and results are provided in Appendix F.

[2] Distances measured from indicated location to the centerline of SR-49.

[3] A +3 dB offset was applied to the upper-floor facades due to reduced ground absorption at elevated floor levels. A -7 dB offset was conservatively applied to the primary common outdoor areas (courtyards) to account for the shielding provided by proposed intervening structures that would break line of sight of SR-49.

Source: Bollard Acoustical Consultants, Inc. (2018)

Evaluation of Interior Traffic Noise Levels at Project Site

The worst-case traffic noise exposure at the proposed development would occur within the residences proposed closest to SR-49. According to Table 8, predicted future L_{dn} values at the first-floor facades of the residences nearest to SR-49 would range from 53-54 dB L_{dn}. Due to reduced ground absorption at elevated positions, upper-level traffic noise levels from SR-49 would approach 56-57 dB L_{dn}. In addition, standard residential construction (stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), results in an exterior to interior noise reduction of at least 25 dB with windows closed and approximately 15 dB with windows open.

Evaluation of Off-Site Traffic Noise Level Increases in the Project Vicinity

Construction of this project would result in increased traffic on the local roadway network. BAC utilized the FHWA Model with the aforementioned project traffic impact study prepared by Kimley-Horn & Associates, Inc. to determine whether traffic noise impacts (by the impact significance criteria identified in General Plan Policy 6.5.1.12) would occur as a result of this project. The FHWA Model inputs are provided in Appendix G, and the results are shown in Tables 9-11.

Table 9
Existing vs. Existing Plus Project Traffic Noise Levels, dB L_{dn}
El Dorado Senior Resort – El Dorado County, California

Roadway	Segment	Existing	Existing + Project	Change	Substantial Increase?
SR-49	South of Pleasant Valley Rd	68.2	68.3	0.1	No
SR-49	Pleasant Valley Rd to Forni Rd	62.4	62.4	0.0	No
SR-49	Forni Rd to Koki Ln	65.1	65.2	0.1	No
SR-49	Koki Ln to Patterson Dr	67.1	67.1	0.0	No
SR-49	Patterson Dr to Missouri Flats Rd	67.9	68.0	0.1	No
SR-49	Missouri Flats Rd to Fowler Ln	67.0	67.0	0.0	No
SR-49	North of Pleasant Valley Rd	66.6	66.7	0.1	No
Pleasant Valley Rd	West of SR-49	61.8	61.8	0.0	No
Pleasant Valley Rd	East of SR-49	66.7	66.8	0.1	No
Forni Rd	North of SR-49	60.4	60.4	0.0	No
Koki Ln	SR-49 to Project Driveway	54.6	55.9	1.3	No
Koki Ln	South of Project Driveway	54.6	54.7	0.1	No
Patterson Dr	South of SR-49	60.7	63.3	2.6	No
Missouri Flats Rd	North of SR-49	69.5	64.3	-5.2	No
Fowler Ln	South of SR-49	57.8	57.8	0.0	No

Sources: FHWA-RD-77-108, project traffic study, and Bollard Acoustical Consultants, Inc. (2018)

Table 10
Near-Term vs. Near-Term Plus Project Traffic Noise Levels, dB L_{dn}
El Dorado Senior Resort – El Dorado County, California

Roadway	Segment	Near-Term	Near-Term + Project	Change	Substantial Increase?
SR-49	South of Pleasant Valley Rd	68.4	68.4	0.0	No
SR-49	Pleasant Valley Rd to Forni Rd	62.6	62.6	0.0	No
SR-49	Forni Rd to Koki Ln	65.4	65.5	0.1	No
SR-49	Koki Ln to Patterson Dr	67.3	67.5	0.2	No
SR-49	Patterson Dr to Missouri Flats Rd	68.0	68.2	0.2	No
SR-49	Missouri Flats Rd to Fowler Ln	67.0	67.1	0.1	No
SR-49	North of Pleasant Valley Rd	67.6	67.7	0.1	No
Pleasant Valley Rd	West of SR-49	62.2	62.2	0.0	No
Pleasant Valley Rd	East of SR-49	67.1	67.2	0.1	No
Forni Rd	North of SR-49	60.5	60.5	0.0	No
Koki Ln	SR-49 to Project Driveway	55.8	56.9	1.1	No
Koki Ln	South of Project Driveway	55.8	55.9	0.1	No
Patterson Dr	South of SR-49	61.3	63.9	2.6	No
Missouri Flats Rd	North of SR-49	69.6	64.4	-5.2	No
Fowler Ln	South of SR-49	58.3	58.3	0.0	No

Sources: FHWA-RD-77-108, project traffic study, and Bollard Acoustical Consultants, Inc. (2018)

Table 11
Cumulative vs. Cumulative Plus Project Traffic Noise Levels, dB L_{dn}
El Dorado Senior Resort – El Dorado County, California

Roadway	Segment	Cumulative	Cumulative + Project	Change	Substantial Increase?
SR-49	South of Pleasant Valley Rd	68.6	68.7	0.1	No
SR-49	Pleasant Valley Rd to Forni Rd	62.9	62.9	0.0	No
SR-49	Forni Rd to Koki Ln	65.8	65.8	0.0	No
SR-49	Koki Ln to Patterson Dr	67.5	67.7	0.2	No
SR-49	Patterson Dr to Missouri Flats Rd	68.3	68.4	0.1	No
SR-49	Missouri Flats Rd to Fowler Ln	67.1	67.2	0.1	No
SR-49	North of Pleasant Valley Rd	68.7	68.7	0.0	No
Pleasant Valley Rd	West of SR-49	62.7	62.7	0.0	No
Pleasant Valley Rd	East of SR-49	67.7	67.7	0.0	No
Forni Rd	North of SR-49	60.7	60.7	0.0	No
Koki Ln	SR-49 to Project Driveway	57.1	57.8	0.7	No
Koki Ln	South of Project Driveway	57.1	57.1	0.0	No
Patterson Dr	South of SR-49	61.9	64.6	2.7	No
Missouri Flats Rd	North of SR-49	69.8	64.6	-5.2	No
Fowler Ln	South of SR-49	58.9	58.9	0.0	No

Sources: FHWA-RD-77-108, project traffic study, and Bollard Acoustical Consultants, Inc. (2018)

The data shown in Tables 9-11 indicate that the project-related increase in traffic noise levels on the local roadway network would not be substantial.

Evaluation of Proposed Commercial Noise Levels at Existing Residences

The project proposes the construction of two commercial buildings within the development. Commercial Building #1 is proposed to be located at the western end of the development, and will contain a restaurant. Commercial Building #2 is proposed to be located at the eastern end of the development adjacent to Koki Lane. The locations of the commercial buildings are shown on Figure 2. The mechanical equipment (HVAC) has been identified as one of the primary noise sources associated with proposed commercial buildings.

According to the project applicant, the HVAC systems for maintaining comfortable temperatures within the future commercial buildings will consist of packaged rooftop air conditioning systems. Such HVAC units, which typically stand about 4-5 feet tall, would be shielded from view of nearby sensitive uses by the building parapets on top of the proposed two-story commercial buildings. Such rooftop HVAC units frequently generate a noise level of approximately 45 dB L_{eq} at a reference distance of 100 feet from the building facade, including shielding by a building parapet. In addition, additional mechanical equipment may be needed should the restaurant located within Commercial Building #1 require food cold storage.

The building facades of Commercial Buildings #1 & 2 are proposed to be located approximately 35 and 5 feet from the property lines of the nearest residential uses, respectively. After taking

into consideration the height of two-story commercial building rooftops, and the locations and sizes of the proposed buildings, it is reasonable to assume that the distances from the rooftop-mounted equipment to the nearest property lines would be greater than the measured ground level distances of 35 and 5 feet. Based on this assumption, and when projecting to distances of 50 feet (Commercial Building #1) and 30 feet (Commercial Building #2) to the nearest residential property lines, commercial HVAC equipment noise levels are calculated to range from approximately 51-55 dB L_{eq} at the nearest residential property lines.

Evaluation of Project Construction Noise at Existing Residences

During project construction, heavy equipment would be used for grading excavation, paving, and building construction, which would increase ambient noise levels when in use. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Noise exposure at any single point outside the project site would also vary depending on the proximity of construction activities to that point. Standard construction equipment, such as graders, backhoes, loaders, and trucks, would be used for this work.

The range of maximum noise levels for various types of construction equipment at a distance of 50 feet is depicted in Table 12. The noise values represent maximum noise generation, or full-power operation of the equipment. As one increases the distance between equipment, or increases separation of areas with simultaneous construction activity, dispersion and distance attenuation reduce the effects of combining separate noise sources.

Table 12
Construction Equipment Noise Emission Levels

Equipment	Typical Sound Level (dBA) 50 Feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Paver	89
Pneumatic tool	85
Pump	76
Roller	74
Saw	76
Truck	88

Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, Table 12-1. (May 2006)

The nearest existing noise-sensitive receptors (residences) are located approximately 25 feet from construction activities which would occur on the project site. As shown in Table 12, construction activities typically generate noise levels ranging from approximately 75 to 90 dB L_{max} at a reference distance of 50 feet from the construction activities. The noise levels from construction operations decrease at a rate of approximately 6 dB per doubling of distance from the source. As a result, worst-case maximum construction noise levels would range from approximately 81 to 96 dB L_{max} at the nearest residences.

Evaluation of Project Construction Vibration Levels at Existing Residences

During project construction heavy equipment would be used for grading excavation, paving, and building construction, which would generate localized vibration in the immediate vicinity of the construction. The nearest residence is located approximately 25 feet from construction activities which would occur on the project site.

The range of vibration source levels for construction equipment commonly used in similar projects are shown in Table 13. The vibration levels depicted in Table 13 are representative of measurements at a distance of 25 feet from the equipment source.

Table 13
Vibration Levels of Construction Equipment – 25 Foot Reference Distance

Source	Peak Particle Velocity (PPV) inches/second
Vibratory Roller	0.210
Loaded Truck	0.076
Excavator	0.051
Front Loader	0.035
Water Truck	0.001

Source: FTA and FHWA

The vibration data shown in Table 13 indicate that heavy equipment-generated vibration levels would be at or below distinctly perceptible levels, and well below levels considered severe, at the nearest residences to the project site.

Evaluation of Vibration Levels at the Project Site

The project proposes a restaurant to be located within Commercial Building #1. It is the experience of BAC that restaurant operations do not typically have equipment that generates appreciable vibration. In addition, it is our understanding that the proposed restaurant operations do not propose equipment that will produce appreciable vibration.

During a site visit on July 25, 2018, vibration levels were below the threshold of perception at the project site and in the immediate project vicinity. Therefore, the existing vibration environment in the immediate project vicinity is considered to be negligible. Based on this observation, it is the

professional opinion of BAC that vibration levels at the project site are well below the threshold of perception (below 0.1 inches/second peak particle velocity).

Evaluation of Impacts Relative to CEQA Criteria

Criteria 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.

On-Site Transportation Noise Exposure

As indicated in Table 8, the proposed common use areas (courtyards) near the community center and assisted living buildings would be exposed to future (Cumulative Plus Project) SR-49 traffic noise levels of 44 and 45 dB L_{dn} (respectively), including the -7 dB offset to account for the shielding provided by the proposed buildings. The predicted exterior traffic noise levels of 44 and 45 dB L_{dn} at the proposed primary common use areas of the development would satisfy the applicable El Dorado County General Plan 60 dB L_{dn} exterior noise level standard.

According to Table 8, the predicted future L_{dn} value at the first-floor facades of the proposed residences/rooms nearest to SR-49 would range from 53-54 dB L_{dn}. Due to reduced ground absorption at elevated positions, upper-level traffic noise levels from SR-49 would approach 56-57 dB L_{dn}. In addition, standard residential construction (stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), results in an exterior to interior noise reduction of at least 25 dB with windows closed and approximately 15 dB with windows open. Therefore, standard residential construction would be acceptable for all residences constructed adjacent to SR-49. Nonetheless, mechanical ventilation (air conditioning) should be provided for all residences/rooms within this development to allow the occupants to close doors and windows as desired for additional acoustical isolation.

Off-Site Non-Transportation Noise Exposure

Mechanical equipment (HVAC) noise levels from Commercial Buildings #1 & 2 are calculated to range from approximately 51-55 dB L_{eq} at the nearest residential property lines, including shielding provided by a building parapet. Because commercial HVAC equipment noise exposure could exceed the applicable El Dorado County evening and nighttime noise level standards at the property lines of the nearest existing residences, this impact is considered to be ***potentially significant***.

Mitigation for Criteria A: Commercial Mechanical Equipment Noise Levels

In order to satisfy the applicable El Dorado County General Plan evening and nighttime noise level standards at the nearest residential property lines, the following noise mitigation options could be employed by the project developer to reduce commercial HVAC noise exposure to a state of compliance:

MM-1: Ensure that all rooftop mounted HVAC equipment associated with air heating and cooling requirements of Commercial Buildings #1 & 2 be completely shielded from view of nearby existing residences by building rooftop parapets (as proposed).

AND (one of the following)

MM-2: When plans are available that identify specific HVAC equipment model information and installation locations, the project developer shall review and confirm that the equipment will not exceed 45 dB L_{eq} at 50 feet (Commercial Building #1) and 45 dB L_{eq} at 30 feet (Commercial Building #2).

OR

MM-3: Should the project developer choose to install rooftop-mounted HVAC equipment that exceeds 45 dB L_{eq} at 50 feet (Commercial Building #1) or 45 dB L_{eq} at 30 feet (Commercial Building #2), the construction of a 6-foot tall localized barrier that encompasses the equipment would be required. Should a barrier be constructed on the rooftop of Commercial Building #1, the barrier shall encompass the equipment around the north, east and west sides. Should a barrier be constructed on the rooftop of Commercial Building #2, the barrier shall encompass the equipment on the south, west and east sides.

Future off-site transportation noise sources are expected to satisfy the applicable El Dorado County exterior and interior noise level criteria at the proposed development. In addition, after implementation of the identified mitigation measures, future project-generated non-transportation noise sources are expected to satisfy the applicable El Dorado County noise level criteria at the nearest existing residences. As a result, this impact is considered to be ***less than significant.***

Criteria B: Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

At the nearest existing residences to the proposed project area, construction-generated vibration levels are predicted to be less than the 0.25 in/sec PPV threshold at which vibration levels become distinctly perceptible. Because construction-generated vibration levels at nearby existing receptors would satisfy the California Department of Transportation (Caltrans) vibration criteria (Table 1),

project construction would not result in the exposure of persons to or generation of excessive groundborne vibration levels.

During a site visit on July 25, 2018, vibration levels were below the threshold of perception at the project site and in the immediate project vicinity (below 0.1 inches per second if converted to peak particle velocity). Therefore, the project would not result in the exposure of persons to or generation of excessive groundborne vibration levels at the project site. In addition, the project is not proposing the installation of equipment that would generate significant off-site vibration levels.

Because vibration levels due to and upon the proposed project will satisfy the applicable Caltrans vibration criteria, this impact is considered to be ***less than significant.***

Criteria C: A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

The impact significance criteria identified in Policy 6.5.1.12 of the El Dorado County General Plan was used to determine the significance of impacts due to the project relative to CEQA:

- Where existing or projected future traffic noise levels are less than 60 dB L_{dn} at the outdoor activity areas of residential uses, an increase of more than 5 dB L_{dn} caused by a new transportation noise source will be considered significant.
- Where existing or projected future traffic noise levels range between 60 and 65 dB L_{dn} at the outdoor activity areas of residential uses, an increase of more than 3 dB L_{dn} caused by a new transportation noise source will be considered significant; and
- Where existing or projected future traffic noise levels are greater than 65 dB L_{dn} at the outdoor activity areas of residential uses, an increase of more than 1.5 dB L_{dn} caused by a new transportation noise source will be considered significant.

The results from the analysis of 15 roadway segments shown in Tables 9-11 indicate that the project-related increases in traffic noise levels on the local roadway network would not exceed the standards of significance as identified in Policy 6.5.1.12 of the El Dorado County General Plan. As a result, this impact is considered to be ***less than significant***.

Criteria D: A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

As shown in Table 12, exterior noise levels at a residence 50 feet from the noise sources could reach as high as 90 dB L_{max}. As noted in the Regulatory Setting

Section of this report, Policy 6.5.1.11 of the El Dorado County General Plan exempts noise sources associated with construction, provided such activities occur between the hours of 7 am and 7 pm, Monday through Friday, and 8 am and 8 pm on weekends, and on federally-recognized holidays. Provided project construction activities are limited to these hours, construction activities would be exempt and this impact would be considered ***less than significant***.

However, if construction activities are proposed outside of the hours defined by General Plan Policy 6.5.1.11, noise levels generated by construction activities would likely exceed the applicable maximum noise level standards identified in Tables 3 & 4 at the nearest residences. This impact would be considered ***significant***.

Mitigation for Criteria D: Construction Noise Control Measures

MM-3: Noise-generating construction activities shall occur within the hours identified in General Plan Policy 6.5.1.11.

Significance after Mitigation: *Less than Significant*

Criteria 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, would the project expose people residing or working in the project area to excessive noise levels?**

Because the project site is not located within 2 miles of a public airport, ***no noise impact*** is identified relative to this significance criteria.

Criteria F: **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?**

Because the project site is not located in the vicinity of a private airstrip, ***no noise impact*** is identified relative to this significance criteria.

Conclusions and Recommendations

This analysis concludes the project will not result in adverse impacts at residences of the proposed development. In addition, with implementation of feasible noise mitigation measures, all potentially significant noise impacts at the nearest existing residences can be mitigated to a less than significant level. Finally, this analysis concludes that project-generated vibration will not result in adverse impacts at the nearest existing residences.

This concludes BAC's noise assessment for the proposed El Dorado Senior Resort project in El Dorado County, California. Please contact BAC at (916) 663-0500 or paulb@bacnoise.com with any questions regarding this assessment.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

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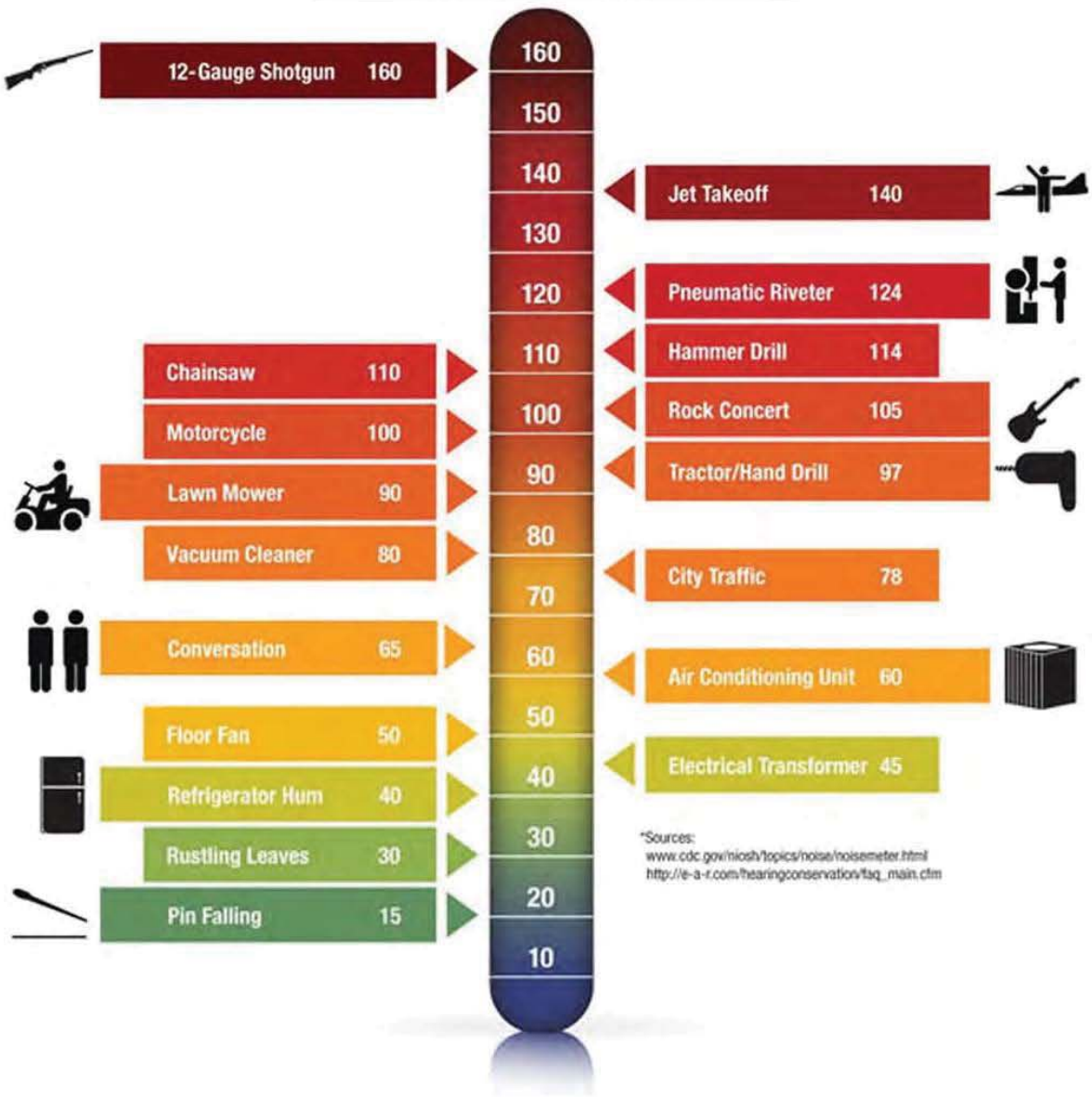
Appendix B

Typical A-Weighted Sound Levels of Common Noise Sources



Appendix C
El Dorado Senior Resort - El Dorado County, CA
Ambient Noise Monitoring Results - Site 1
Thursday, July 26, 2018

Hour	Leq	Lmax	L50	L90
0:00	40	58	35	33
1:00	38	62	34	33
2:00	37	53	34	32
3:00	41	60	35	33
4:00	44	64	40	34
5:00	46	64	45	38
6:00	47	58	46	42
7:00	51	76	47	42
8:00	45	57	43	39
9:00	45	64	42	38
10:00	43	59	42	39
11:00	47	73	42	38
12:00	43	61	41	37
13:00	43	60	41	37
14:00	43	55	42	37
15:00	43	55	42	39
16:00	45	65	43	40
17:00	44	65	43	39
18:00	44	62	42	38
19:00	45	60	42	37
20:00	45	55	44	40
21:00	47	71	43	37
22:00	42	57	38	33
23:00	41	59	37	33

Statistical Summary						
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	51	43	45	47	37	43
Lmax (Maximum)	76	55	63	64	53	59
L50 (Median)	47	41	43	46	34	38
L90 (Background)	42	37	39	42	32	35

Computed Ldn, dB	50
% Daytime Energy	74%
% Nighttime Energy	26%

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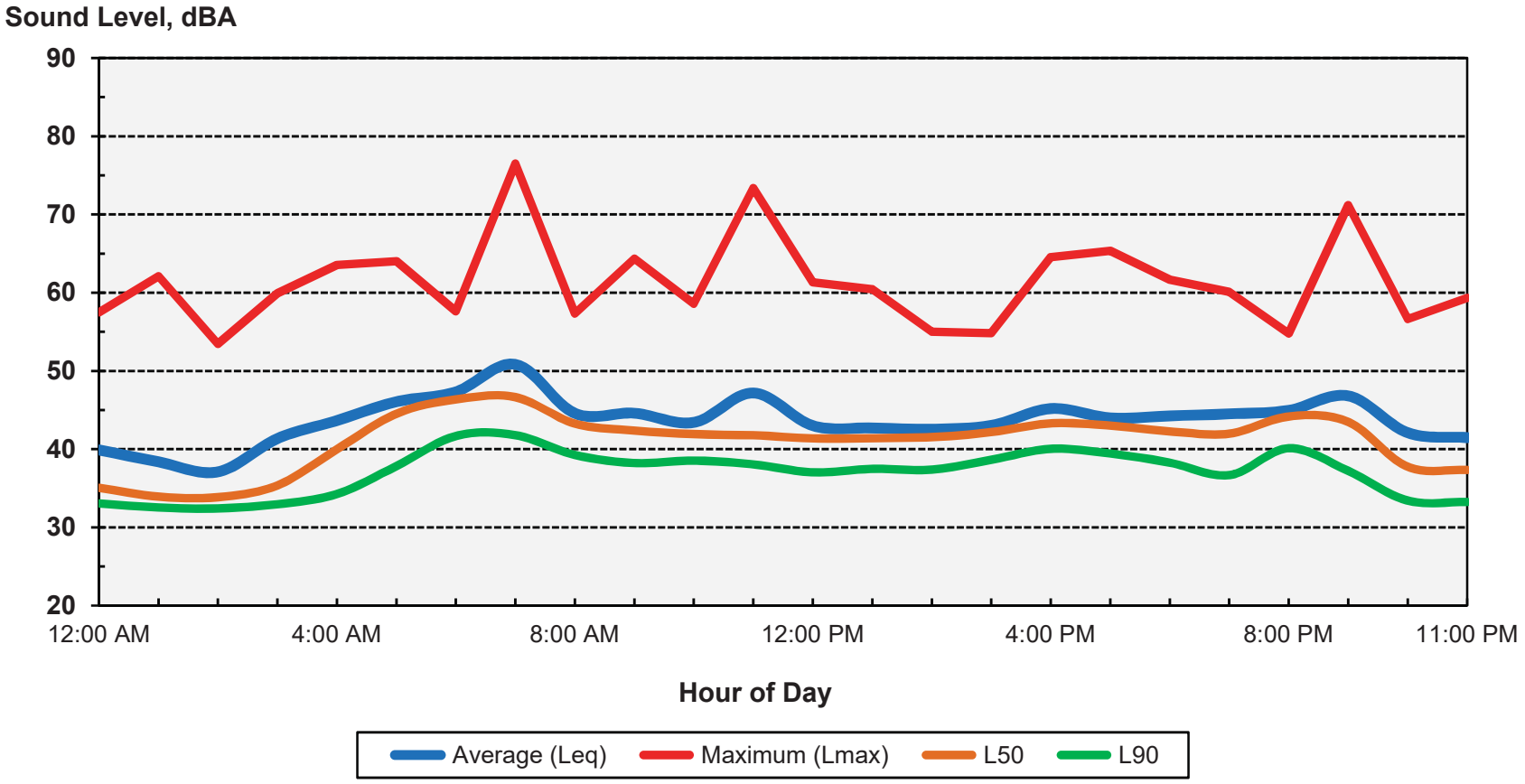
Appendix D
El Dorado Senior Resort - El Dorado County, CA
Ambient Noise Monitoring Results - Site 1
Thursday, July 26, 2018



Ldn: 50 dB

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EXHIBIT V - PROJECT NOISE ASSESSMENT
DR20-0001

Appendix E

Photographs of Noise Measurement Site Locations
El Dorado Senior Resort - El Dorado County, California

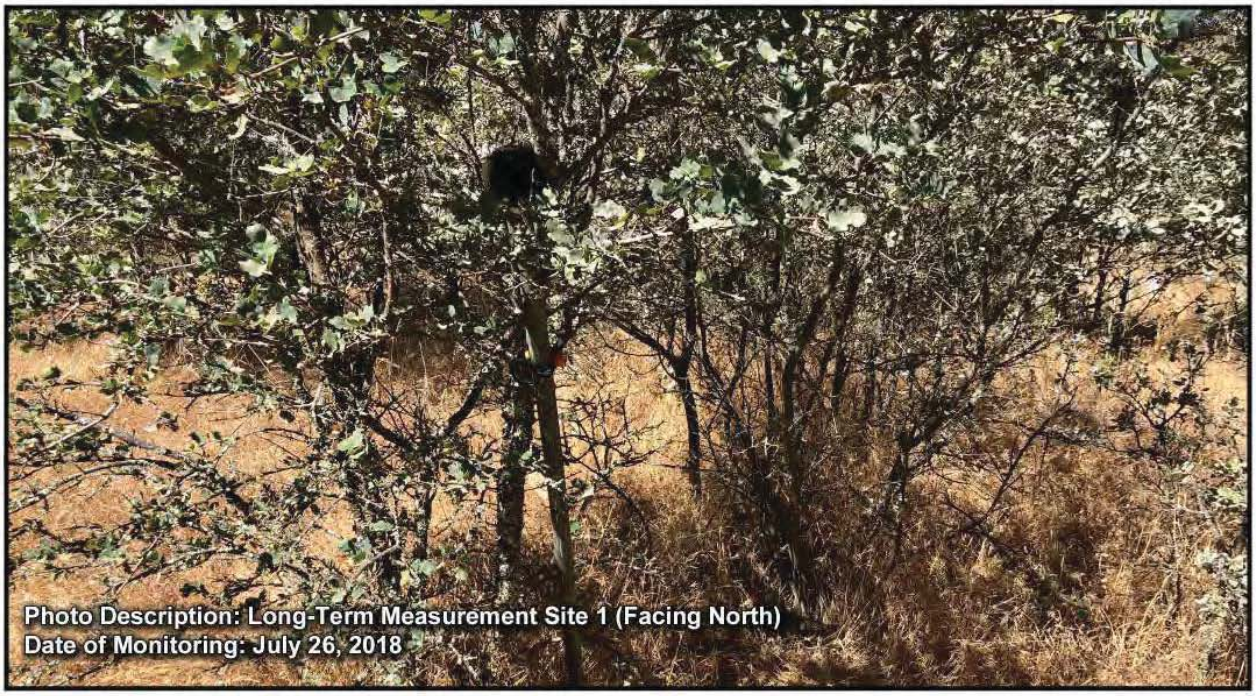

Photo Description: Long-Term Measurement Site 1 (Facing North)
Date of Monitoring: July 26, 2018

Photo Description: Short-Term Measurement Site A (Facing South)
Date of Monitoring: July 25, 2018

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Appendix F

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number: 2018-134
Project Name: El Dorado Senior Resort
Roadway Name: California State Route 49 (SR-49)

Traffic Data:

Year:	Future (2035)
Average Daily Traffic Volume[1]:	8,930
Percent Daytime Traffic:	83
Percent Nighttime Traffic:	17
Percent Medium Trucks (2 axle):	2
Percent Heavy Trucks (3+ axle):	1
Assumed Vehicle Speed (mph):	40
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				----------L_{dn}, dB----------			
Location	Description	Distance	Offset (dB)[2]	Autos	Medium Trucks	Heavy Trucks	Total
1	Assisted Living Building - Courtyard	415	-7	44	36	37	45
2	Assisted Living Building - First-floor facades	300		53	45	47	54
3	Assisted Living Building - Upper-floor facades	300	3	56	48	50	57
4	Apartment Building - First-floor facades	380		51	43	45	53
5	Apartment Building - Upper-floor facades	380	3	54	46	48	56
6	Community Center - Courtyard	480	-7	43	35	36	44

Traffic Noise Contours (No Calibration Offset):

L_{dn} Contour, dB	Distance from Centerline, (ft)
75	12
70	26
65	57
60	122

Notes:

[1] Future average daily traffic volume (Cumulative Plus Project Conditions) for SR-49 was calculated by using peak hour traffic volume data obtained from the El Dorado Senior Resort Traffic Impact Study prepared by Kimley-Horn (2018). Future peak hour traffic volumes were estimated by conservatively multiplying peak hour conditions by a factor of 10.

[2] A +3 dB offset was applied at upper-level facades to account for reduced ground absorption at elevated locations. To account for the shielding provided by proposed intervening buildings, a -7 dB offset was conservatively applied to at the primary common outdoor areas (courtyards).

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Appendix G-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2018-034 El Dorado Senior Resort
Description: Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR-49	South of Pleasant Valley Rd	7,070	83		17	2	1	55	50	
2	SR-49	Pleasant Valley Rd to Forni Rd	10,110	83		17	2	1	25	50	
3	SR-49	Forni Rd to Koki Ln	7,600	83		17	2	1	40	50	
4	SR-49	Koki Ln to Patterson Dr	9,010	83		17	2	1	45	50	
5	SR-49	Patterson Dr to Missouri Flats Rd	10,750	83		17	2	1	45	50	
6	SR-49	Missouri Flats Rd to Fowler Ln	15,890	83		17	2	1	35	50	
7	SR-49	North of Pleasant Valley Rd	6,200	83		17	2	1	50	50	
8	Pleasant Valley Rd	West of SR-49	8,860	83		17	2	1	25	50	
9	Pleasant Valley Rd	East of SR-49	14,980	83		17	2	1	35	50	
10	Forni Rd	North of SR-49	3,470	83		17	2	1	35	50	
11	Koki Ln	South of SR-49	1,700	83		17	2	1	25	50	
12	Patterson Dr	South of SR-49	3,790	83		17	2	1	35	50	
13	Missouri Flats Rd	North of SR-49	15,760	83		17	2	1	45	50	
14	Fowler Ln	South of SR-49	3,570	83		17	2	1	25	50	

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Appendix G-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2018-034 El Dorado Senior Resort
Description: Existing Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR-49	South of Pleasant Valley Rd	7,130	83		17	2	1	55	50	
2	SR-49	Pleasant Valley Rd to Forni Rd	10,250	83		17	2	1	25	50	
3	SR-49	Forni Rd to Koki Ln	7,740	83		17	2	1	40	50	
4	SR-49	Koki Ln to Patterson Dr	9,010	83		17	2	1	45	50	
5	SR-49	Patterson Dr to Missouri Flats Rd	11,150	83		17	2	1	45	50	
6	SR-49	Missouri Flats Rd to Fowler Ln	16,150	83		17	2	1	35	50	
7	SR-49	North of Pleasant Valley Rd	6,340	83		17	2	1	50	50	
8	Pleasant Valley Rd	West of SR-49	8,940	83		17	2	1	25	50	
9	Pleasant Valley Rd	East of SR-49	15,100	83		17	2	1	35	50	
10	Forni Rd	North of SR-49	3,470	83		17	2	1	35	50	
11	Koki Ln	SR-49 to Project Drvwy	2,290	83		17	2	1	25	50	
12	Koki Ln	South of Project Drvwy	1,720	83		17	2	1	25	50	
13	Patterson Dr	South of SR-49	3,790	83		17	2	1	45	50	
14	Missouri Flats Rd	North of SR-49	15,900	83		17	2	1	25	50	
15	Fowler Ln	South of SR-49	3,570	83		17	2	1	25	50	

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Appendix G-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2018-034 El Dorado Senior Resort
Description: Near-Term
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR-49	South of Pleasant Valley Rd	7,330	83		17	2	1	55	50	
2	SR-49	Pleasant Valley Rd to Forni Rd	10,590	83		17	2	1	25	50	
3	SR-49	Forni Rd to Koki Ln	8,090	83		17	2	1	40	50	
4	SR-49	Koki Ln to Patterson Dr	9,400	83		17	2	1	45	50	
5	SR-49	Patterson Dr to Missouri Flats Rd	11,160	83		17	2	1	45	50	
6	SR-49	Missouri Flats Rd to Fowler Ln	15,960	83		17	2	1	35	50	
7	SR-49	North of Pleasant Valley Rd	7,720	83		17	2	1	50	50	
8	Pleasant Valley Rd	West of SR-49	9,660	83		17	2	1	25	50	
9	Pleasant Valley Rd	East of SR-49	16,530	83		17	2	1	35	50	
10	Forni Rd	North of SR-49	3,560	83		17	2	1	35	50	
11	Koki Ln	South of SR-49	2,240	83		17	2	1	25	50	
12	Patterson Dr	South of SR-49	4,270	83		17	2	1	35	50	
13	Missouri Flats Rd	North of SR-49	16,100	83		17	2	1	45	50	
14	Fowler Ln	South of SR-49	3,990	83		17	2	1	25	50	

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Appendix G-4

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2018-034 El Dorado Senior Resort
Description: Near-Term Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR-49	South of Pleasant Valley Rd	7,390	83		17	2	1	55	50	
2	SR-49	Pleasant Valley Rd to Forni Rd	10,730	83		17	2	1	25	50	
3	SR-49	Forni Rd to Koki Ln	8,260	83		17	2	1	40	50	
4	SR-49	Koki Ln to Patterson Dr	9,850	83		17	2	1	45	50	
5	SR-49	Patterson Dr to Missouri Flats Rd	11,560	83		17	2	1	45	50	
6	SR-49	Missouri Flats Rd to Fowler Ln	16,220	83		17	2	1	35	50	
7	SR-49	North of Pleasant Valley Rd	7,860	83		17	2	1	50	50	
8	Pleasant Valley Rd	West of SR-49	9,740	83		17	2	1	25	50	
9	Pleasant Valley Rd	East of SR-49	16,650	83		17	2	1	35	50	
10	Forni Rd	North of SR-49	3,560	83		17	2	1	35	50	
11	Koki Ln	SR-49 to Project Drvwy	2,860	83		17	2	1	25	50	
12	Koki Ln	South of Project Drvwy	2,260	83		17	2	1	25	50	
13	Patterson Dr	South of SR-49	4,320	83		17	2	1	45	50	
14	Missouri Flats Rd	North of SR-49	16,240	83		17	2	1	25	50	
15	Fowler Ln	South of SR-49	3,990	83		17	2	1	25	50	

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EXHIBIT V - PROJECT NOISE ASSESSMENT
DR20-0001

Appendix G-5

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2018-034 El Dorado Senior Resort
Description: Cumulative
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR-49	South of Pleasant Valley Rd	7,720	83		17	2	1	55	50	
2	SR-49	Pleasant Valley Rd to Forni Rd	11,410	83		17	2	1	25	50	
3	SR-49	Forni Rd to Koki Ln	8,790	83		17	2	1	40	50	
4	SR-49	Koki Ln to Patterson Dr	9,970	83		17	2	1	45	50	
5	SR-49	Patterson Dr to Missouri Flats Rd	11,750	83		17	2	1	45	50	
6	SR-49	Missouri Flats Rd to Fowler Ln	16,450	83		17	2	1	35	50	
7	SR-49	North of Pleasant Valley Rd	9,910	83		17	2	1	50	50	
8	Pleasant Valley Rd	West of SR-49	10,850	83		17	2	1	25	50	
9	Pleasant Valley Rd	East of SR-49	18,760	83		17	2	1	35	50	
10	Forni Rd	North of SR-49	3,790	83		17	2	1	35	50	
11	Koki Ln	South of SR-49	2,980	83		17	2	1	25	50	
12	Patterson Dr	South of SR-49	4,960	83		17	2	1	35	50	
13	Missouri Flats Rd	North of SR-49	16,570	83		17	2	1	45	50	
14	Fowler Ln	South of SR-49	4,580	83		17	2	1	25	50	

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Appendix G-6

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2018-034 El Dorado Senior Resort
Description: Cumulative Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR-49	South of Pleasant Valley Rd	7,780	83		17	2	1	55	50	
2	SR-49	Pleasant Valley Rd to Forni Rd	11,550	83		17	2	1	25	50	
3	SR-49	Forni Rd to Koki Ln	8,930	83		17	2	1	40	50	
4	SR-49	Koki Ln to Patterson Dr	10,420	83		17	2	1	45	50	
5	SR-49	Patterson Dr to Missouri Flats Rd	12,150	83		17	2	1	45	50	
6	SR-49	Missouri Flats Rd to Fowler Ln	16,710	83		17	2	1	35	50	
7	SR-49	North of Pleasant Valley Rd	10,050	83		17	2	1	50	50	
8	Pleasant Valley Rd	West of SR-49	10,930	83		17	2	1	25	50	
9	Pleasant Valley Rd	East of SR-49	18,880	83		17	2	1	35	50	
10	Forni Rd	North of SR-49	3,790	83		17	2	1	35	50	
11	Koki Ln	SR-49 to Project Drvwy	3,570	83		17	2	1	25	50	
12	Koki Ln	South of Project Drvwy	3,000	83		17	2	1	25	50	
13	Patterson Dr	South of SR-49	5,010	83		17	2	1	45	50	
14	Missouri Flats Rd	North of SR-49	16,710	83		17	2	1	25	50	
15	Fowler Ln	South of SR-49	4,580	83		17	2	1	25	50	

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