

## **Appendix K: Environmental Noise Assessment**

# Environmental Noise Assessment

## Diamond Springs Parkway EIR

El Dorado County, California

BAC Job # 2007-141

Prepared For:

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December 16, 2009



## **ENVIRONMENTAL SETTING**

### **Project Location and Description**

The proposed Diamond Springs Parkway Project (Parkway, or project) is located within unincorporated El Dorado County, California, south of the Missouri Flat Road/US 50 Interchange, west of the City of Placerville, and north of the Town of Diamond Springs.

The El Dorado County Department of Transportation (DOT) is proposing to improve traffic circulation along the Pleasant Valley Road and Missouri Flat Road corridors by constructing the Parkway, which would connect Missouri Flat Road with State Route 49 (SR-49)/Diamond Road as presented in Exhibit 1. Under the proposed project, SR-49/Diamond Road would be improved to a four-lane major highway from north of the proposed intersection with the Parkway to SR-49/Pleasant Valley Road. Construction of the Parkway would also require minor roadway improvements and/or realignments at China Garden Road, Black Rice Road, Happy Lane, Throwita Way, Old Depot Road, Truck Street, Bradley Drive, and Lime Kiln Road.

### **Acoustical Terminology**

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that human hearing can detect. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, or Hertz (Hz). Human hearing is generally capable of detecting sound between 20 Hz and 20,000 Hz.

Our hearing is capable of processing these pressure variations (sound) over an extremely broad dynamic range. Therefore, the measurement of sound directly in terms of pressure would require a very large and awkward range of numbers. The logarithmic treatment of these numbers – converting measured sound pressure (Pa) into sound pressure level (decibels, dB) – was developed primarily to limit the range of numbers. The decibel scale allows for 5 orders of magnitude in sound pressure to be expressed within a range of 100 dB.

The perceived loudness of sound is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by the A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way we perceive noise. For this reason, the A-weighted sound level has become a standard tool for environmental noise assessment. All noise levels reported below are A-weighted.

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 used to measure the ambient noise level is the average, or equivalent sound level ( $L_{eq}$ ), which corresponds to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The  $L_{eq}$  is the foundation for the day/night average level ( $L_{dn}$ ). The  $L_{dn}$  is based on the average noise level over a continuous 24-hour period, with a +10 dB weighting (penalty) applied to noise occurring during nighttime hours (10 p.m.-7 a.m.). The nighttime penalty is based on the assumption that people react to nighttime noise exposures as if they are 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.



Table 1 provides definitions of acoustical terminology relevant to this study.

<b>Table 1</b>	
<b>Acoustical Terminology</b>	
<b>Acoustics</b>	The science (or physics) of sound.
<b>Ambient Noise</b>	The distinctive acoustical characteristics of a given environment consisting of all noise sources audible at a given 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.
<b>Attenuation</b>	The reduction of noise.
<b>A-Weighting</b>	A frequency-response filter that conditions a given sound signal to approximate human response.
<b>CNEL</b>	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 (10 p.m.-7 a.m.) weighted by a factor of 10 prior to averaging.
<b>Decibel or dB</b>	A Bel 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 Bel.
<b>Frequency</b>	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
<b>L<sub>dn</sub></b>	Day/Night Average Level. Similar to CNEL but with no evening weighting. The hours of 7-10 p.m. are considered daytime.
<b>L<sub>eq</sub></b>	Equivalent or energy-averaged sound level.
<b>L<sub>max</sub></b>	The highest root-mean-square (RMS) sound level measured over a given period of time.
<b>L<sub>n</sub></b>	The measured sound pressure level exceeded (n) percent of the time.
<b>Loudness</b>	A subjective term for the sensation of the magnitude of sound.
<b>Noise</b>	Unwanted sound.
<b>Threshold of Hearing</b>	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB at 1,000 Hz for persons with good hearing.
<b>SEL</b>	A single-number rating indicating the total energy of a discrete noise event compressed into a 1-second time duration.

### **Existing Land Uses in the Project Vicinity**

The project crosses many commercial/industrial zoned uses and may affect existing residential uses on SR-49/Diamond Road between Bradley Drive and SR-49/Pleasant Valley Road.

## Existing Ambient Noise Environment

The existing ambient noise environments at residential uses in the project area are defined primarily by traffic operations on SR-49/Diamond Road and other local area roadways. To quantify the existing ambient noise environments in the project vicinity, 24-hour noise level measurement surveys were completed at two locations in the project area on February 7-8, 2008. Measurement sites included 4000 SR-49 (Site 1) and 4151 SR-49 (Site 2). Please see Exhibit 1 for the measurement locations. Site 1 was located in the front yard landscaping, approximately 40 feet from the centerline of SR-49/Diamond Road. Site 2 was located on the south side of the front yard, approximately 50 feet from the centerline of SR-49/Diamond Road.

Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meters equipped with LDL 2560 ½" microphones were used for the ambient noise level measurement surveys. The meters were calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters (ANSI S1.4).

Ambient noise exposure at Sites 1 and 2 during the 24-hour noise level measurement periods were 72 dB  $L_{dn}$  and 63 dB  $L_{dn}$ , respectively. The ambient noise level measurement surveys revealed that existing noise levels at these receiver locations are elevated due to their proximity to SR-49/Diamond Road (and Bradley Drive for Site 1). As shown, existing noise levels at these properties exceed the County's 60 dB  $L_{dn}$  noise exposure criterion.

## REGULATORY SETTING

In order to limit population exposure to physically and/or psychologically damaging noise levels, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. El Dorado County and CEQA provide regulations regarding noise exposure relevant to the proposed project. The following provides a general overview of the existing regulations established by the El Dorado County General Plan – Public Health, Safety, and Noise Element (July 2004, Amended March 2009).

**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 6-1 at existing noise-sensitive land uses.**

The El Dorado County General Plan establishes land use compatibility criteria for various community land uses. For noise generated by transportation noise sources such as traffic, the General Plan specifies that noise sensitive land uses are compatible with exterior noise levels of up to 60 dB  $L_{dn}$  without the need for noise mitigation. This criterion is applied at outdoor activity spaces (e.g., backyards). For residential uses fronting the traffic noise source(s), a noise level limit of 65 dB  $L_{dn}$  is applied at the closest building façades. The County may allow an exterior noise level of up to 65 dB  $L_{dn}$  at outdoor activity areas provided that available exterior noise level reduction measures have been implemented and interior noise levels satisfy the applicable standard.

The County's interior noise level criterion of 45 dB  $L_{dn}$  is specified in the General Plan for residential land uses exposed to transportation noise sources. The intent of this interior noise level standard is to provide a suitable environment for indoor communication and sleep.

**Policy 6.5.1.11** The standards outlined in Tables 6-3, 6-4, and 6-5 shall apply to those activities associated with actual construction of a project as long as such construction occurs between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends, and on federally recognized holidays. Exceptions are allowed if it can be shown that construction beyond these times is necessary to alleviate traffic congestion and safety hazards.

The noise level criteria presented in Table 2 (Table 6-3 of the General Plan, as referenced above in Policy 6.5.1.11) apply to activities associated with the construction of a given project. It is expected that most project construction would occur between the hours of 7 a.m. and 7 p.m., Monday thru Friday, and 8 a.m. and 5 p.m. on weekends and federally recognized holidays. It is assumed that the criteria summarized in Table 2 would apply mostly to noise sensitive uses (e.g., residential).

**Table 2**

<b>Construction Noise Exposure Limits – Community Regions and Adopted Plan Areas</b>			
<b>Land Use</b>	<b>Time Period</b>	<b>Noise Level (dBA)</b>	
		<b>L<sub>eq</sub></b>	<b>L<sub>max</sub></b>
Residential	7 a.m.-7p.m.	55	75
	7 p.m.-10 p.m.	50	65
	10 p.m.-7 a.m.	45	60
Commercial and Public	7 a.m.-7 p.m.	70	90
	7 p.m.-7 a.m.	65	75
Industrial	Any Time	80	90

*Source: Table 6-3 of the El Dorado County General Plan (July 2004) – Public Health, Safety, and Noise Element*

**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 dBA L<sub>dn</sub> at the outdoor activity areas of residential uses, an increase of more than 5 dBA L<sub>dn</sub> 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<sub>dn</sub> at the outdoor activity areas of residential uses, an increase of more than 3 dBA L<sub>dn</sub> 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<sub>dn</sub> at the outdoor activity areas of residential uses, an increase of more than 1.5 dBA L<sub>dn</sub> caused by a new transportation noise will be considered significant.**

The potential increase in traffic noise exposure due to the project is a factor in determining significance. Research into the human perception of changes in sound level indicates the following.

- A 3 dB change is barely perceptible,
- A 5 dB change is clearly perceptible, and
- A 10 dB change is perceived as being twice or half as loud.

A limitation of using a single noise level increase value to evaluate noise impacts is that it fails to account for pre-project noise conditions. Table 3, which is offered as impact criteria within Policy 6.5.1.12 of the El Dorado County General Plan – Public Health, Safety, and Noise Element, is based on recommendations made in August 1992 by the Federal Interagency Committee on Noise (FICON). These criteria were developed to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been asserted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the  $L_{dn}$ . Specifically, they provide good correlation to transportation-related noise sources.

An increase in the traffic noise levels becomes more significant as the ambient noise levels increase. For instance, a significant increase in traffic noise levels is expected to be 1.5 dB when the “No Project” traffic noise levels exceed 65 dB  $L_{dn}$ . However, a significant increase in traffic noise levels is expected to be 5 dB when the No Project traffic noise levels are less than 60 dB  $L_{dn}$ . In other words, as ambient noise levels increase, a smaller increase in noise resulting from the project is sufficient to cause significant annoyance.

**Table 3**

**Significance of Changes in Cumulative Noise Exposure**

Noise Level Without Project ( $L_{dn}$ )	Increase Required for Significant Impact
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

*Source: Federal Interagency Committee on Noise (FICON) and the El Dorado County General Plan (July 2004)*

Noise impacts associated with the proposed project would be considered significant if they would expose existing noise sensitive land uses to a traffic noise level increase consistent with Table 3.

**NOISE IMPACTS ANALYSES**

The identified, primary noise-producing elements associated with the project include increased traffic on the local roadway network, future traffic on the realigned (new) section of SR-49/Diamond Road between the future Parkway and SR-49/Pleasant Valley Road, future traffic on the new Parkway, and project construction.



The noise assessments completed for this project were based on the project site plan presented in Exhibit 1 which depicts the ultimate four-lane Diamond Springs Parkway and ultimate four-lane SR-49 project improvements. Based on available funding and other considerations, the project may be constructed in phases. If phasing is necessary, under Phase 1, the Parkway would be constructed as a two-lane Arterial; under Phase 2, the Parkway would be widened to four lanes. Phase 1 may include right-of-way acquisitions and grading for a two-lane Parkway or for the full road prism to accommodate the four-lane improvements.

SR-49 may also be constructed in phases. If phasing is necessary, under Phase 1, Diamond Road (SR-49) would initially be constructed as a major two-lane highway, with restricted left-turn movement from Lime Kiln Road and Black Rice onto SR-49. Under Phase 2, SR-49 would be widened to a major four-lane highway.

Based on the traffic study (Kimley-Horn and Associates, Inc. 2009), this assessment assumes that project-area traffic volumes would be the same under Phase 1 and 2. It is expected that the analyses below adequately represent project related noise associated with all project options. Any significant changes to the project roadway alignments could affect the accuracy and validity of these analyses and the associated impacts and mitigation.

### **Exterior Traffic Noise Exposure**

The FHWA Model was used to assess noise impacts due to project-related traffic increases on the local roadway network. The Model incorporates the Calvenio reference noise factors for automobiles, medium trucks, and heavy trucks – and considers vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the project site. The Model was developed to predict hourly  $L_{eq}$  values for free-flowing traffic conditions.

A day/night traffic distribution of 83%/17% was factored into the calculations to determine  $L_{dn}$ . Additionally, medium/heavy truck splits of 4%/6%, 4%/5%, and 4%/3% were assumed for SR-49/Diamond Road under Existing (2010), Interim (2020), and Future (2030) conditions, respectively. A medium/heavy truck split of 1%/2% was assumed for all other studied roadways for all conditions. Traffic speeds of 35-45 MPH were assumed. Traffic volumes and the modeling data presented above were obtained from the project Traffic Impact Study (Kimley-Horn and Associates, Inc., 2009) and Caltrans.

Traffic noise levels were predicted at 100 feet from the roadway centerlines for the Existing (2010), Existing (2010)+Project, Interim (2020), Interim (2020)+Project, Future (2030), and Future (2030)+Project traffic scenarios. Results of the project traffic noise modeling are summarized in Table 4.

**Table 4**

**Predicted Traffic Noise Exposure Levels at 100 Feet from Roadway Centerlines  
Diamond Springs Parkway EIR – El Dorado County, California**

Roadway	Segment	L <sub>dn</sub> , dB (Δ re: No Project)		
		Existing (2010)+Project	Interim (2020)+Project	Future (2030)+Project
Missouri Flat Rd.	Golden Center Dr. to Golden Springs Pkwy.	66 (0)	68 (0)	69 (0)
	Golden Springs Pkwy. to China Garden Rd.	63 (-3)	64 (-4)	65 (-4)
	China Garden Rd. to SR-49/Pleasant Valley Rd.	63 (-1)	64 (-2)	65 (-2)
SR-49/Diamond Rd.	North of Truck St.	65 (+1)	65 (+1)	65 (0)
	Truck St. to Bradley St.	65 (+1)	65 (+1)	65 (+1)
	Bradley St. to Diamond Springs Pkwy.	65 (+1)	65 (0)	65 (0)
	Diamond Springs Pkwy. to Lime Kiln Rd.	67 (+3)	68 (+3)	67 (+2)
	Lime Kiln Rd. to SR-49/Pleasant Valley Rd.	67 (+3)	67 (+3)	67 (+3)
SR-49/Pleasant Valley Rd.	SR-49/Pleasant Valley Rd. to China Garden Rd.	65 (-3)	65 (-3)	66 (-2)
	China Garden Rd. to Missouri Flat Rd.	65 (-3)	66 (-2)	65 (-3)
	West of Missouri Flat Rd.	66 (-1)	66 (-1)	66 (-1)
Pleasant Valley Rd.	SR49/Pleasant Valley Rd. to Racquet Way	63 (+1)	63 (0)	64 (0)
	East of Racquet Wy.	61 (0)	61 (0)	62 (+1)
China Garden Rd.	Missouri Flat Rd. to SR-49/Pleasant Valley Rd.	55 (0)	56 (0)	57 (0)
Lime Kiln Rd.	West of SR-49/Diamond Rd.	54 (+1)	55 (+1)	55 (0)
Black Rice Rd.	East of SR-49/Diamond Rd.	53 (+3)	52 (+2)	53 (+2)
Flower Ln.	South of SR-49/Pleasant Valley Rd.	55 (0)	55 (-1)	56 (0)
Diamond Springs Pkwy.	Missouri Flat Rd. to Throwita Wy.	63 (na)	64 (na)	64 (na)
	Throwita Wy. to SR-49/Diamond Rd.	63 (na)	64 (na)	64 (na)

Sources: FHWA-RD-77-108, Kimley-Horn and Associates, Inc. (March 26, 2009), and Bollard Acoustical Consultants, Inc.

Note: More site-specific analyses are provided for residential receivers adjacent to the highlighted roadway segments.

Based on the information presented in Table 4, it is expected that project-related traffic noise level changes outside of the project area would not significantly impact existing noise sensitive receivers. In fact, in many cases, the project would reduce traffic volumes on these area roadways resulting in lower traffic noise exposure relative to the No Project condition. It is noted that traffic noise exposure from SR-49/Diamond Road in the project area is not expected to change substantially between 2010, 2020, and 2030 even though overall traffic volumes are expected to substantially increase. This result is directly related to an assumed drop in heavy truck percentage of the overall traffic volume (% ADT) over time (see the modeling assumptions presented above). Since heavy truck operations are louder than medium truck or auto operations, the expected decrease in percent heavy trucks would offset the overall traffic volume increase, resulting in little to no change in traffic noise exposure.

Within the project area, project-related traffic noise level increases may be significant at existing residential uses on SR-49/Diamond Road between Lime Kiln Road and SR-49/Pleasant Valley

Road. More specific traffic noise assessments were completed for these residential receivers. A site-specific traffic noise assessment was also completed for the residence on the southwest corner of Bradley Drive and SR-49/Diamond Road, just north of the future Parkway intersection of SR-49/Diamond Road.

#### Traffic Noise Model Calibration

On November 24, 2009, Bollard Acoustical Consultants, Inc. conducted short-term (15-minute) traffic noise level measurements and concurrent counts of SR-49/Diamond Road traffic in the vicinity of the closest existing residential receivers. As shown in Exhibit 1, the measurements were completed in the vicinity of 4000 SR-49 (Site A) and 4151 SR-49 (Site B). These short-term measurements and counts were used to determine the accuracy of the FHWA Model regarding the prediction of traffic noise exposure along SR-49/Diamond Road in the project area – accounting for acoustical shielding, actual travel speeds, and roadway grade. The noise level measurement results were compared to the FHWA Model results to determine any applicable noise modeling offsets (calibration of the FHWA Model). The FHWA Model was found to predict noise exposure at the measurement sites within 0.9-1.1 dB of the measurement results. Based on this finding, the FHWA Model was used to estimate traffic noise exposure at specific residential receivers without adjustment.

#### Traffic Noise Exposure at 4000 SR-49 (APN 051-250-11)

Using the FHWA Model without offset, traffic noise exposure from SR-49/Diamond Road at a distance of 75 feet from the Roadway centerline (assumed building setback distance) was calculated to be approximately 67 dB  $L_{dn}$  for the Existing (2010)+Project, Interim (2020)+Project, and Future (2030)+Project traffic scenarios. This is a 2 dB increase in traffic noise exposure relative to the level predicted at 100 feet shown in Table 4.

The residential property at 4000 SR-49 would experience new noise exposure from the proposed Parkway. Existing (2010)+Project, Interim (2020)+Project, and Future (2030)+Project noise exposure from Parkway traffic would be approximately 59 dB  $L_{dn}$ , 60 dB  $L_{dn}$ , and 60 dB  $L_{dn}$ , respectively, at a distance of 190 feet from the roadway centerline. The distance of 190 feet is the assumed setback of the center of the residence's back/side yard relative to the centerline of the future Parkway. These noise exposure levels are 4 dB less than the levels at 100 feet shown in Table 4.

Combine SR-49/Diamond Road and Parkway traffic noise exposure would be approximately 69 dB  $L_{dn}$ , 70 dB  $L_{dn}$ , and 70 dB  $L_{dn}$  for the Existing (2010)+Project, Interim (2020)+Project, and Future (2030)+Project scenarios, respectively. These noise exposure levels represent a calculated, project-related, traffic noise level increase of 1-2 dB. Project traffic noise exposure may exceed the 1.5 dB threshold under the Existing (2010)+Project condition, producing a potentially significant traffic noise impact. Please see Table 5 for a summary of the traffic noise level assessment.

#### Traffic Noise Exposure at Residences on the East Side of SR-49/Diamond Road between Lime Kiln Road and SR-49/Pleasant Valley Road

Existing (2010), Interim (2020), and Future (2030) traffic noise exposure at the studied residences was estimated to be 69 dB  $L_{dn}$  at a building setback of 50 feet from the centerline of SR-49/Diamond

Road. This noise exposure is 5 dB higher than estimated by the FHWA Model at a distance of 100 feet. As part of the project, the roadway alignment would be moved to the west to accommodate a frontage road for the residences in this area; resulting in a roadway centerline of approximately 90 feet from the closest residential structures. A traffic noise level change of approximately -4 dB would be expected as a result of the new SR-49/Diamond Road alignment. Project-related traffic volume increases on the roadway would add to the traffic noise exposure by approximately 3 dB (as shown in Table 4). Therefore, an overall traffic noise level change of approximately -1 dB would be experienced by the nearest residences as a result of the project. Existing (2010)+Project, Interim (2020)+Project, and Future (2030)+Project traffic noise exposure at the closest residential building facades to the new SR-49/Diamond Road alignment would be approximately 68 dB  $L_{dn}$ . From a traffic noise perspective, residences to the east of the re-aligned Highway would be expected to benefit from the project. This traffic noise assessment is summarized in Table 5 below.

#### Traffic Noise Exposure at 4160 SR-49 (APN 051-342-20)

As shown in Table 4, the project would be expected to produce a 3 dB traffic noise level increase at an established reference distance from the centerline of SR-49/Diamond Road between Lime Kiln Road and SR-49/Pleasant Valley Road. The current distance from the centerline of the Highway to the residential outdoor activity area (pool area) to the west is approximately 125 feet. As part of the project, the roadway alignment would be moved to the west approximately 40 feet in the vicinity of the studied residence (approximately 85 feet from the center of the pool area to the centerline of SR-49). The resulting traffic noise exposure increase due to the reduced distance would be approximately 3 dB, resulting in an overall project-related traffic noise level increase of 6 dB at the outdoor activity area. This preliminary assessment does not account for the noise attenuation provided by the substantial topography or residential privacy wall associated with this residential property.

The residence in question is elevated above the existing and proposed future SR-49/Diamond Road by approximately 24 feet. Additionally, the property includes a 6-7 foot high wood-framed/stucco privacy wall that was constructed by the property owner. The privacy wall functions as a de facto noise barrier because it mitigates existing, and presumably, future traffic noise exposure for users of the backyard/pool area. Noise barrier calculations using the FHWA Model methodology were used to determine the noise attenuation/insertion loss provided by the property topography and the 6-foot high privacy wall at the primary outdoor activity area (i.e., backyard/pool area). The noise attenuation provided by the existing shielding was calculated to be approximately 11 dB with the existing roadway alignment and approximately 14-15 dB with the proposed project alignment. Given this attenuation and applying the appropriate distance offset (+3 dB), Existing (2010)+Project, Interim (2020)+Project, and Future (2030)+Project traffic noise exposure within the primary outdoor activity area was calculated to be approximately 54 dB  $L_{dn}$ , 53 dB  $L_{dn}$ , and 54 dB  $L_{dn}$ , respectively. As shown, project-related traffic noise level increases of 2-3 dB would be expected at this residence. These levels do not exceed the applicable +5 dB threshold for significance. Please see Table 5 for a summary of this traffic noise assessment.

**Table 5**

**Summary of Noise Level Calculations  
Diamond Springs Parkway EIR – El Dorado County, California**

Receiver (Source)	Traffic Scenario	Level @ 100', dB L <sub>dn</sub> <sup>1</sup>	Offsets/Adjustments to Levels @ 100'			Level, dB L <sub>dn</sub> <sup>2,3</sup>	Impact (Y/N)
			Distance	Topo/Shielding	Cal./Meas.		
4000 SR-49 (SR-49/Pkwy)	Existing (2010)	64	+2	0	0	66	n/a
	Interim (2020)	65	+2	0	0	67	n/a
	Future (2030)	65	+2	0	0	67	n/a
	Existing (2010)+Project	65/63	+2/-4	0/0	0/0	67/59 (68)	Y
	Interim (2020)+Project	65/64	+2/-4	0/0	0/0	67/60 (68)	N
	Future (2030)+Project	65/64	+2/-4	0/0	0/0	67/60 (68)	N
SR-49 – East (SR-49)	Existing (2010)	64	+5	0	0	69	n/a
	Interim (2020)	64	+5	0	0	69	n/a
	Future (2030)	64	+5	0	0	69	n/a
	Existing (2010)+Project	67	+1	0	0	68	N
	Interim (2020)+Project	67	+1	0	0	68	N
	Future (2030)+Project	67	+1	0	0	68	N
4160 SR-49 (SR-49)	Existing (2010)	64	-2	-11	0	51	n/a
	Interim (2020)	64	-2	-11	0	51	n/a
	Future (2030)	64	-2	-11	0	51	n/a
	Existing (2010)+Project	67	+1	-14	0	54	N
	Interim (2020)+Project	67	+1	-15	0	53	N
	Future (2030)+Project	67	+1	-14	0	54	N

Notes:

<sup>1</sup> Refer to Table 4. Level calculated at 100 feet not accounting for any offsets or adjustments. Levels represent SR-49/Parkway.

<sup>2</sup> Level calculated at receiver outdoor activity area or building setback accounting for offsets/adjustments.

<sup>3</sup> Levels for 4151 SR-49 represent noise exposure or offsets/adjustments for SR-49/Parkway (SR-49+Parkway).

### Interior Traffic Noise Exposure

Standard residential construction consistent with Uniform Building Code standards will generally provide at least 25 dB of exterior-to-interior noise level reduction when exterior windows and doors are fully closed. Therefore, to exceed the applicable interior noise exposure limit (45 dB L<sub>dn</sub>), exterior noise exposure would need to exceed 70 dB L<sub>dn</sub>.

As presented above, exterior traffic noise exposure would be no higher than approximately 69 dB L<sub>dn</sub> at residential structures in the project area. Therefore, with exterior windows and doors fully closed, interior noise exposure associated with traffic on project-area roadways would be limited to 44 dB L<sub>dn</sub> or less.

### Project Construction

During the construction phases of the project, noise from building equipment would be expected to add to the noise environment in the immediate project vicinity. Activities involved in construction of the project would likely generate maximum noise levels, as indicated in Table 6, ranging from 77-85 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur between 7 a.m.-7 p.m., Monday thru Friday, and 8 a.m.-5 p.m. on weekends and federally recognized holidays. Still, existing residences in the project area would likely be affected by this noise.

**Table 6**

**Construction Equipment Noise Levels at 50 Feet**

Type of Equipment	L <sub>max</sub> , dB	Hourly L <sub>eq</sub> , dB/% Use
Backhoe	78	74/40%
Concrete Mixer Truck	79	75/40%
Dump Truck	77	73/40%
Front End Loader	79	75/40%
Pneumatic Tools	85	82/50%
Air Compressor	78	74/40%

*Source: Roadway Construction Noise Model V 1.0, U.S. Department of Transportation*

Noise would also be generated during the project construction by increased truck traffic on local area roadways. A significant project-generated noise source would be truck traffic associated with the transport of heavy materials and equipment to and from the construction sites.

Due to the proximity of project construction equipment to existing residences on SR-49/Diamond Road, which could be within 50 feet of residential buildings, project construction would be expected to produce maximum noise exposure as high as 85 dB (L<sub>max</sub>). This level exceeds the applicable daytime construction noise criterion by 10 dB. The installation of temporary noise barrier between the construction areas and affected residences would normally be recommended to mitigate this noise exposure; however, ingress/egress for the residential properties would make this an unlikely and ineffective effort.

**SPECIFIC IMPACTS AND MITIGATION STATEMENTS**

**Impact 1: Project-Related Traffic Noise Outside of the Project Area (Exterior)**

Project-related traffic noise level increases on local roadways outside of the project area would not be expected to exceed +1 dB. Along many existing roadways outside of the project area, the project would be expected to decrease traffic noise exposure by as much as -4 dB. Therefore, project-related traffic noise exposure changes outside of the project area are expected to be less than significant.

**Mitigation 1**

None required.

## **Impact 2: Project-Related Traffic Noise in the Project Area (Exterior)**

The project would affect existing noise sensitive residential receivers at 4000 SR-49, the east side of SR-49/Diamond Road between Lime Kiln Road and SR-49/Pleasant Valley Road, and 4160 SR-49. Project-related traffic noise exposure at these receivers is presented independently below.

### **Impact 2a: Project-Related Traffic Noise at 4000 SR-49 (Exterior)**

Based on the traffic noise assessment presented above, a project-related traffic noise level increase of 2 dB would be expected at this residential property under the Existing (2010)+Project traffic scenario, resulting in a noise exposure level of approximately 68 dB  $L_{dn}$  at the building setback and center of outdoor activity area. Since the noise exposure increase exceeds the +1.5 dB significance threshold, the project impact is considered potentially significant.

#### **Mitigation 2a**

The following construction may be considered to mitigate project-related traffic noise exposure from SR-49/Diamond Road at 4000 SR-49. The construction of property line noise barriers in this instance is not feasible due to required access of the property from SR-49/Diamond Road and because the County General Plan discourages the use of sound walls (Policy 6.5.1.5).

#### *Evaluation of Rubberized Asphalt Noise Mitigation Measure Effectiveness:*

One means of reducing overall traffic-related noise levels would be to install a rubberized asphalt pavement or open gap pavement (or other equally effective surfacing). Studies conducted for the Sacramento County Department of Environmental Review and Assessment and Transportation Department to determine the noise reduction provided by rubberized asphalt have been completed in recent years. Those studies indicate that the use of rubberized asphalt on Sacramento County roadways appears to have resulted in an average traffic noise level reduction of approximately 4 dB over that provided by conventional asphalt.

The European Commission Green Paper, published in the June 1997 edition of Noise/News International, cites the following on Page 87:

*Low-noise porous road surfaces have been the subject of much research. These porous road surfaces reduce both the generation and propagation of noise by several mechanisms - which can be related to the open structure of the surface layer. Results have shown that the emission noise levels can be reduced from levels generated on equivalent non-porous road surfaces by between 3-5 dB on average; by optimizing the surface design, larger noise reductions are feasible. At present, the cost of porous asphalt surfacing is higher than conventional surfaces (for resurfacing, but for new roads, the cost is minimal), but may drop as contractors gain experience with porous surfaces.*

The use of noise-reducing paving materials for the impacted areas is a feasible means of achieving a 3-5 dB decrease in traffic noise and reducing the potential for adverse public

reaction to future traffic noise levels on these roadways. Following mitigation, this impact would be *less than significant*.

Noise-reducing pavement shall be installed at SR-49/Diamond Road between the north end of the Bradley Drive intersection and the south end of the future Parkway intersection. This noise mitigation effort would require an extension of the project limits to the north.

**Impact 2b: Project-Related Traffic Noise at Residences on the East Side of SR-49/Diamond Road between Lime Kiln Road and SR-49/Pleasant Valley Road (Exterior)**

Based on the traffic noise assessment presented above, the project would be expected to reduce traffic noise exposure by approximately -1 dB relative to No Project conditions in this area. In this case, the project would be expected to produce no adverse impact.

Noise exposure at area residences on SR-49/Diamond Road between Lime Kiln Road and SR-49/Pleasant Valley Road is estimated to be as high as 68 dB with the Project. Although this noise exposure still exceeds the County's 65 dB  $L_{dn}$  exterior noise exposure criterion, it is not a direct result of the project, and is not considered to be significant.

**Mitigation 2b**

None required.

**Impact 2c: Project-Related Traffic Noise at 4160 SR-49 (Exterior)**

Based on the traffic noise assessment presented above, project-related traffic noise level increases of 2-3 dB would be expected at this residential property, resulting in noise exposure levels of 54 dB  $L_{dn}$ , 53 dB  $L_{dn}$ , and 54 dB  $L_{dn}$ , for the Existing (2010)+Project, Interim (2020)+Project, and Future (2030)+Project scenarios, respectively. In this case, the significance criteria would not be exceeded, and the project would be expected to produce a less than significant impact.

**Mitigation 2c**

None required.

**Impact 3: Project-Related Traffic Noise Exposure (Interior)**

Project-related traffic noise level increases would not be expected to exceed the applicable 45 dB  $L_{dn}$  limit within affected residential uses. At residences on the east side of SR-49/Diamond Road between Lime Kiln Road and SR-49/Pleasant Valley Road, the project would be expected to reduce interior traffic noise relative to No Project conditions. Interior traffic noise exposure associated with the project is expected to be less than significant.

**Mitigation 3**

None required.



## Impact 4: Construction Noise

During construction of the Project, construction noise could cause short-term increases in noise levels at existing residences adjacent to construction areas. Activities involved in construction would typically generate maximum noise levels high as 85 dB  $L_{max}$  at a distance of 50 feet, as indicated by the representative construction vehicles/equipment and associated noise levels shown Table 6. Construction activities would be temporary and would occur during daytime hours.

Project construction noise is considered potentially significant. The County shall require that construction contractors comply with all applicable local regulations regarding noise suppression and attenuation and shall require that engine-driven equipment be fitted with mufflers according to manufacturers' specifications. Incorporation of this mitigation measure will reduce potential construction impacts to less than significant.

### Mitigation 4

The County shall require that construction contractors comply with all applicable local regulations regarding noise suppression and attenuation and shall require that engine-driven equipment be fitted with mufflers according to manufacturers' specifications. The following requirements shall be included in the construction specifications:

- a) Limit construction activities to the hours of 7:00 a.m. to 7:00 p.m. on weekdays and the hours of 8:00 a.m. to 5:00 p.m. on weekends and federally recognized holidays except as required to alleviate traffic congestion or safety hazards;
- b) Locate fixed construction equipment such as compressors and generators at distances no less than 250 feet from sensitive receptors (including occupied residential property boundaries);
- c) Shroud or shield impact tools, and muffle or shield intake and exhaust ports on power construction equipment; and
- d) Construction equipment using internal combustion engines shall be in proper tune.

This concludes our Environmental Noise Assessment for the Diamond Springs Parkway EIR project in El Dorado County, California. Please contact me at (916) 663-0500 or [jasonm@bacnoise.com](mailto:jasonm@bacnoise.com) if you have any questions or require additional information.