NOISE TECHNICAL REPORT

El Dorado Hills Noise Study
El Dorado Hills, California

Prepared For

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TABLE OF CONTENTS

Page

TABLES

PHOTOS

Summary

RCH Group (RCH) has conducted this noise analysis for 1139 Lomond Drive. The site is located in El Dorado Hills, California on Lomond Drive, south of Green Valley Road and east of Silva Valley Parkway. Surrounding land uses are residential and open space. The purpose is to characterize existing noise conditions to determine if construction of a sound berm would be warranted to shield noise from traffic on Green Valley Road.

This report provides an overview of the local noise regulatory framework and existing noise levels measured at the project site. The 24-hour noise levels at the site, 215 feet from the centerline of Green Valley Road, were approximately 65 dB CNEL. These noise levels exceed the 60 dB Ldn/CNEL standard for outdoor activity areas from the El Dorado County General Plan, and construction of a sound berm may be warranted.

The top of the sound berm would probably be 5 to 8 feet above the road level and could reduce noise levels at the residences to the south by 5 to 8 dB, depending on the final configuration. This assumes that noise levels are reduced by approximately 1 dB for every 1 foot in height of the berm. A 5 dB reduction would be experienced as a clearly perceptible reduction in loudness. An 8 dB reduction would be experienced as a reduction in loudness of almost one half (which would occur with a 10 dB reduction).[1] With the sound berm installed, the activity areas of the residences immediately to the south would have quieter noise levels that would be more consistent with the El Dorado County General Plan guidance regarding maximum transportation noise exposure in outdoor activity areas (the average noise being reduced from approximately 65 dB now to 60 dB or lower with the sound berm). The sound berm would have to be constructed in the approximately 30 feet of space between the road and the non-building set-back area (Lots 9-11). This report does not access the engineering feasibility of constructing the photo-simulated berm shown in Photo 2.

Background

Noise Descriptors

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound pressure level has become the most common descriptor used to characterize the "loudness" of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Decibels are measured using different scales, and it has been found that A-weighting of sound levels best reflects the human ear's reduced sensitivity to low frequencies, and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. All references to decibels (dB) in this report will be A-weighted unless noted otherwise.

Several time-averaged scales represent noise environments and consequences of human activities. The most commonly used noise descriptors are the equivalent A–weighted sound level over a given time

[1] CalTrans Technical Noise Supplement (2013) and Sengpiel Audio (2017).

period (Leq)[2]; average day–night 24-hour average sound level (Ldn)[3] with a nighttime increase of 10 dB to account for sensitivity to noise during the nighttime; and community noise equivalent level (CNEL)[4], also a 24-hour average that includes both an evening and a nighttime sensitivity weighting.

Table 1 identifies decibel levels for common sounds heard in the environment.

Table 1: Typical Noise Levels

Noise Level (dB)	Outdoor Activity	Indoor Activity
90+	Gas lawn mower at 3 feet, jet flyover at 1,000 feet	Rock Band
80–90	Diesel truck at 50 feet	Loud television at 3 feet
70–80	Gas lawn mower at 100 feet, noisy urban area	Garbage disposal at 3 feet, vacuum cleaner at 10 feet
60–70	Commercial area	Normal speech at 3 feet
40–60	Quiet urban daytime, traffic at 300 feet	Large business office, dishwasher next room
20–40	Quiet rural, suburban nighttime	Concert hall (background), library, bedroom at night
10–20		Broadcast / recording studio
0	Lowest threshold of human hearing	Lowest threshold of human hearing

Source: (modified from Caltrans Technical Noise Supplement, 2013)

Noise Attenuation

Stationary point sources of noise, including construction equipment, attenuate (lessen) at a rate of 6 to 7.5 dB per doubling of distance from the source, depending on ground absorption. Soft sites attenuate at 7.5 dB per doubling because they have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. Hard sites have reflective surfaces (e.g., parking lots or smooth bodies of water) and therefore have less attenuation (6.0 dB per doubling). A street or roadway with moving vehicles (known as a "line" source), would typically attenuate at a lower rate, approximately 3 to 4.5 dB each time the distance doubles from the source, which also depends on ground absorption (CalTrans, 1998). Physical barriers located between a noise source and the noise receptor, such as berms or sound walls, will increase the attenuation that occurs by distance alone.

[2]The Equivalent Sound Level (Leq) is a single value of a constant sound level for the same measurement period duration, which has sound energy equal to the time–varying sound energy in the measurement period.

[3]Ldn is the day–night average sound level that is equal to the 24-hour A-weighted equivalent sound level with a 10-decibel penalty applied to night between 10:00 p.m. and 7:00 a.m.

[4]CNEL is the average A-weighted noise level during a 24-hour day, obtained by addition of 5 decibels in the evening from 7:00 to 10:00 p.m., and an addition of a 10–decibel penalty in the night between 10:00 p.m. and 7:00 a.m.

Regulatory Framework

State Guidelines

State Land Use Compatibility Standards for Community Noise are provided in the State of California General Plan Guidelines. The guidelines indicate that a Community Noise Exposure up to 60 (Ldn or CNEL) is Normally Acceptable for Single Family Residential, and a Community Noise Exposure up to 70 (Ldn or CNEL) is Conditionally Acceptable (OPR 2003).

El Dorado County General Plan

The Public Health, Safety, and Noise Element of the El Dorado County General Plan establishes goals and policies for transportation noise sources. As shown in **Table 2**, the maximum allowable exposure to transportation noise sources for residential land uses is 60 dB Ldn at outdoor activity areas and 45 dB Ldn in interior spaces.

Table 2: Maximum Allowable Noise Exposure
Transportation Noise Sources

Land Use	Outdoor Activity Areas[1] Ldn/CNEL, dB	Interior Spaces Ldn/CNEL, dB
Residential	60[2]	45

Source: El Dorado County General Plan, 2015

Notes:

[1]In Communities 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 Ldn shall be applied at the building facade, in addition to a 60 dB Ldn criterion at the outdoor activity area. In Rural Regions, an exterior noise level criterion of 60 dB Ldn 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 Ldn 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]Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB Ldn/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.

Significance Criteria

Construction of a sound berm would be warranted if residents at the project site are exposed to transportation noise sources in excess of the maximum allowable noise exposure from transportation noise sources contained in the El Dorado County General Plan.

Existing Noise Sources and Levels

To quantify existing ambient noise levels in the immediate project vicinity, RCH conducted short-term (15-minute) measurements and long-term (48-hour) measurements at the project site. Noise measurements were made using Metrosonics db308 Sound Level Meters calibrated before and after the measurements. Noise measurements were taken from the location on the 1139 Lomond Drive property that was closest to Green Valley Road.

The noise measurements are summarized in **Table 3** below. The Noise Appendix includes 24-hour noise plots of the data and a figure showing noise measurement locations. The dominant source of noise during the measurements was traffic noise from Green Valley Road.

As shown in **Table 3**, long-term sound level measurements were conducted from Thursday September 7 through Saturday September 9, 2017. The noise meter recorded 24 hours of data for September 7 and 8 and 17 hours of data on Saturday September 9. The 24-hour noise levels (CNELs) were 64 on Thursday, 66 on Friday, and an estimated 64 dB on Saturday. Short-term sound level measurements were conducted at the site on Monday September 11, 2017. The average noise level (Leq) for the 5-minute periods measured at the site was 58 to 59 dB.

Table 3: Existing Noise Measurements

Location	Time Period	Noise Levels (dB)	Noise Sources
Site 1. Back deck of 1139 Lomond Drive, 215 feet from the centerline of Green Valley Road	Thursday September 7, 12:00 a.m. through Saturday September 9, 11:59 p.m., 2017 48+-hour measurement	Hourly Leq's ranged from: 51-62 CNELs: 64, 66, 64*	Unattended noise measurements do not specifically identify noise sources.
Site 1. Back deck of 1139 Lomond Drive, 215 feet from the centerline of Green Valley Road	Monday September 11, 2017 11:48 a.m.-12:03 p.m.	5-minute Leq's: 58, 59, 58	Traffic is 57-67 dB. Noisy pick-up truck is 70 dB. Airplane is 52 dB. Background noise is 42 dB. Quieter noise includes water from a backyard fountain.

Source: RCH Group, 2017

* Note: The Saturday measurement recorded 17 hours (before low battery shut down). The CNEL is estimated based on the 17 hours of recorded noise data, and should be accurate within +/- 1 dB.

Impact Analysis

Traffic Noise Impacts on Residences

Exterior Noise Levels

As shown in **Table 3**, the 24-hour noise levels at the site, 215 feet from the centerline of Green Valley Road, were 64, 66, and 64 dB CNEL. Therefore, noise levels at the outdoor activity area exceed the 60

dB Ldn/CNEL standard from the El Dorado County General Plan, and construction of a sound berm may be warranted. (See Photos 1-2 for existing and projected views.)

The top of the sound berm would probably be 5 to 8 feet above the road level and could reduce noise levels at the residences to the south by 5 to 8 dB, depending on the final configuration. This assumes that noise levels are reduced by approximately 1 dB for every 1 foot in height of the berm. A 5 dB reduction would be experienced as a clearly perceptible reduction in loudness. An 8 dB reduction would be experienced as a reduction in loudness of almost one half (which would occur with a 10 dB reduction).[5] With the sound berm installed, the activity areas of the residences immediately to the south would have quieter noise levels that would be more consistent with the El Dorado County General Plan guidance regarding maximum transportation noise exposure in outdoor activity areas (the average noise being reduced from approximately 65 dB now to 60 dB or lower with the sound berm). The sound berm would have to be constructed in the approximately 30 feet of space between the road and the non-building set-back area (Lots 9-11). This report does not access the engineering feasibility of constructing the photo-simulated berm shown in Photo 2.

Interior Noise Levels

Typical residential construction consistent with the Uniform Building Code (UBC) provides an exterior-to interior noise level reduction of no less than 25 dB provided that exterior windows and doors are closed (Bollard, 2005, Burn, 1994). As discussed above, exterior noise levels at the site were 64 to 66 dB CNEL. Given this and the 25 dB reduction, interior noise levels would be 39 to 41 dB CNEL. Because interior noise levels are less than 45 dB Ldn (the El Dorado County interior standard), this is a less-than-significant impact.

References

Bollard Acoustical Consultants, 2005. *PFE/Walerga Mixed-Use Development, Environmental Noise Assessment*, 2005.

Burn, Melissa, 1994. WYLE Laboratories. *WYLE Research Report WR 94-23. Raleigh-Durham International Airport New Construction Acoustical Design Guide*, 1994. (reference for homes having 20 -35 dBA of noise attenuation).

California Department of Transportation (Caltrans), 2013. *Technical Noise Supplement*.

California Department of Transportation (Caltrans), 1998. *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects*, October 1998.

El Dorado County, 2015. *El Dorado County General Plan*, Public Health, Safety, and Noise Element.

Governor's Office of Planning and Research (OPR), 2003. *State of California General Plan Guidelines*.

Sengpiel Audio, 2017. Forum for microphone recording technology and recording studio technology. *Poll: Is 3 dB, 6 dB, or 10 dB SPL double the sound pressure?* [www.sengpielaudio.com/calculator-levelchange.htm]

[5]CalTrans Technical Noise Supplement (2013) and Sengpiel Audio (2017).

Photo #1) Existing Westbound View

Photo #2) Projected Westbound View

El Dorado Hills Noise Study

Noise Appendix

Site 1 – 24-Hour Noise Plots

Noise Measurement Locations Figure

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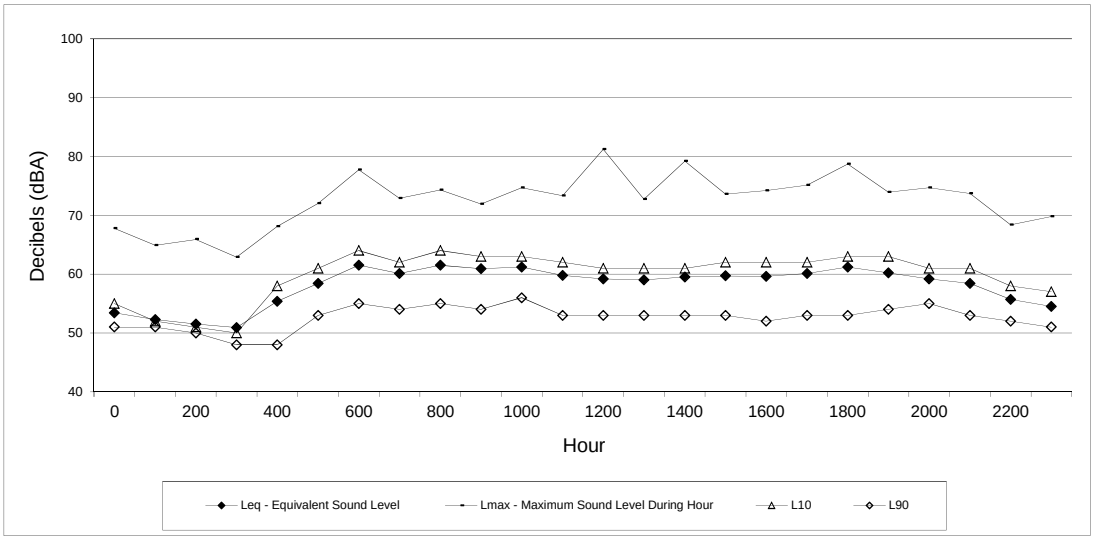
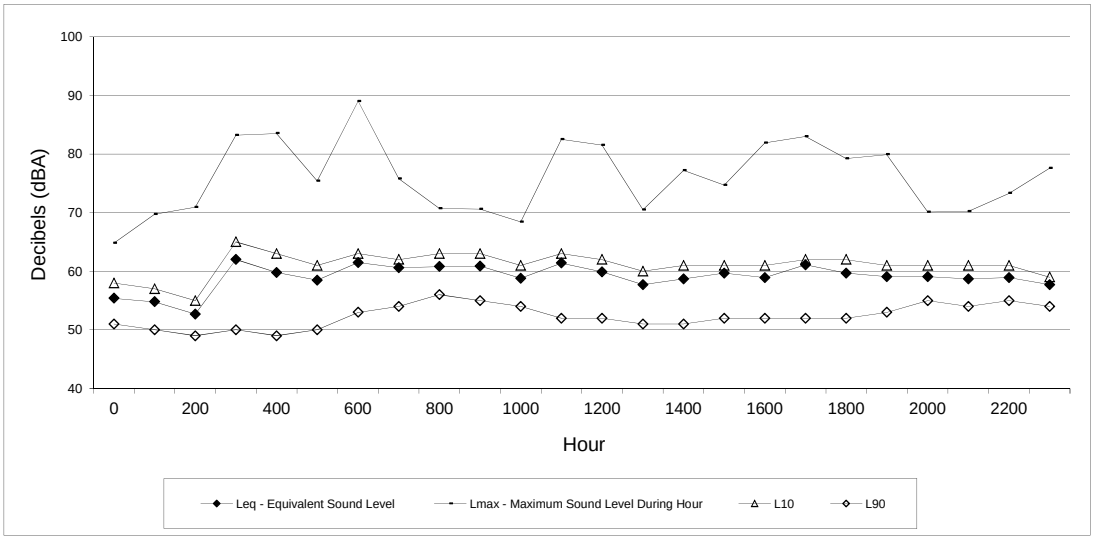


Site 1: Back deck of 1139 Lomond Drive, 215 feet from the centerline of Green Valley Road
Thursday September 7, 2017

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	53	68	55	51
100	52	65	52	51
200	52	66	51	50
300	51	63	50	48
400	55	68	58	48
500	58	72	61	53
600	62	78	64	55
700	60	73	62	54
800	62	74	64	55
900	61	72	63	54
1000	61	75	63	56
1100	60	73	62	53
1200	59	81	61	53
1300	59	73	61	53
1400	60	79	61	53
1500	60	74	62	53
1600	60	74	62	52
1700	60	75	62	53
1800	61	79	63	53
1900	60	74	63	54
2000	59	75	61	55
2100	58	74	61	53
2200	56	68	58	52
2300	55	70	57	51

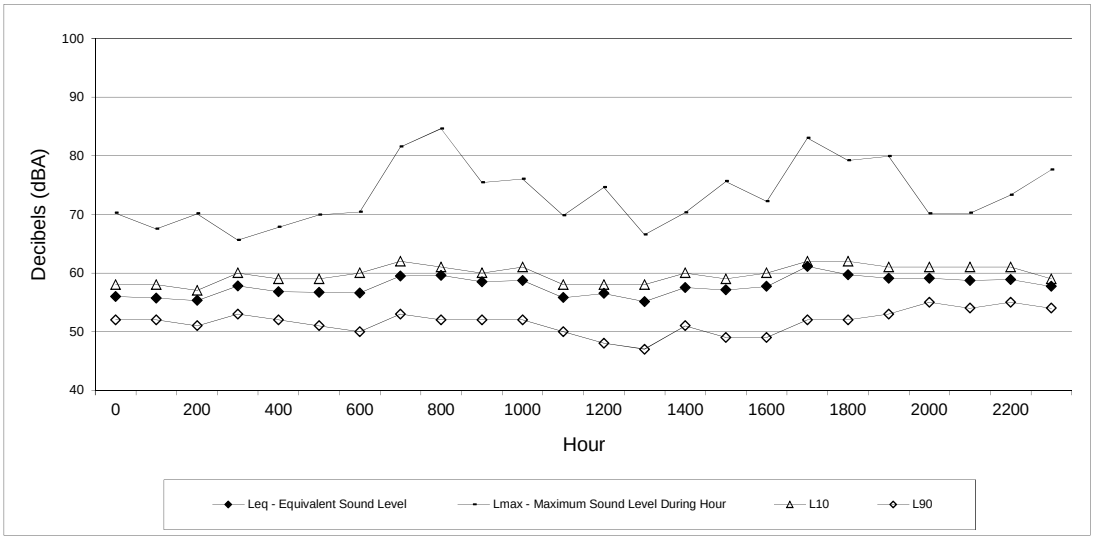
CNEL 64



Site 1: Back deck of 1139 Lomond Drive, 215 feet from the centerline of Green Valley Road
Friday September 8, 2017

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	55	65	58	51
100	55	70	57	50
200	53	71	55	49
300	62	83	65	50
400	60	84	63	49
500	59	75	61	50
600	62	89	63	53
700	61	76	62	54
800	61	71	63	56
900	61	71	63	55
1000	59	68	61	54
1100	61	83	63	52
1200	60	82	62	52
1300	58	71	60	51
1400	59	77	61	51
1500	60	75	61	52
1600	59	82	61	52
1700	61	83	62	52
1800	60	79	62	52
1900	59	80	61	53
2000	59	70	61	55
2100	59	70	61	54
2200	59	73	61	55
2300	58	78	59	54

CNEL: 66



Site 1: Back deck of 1139 Lomond Drive, 215 feet from the centerline of Green Valley Road
Saturday September 9, 2017

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	56	70	58	52
100	56	68	58	52
200	55	70	57	51
300	58	66	60	53
400	57	68	59	52
500	57	70	59	51
600	57	70	60	50
700	60	82	62	53
800	60	85	61	52
900	59	75	60	52
1000	59	76	61	52
1100	56	70	58	50
1200	57	75	58	48
1300	55	67	58	47
1400	58	70	60	51
1500	57	76	59	49
1600	58	72	60	49
1700	61	83	62	52
1800	60	79	62	52
1900	59	80	61	53
2000	59	70	61	55
2100	59	70	61	54
2200	59	73	61	55
2300	58	78	59	54

CNEL: 64

Estimated

SOURCE: Google Earth and RCH Group 2017

El Dorado Hills Noise Study
1139 Lomond Drive
Noise Measurement Location