APPENDIX F

Noise

Environmental Noise Assessment

Alpine Sierra Subdivision

Placer County, California

BAC Job # 2012-064

Prepared For:

Dudek

Attn: Ms. Katherine Waugh
853 Lincoln Way, Suite 208
Auburn, CA 95603

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard, President

July 28, 2015

BOLLARD
Acoustical Consultants

3551 Bankhead Road < Loomis, CA 95650 < Phone: (916) 663-0500 < Fax: (916) 663-0501 < BACNOISE.COM

Introduction

The Alpine Sierra Subdivision Project (project) area is located in the Alpine Meadows community in unincorporated Placer County, California. The property is bounded to the north and south by existing residential land uses. The proposed residential subdivision will comprise approximately 47 individual lots consisting of both high and low density residential housing.

This section discusses the existing noise and vibration environment in project vicinity and evaluates potential impacts and mitigation measures development within the project area. The project site location is presented in Figure 1. The project site plan is presented as Figure 2.

Fundamentals and Terminology

Noise

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and hence are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, called Hertz (Hz).

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel 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 then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in levels (dB) correspond closely to human perception of relative loudness. Complete descriptions of terminology are defined in Appendix A.

The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content of the source. 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 the human ear perceives noise. For this reason, the A-weighted sound level has become a standard tool for environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels. Common noise sources can be found in Figure 3.

Figure 1

Alpine Sierra Subdivision - Placer County, California

Project Area and Ambient Noise Measurement Locations

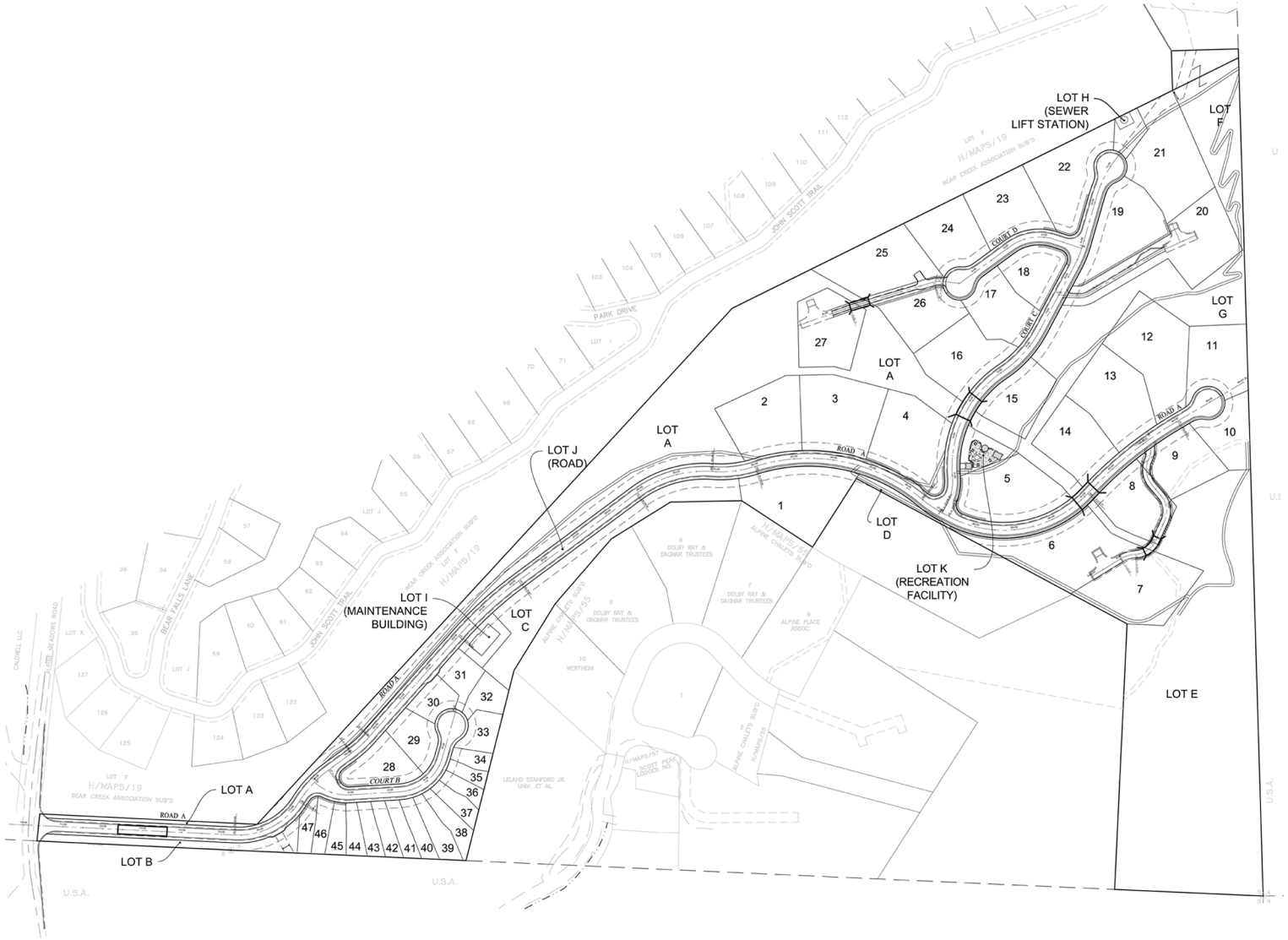
BOLLARD
Acoustical Consultants

Scale (feet)
0 250 500

Figure 2

Alpine Sierra Subdivision - Placer County, California

Project Site Plan



BOLLARD
Acoustical Consultants

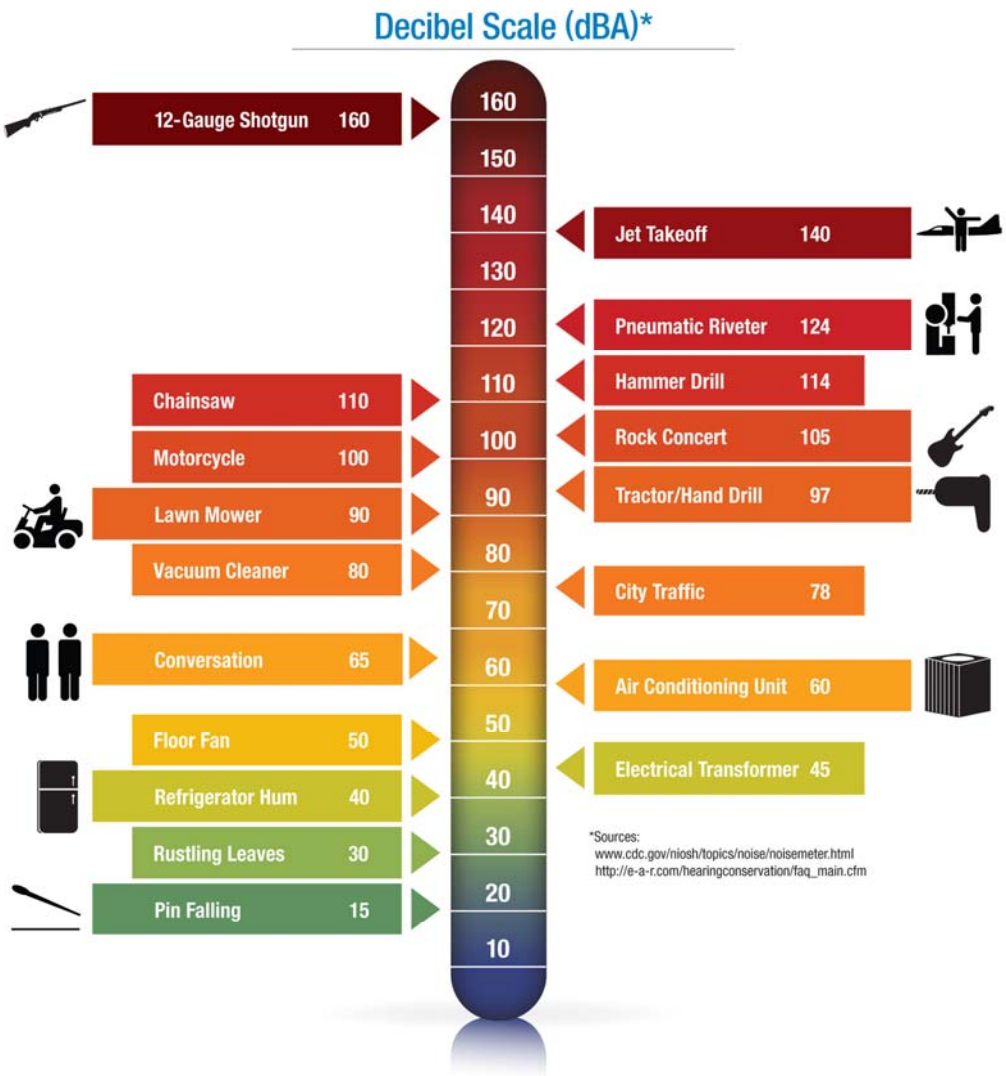
Scale (feet)

0 250 500

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}), 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 Noise Level (L_{dn}).

The L_{dn} is based on the average noise level over a continuous 24-hour period, with a +10 dB weighting applied to noise occurring during nighttime (10 p.m. to 7 a.m.) hours. The nighttime penalty is based on 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.

Figure 3



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 a structure. 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 peak particle velocities (inches/second). Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity.

Environmental Setting

Existing Noise Conditions in the Project Area

The project area is sparsely developed and, with the exception of seasonal activity associated with the Alpine Meadows Ski Resort, and periodic avalanche control activities, there are no substantial sources of noise in the immediate project vicinity. As a result, the existing ambient noise environment in the immediate project vicinity is defined primarily by light traffic on Alpine Meadows Road during non-ski seasons, and by heavier traffic and resort activity during the winter ski season. Noise-sensitive land uses in the immediate project vicinity generally consist of existing single-family residences to the north and south.

General Ambient Noise Environment

To quantify the existing ambient noise environment in the project vicinity, continuous ambient noise level surveys were conducted. The continuous noise level measurements were conducted at the three (3) locations shown on Figure 1 during the summer and winter seasons. The summer monitoring was between Friday, September 6 and Monday, September 9, 2013. The winter monitoring was between Friday, April 4 and Monday, April 7, 2013.

Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the noise level measurement surveys. The meters were calibrated before use with a 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).

The results of the noise measurements are provided in Table 1, with charted results in Appendix B.

Table 1
Ambient Noise Measurement Results
Alpine Sierra Subdivision Vicinity

Site	Date		Ldn	Daytime (7 a.m. - 10 p.m.)						Nighttime (10 p.m. - 7 a.m.)					
				Leq			Lmax			Leq			Lmax		
				High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average
Site 1	Friday	9/6/13	51	59	40	50	89	64	71	51	28	43	77	34	53
	Saturday	9/7/13	46	48	40	45	78	64	67	43	26	38	69	28	52
	Sunday	9/8/13	45	47	38	44	75	63	66	39	27	35	67	29	51
	Monday	9/9/13	50	56	38	51	79	63	72	46	29	39	67	32	53
	AVERAGE	--	48	53	39	47	80	63	69	45	28	39	70	31	52
	Friday	4/4/14	56	62	42	57	82	63	72	49	40	44	71	56	65
	Saturday	4/5/14	54	59	45	55	72	67	69	48	36	42	68	41	60
	Sunday	4/6/14	55	59	42	55	76	67	70	48	38	43	73	41	57
	Monday	4/7/14	53	56	44	53	79	65	71	48	41	44	72	44	61
	AVERAGE	--	55	59	43	55	77	66	70	48	39	43	71	46	61
Site 2	Friday	9/6/13	43	47	29	41	66	42	55	39	25	35	52	41	47
	Saturday	9/7/13	39	43	29	39	61	42	54	32	23	29	53	26	43
	Sunday	9/8/13	38	44	29	38	68	43	53	29	25	27	45	28	40
	Monday	9/9/13	39	41	33	38	64	50	57	34	26	30	53	28	40
	AVERAGE	--	40	44	30	39	65	44	55	34	25	30	51	31	43
	Friday	4/4/14	45	51	34	42	66	47	54	42	33	38	63	44	51
	Saturday	4/5/14	41	41	35	39	64	44	51	34	31	33	48	35	40
	Sunday	4/6/14	42	42	37	40	62	45	53	37	33	35	46	34	41
	Monday	4/7/14	44	43	38	40	70	46	55	39	36	37	48	37	42
	AVERAGE	--	43	44	36	40	66	46	54	38	33	36	51	38	43
Site 3	Friday	9/6/13	38	40	27	37	63	43	53	33	21	30	51	36	43
	Saturday	9/7/13	35	37	25	34	61	38	49	29	20	26	51	26	38
	Sunday	9/8/13	34	39	25	34	60	41	51	27	20	23	48	23	35
	Monday	9/9/13	39	41	31	37	61	47	54	38	20	31	56	23	37
	AVERAGE	--	37	39	27	35	61	42	52	32	20	27	51	27	38

Source: Bollard Acoustical Consultants, Inc. (2015)

The Table 1 data indicate that existing ambient noise conditions in the project vicinity are fairly low at locations removed from Alpine Meadows Road (Sites 2 & 3), with average daytime noise levels in the low 40's and average nighttime levels in the low 30's, dB L_{eq}. At the sites located closer to Alpine Meadows Road (Site 1), average daytime noise levels were in the low 50's and nighttime levels in the low 40's, dB L_{eq}. This range of measured ambient noise levels is suitable for residential development.

Existing Traffic Noise Environment

To predict existing noise levels specifically due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The Model is based on the Calveno reference noise 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 project site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions.

Table 2 shows the existing traffic noise levels in terms of L_{dn} at a reference distance of 100 feet from the centerlines of existing project-area roadways. The table also includes the distances to existing traffic noise contours. Both winter and summer conditions were considered in the analysis.

Table 2
Existing Traffic Noise Levels and Distances to Contours
Alpine Sierra Subdivision – Placer County, California

			Distance to L_{dn} Contours (feet)		
Roadway	Segment Description	L_{dn} @ 100'	70 dB	65 dB	60 dB
Winter Conditions					
SR 89	North of Alpine Meadows Road	65.9	53	114	246
	South of Alpine Meadows Road	65.4	49	106	228
Alpine Meadows Road	West of SR 89	60.3	23	49	105
	North of Site Access	59.4	20	43	92
	South of Site Access	59.4	20	43	92
Summer Conditions					
SR 89	North of Alpine Meadows Road	65.6	51	110	236
	South of Alpine Meadows Road	65.7	51	111	239
Alpine Meadows Road	West of SR 89	55.8	11	24	52
	North of Site Access	47.7	3	7	15
	South of Site Access	47.5	3	7	15

Source: FHWA-RD-77-108 with inputs from Bollard Acoustical Consultants, Inc.
See Appendices C-E for a complete listing of FHWA Model Inputs and results.

Existing Vibration Environment

No appreciable off-site sources of vibration were identified during BAC field surveys of the area and existing ambient vibration levels were subjectively evaluated as being below the threshold of perception. During periodic avalanche control activities in winter months, avalanche guns are used to propel explosive charges onto the mountains to mitigate the potential for avalanches. Although no vibration data was available for avalanche control activities in the Alpine Meadows area, such events undoubtedly result in brief periods of perceptible vibration at local residences.

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. The Placer County General Plan Noise Element, Noise Ordinance, and CEQA provide regulations regarding noise levels for uses relevant to the proposed project. The following provides a general overview of the existing regulatory framework for the proposed project.

Placer County General Plan

The Placer County General Plan Noise Standards which would be applicable to this project are provided below in Tables 3 and 4.

Table 3
Allowable Ldn Noise Levels Within Specified Zone Districts[1]
Applicable to New Projects Affected by or Including
Non-Transportation Noise Sources – Placer County Noise Element

Zone District of Receptor	Property Line of Receiving Use	Interior Spaces[2]
Residential Adjacent to Induratial[3]	60	45
Other Residential[4]	50	45
Office/Professional	70	45
Transient Lodging	65	45
Neighborhood Commercial	70	
General Commercial	70	45
Timberland Preserve	---	---
Recreation & Forestry	70	---
Open Space	---	---
Mineral Reserve	---	---

Source: Placer County General Plan Noise Element, Table 9-1

Table 4
Maximum Allowable Noise Exposure
Transportation Noise Sources

	Outdoor Activity Areas [1]	Interior Spaces	
Land Use	**Ldn / CNEL**	**Ldn / CNEL**	**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	60 [3]	---	40
Office Buildings	---	---	45
Schools, Libraries, Museums	---	---	45
Playgrounds, Neighborhood Parks	70	---	C

Source: Placer County General Plan Noise Element, Table 9-3

(1) Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.

(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 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.

Notes on Tables 3 & 4:

• Except where noted otherwise, noise exposures will be those which occur at the property line of the receiving use.

• Where existing transportation noise levels exceed the standards of this table, the allowable Ldn shall be raised to the same level as that of the ambient level.

• If the noise source generated by, or affecting, the uses shown above consists primarily of speech or music, of if the noise source is impulsive in nature, the noise standards shown above shall be decreased by 5 dB.

• Where a use permit has established noise level standards for an existing use, those standards shall supersede the levels specified in Table 4 and Table 5. Similarly, where an existing use which is not subject to a use permit causes noise in excess of the allowable levels in Tables 4 and 5, said excess noise shall be considered the allowable level. If a new development is proposed which will be affected by noise from such an existing use, it will ordinarily be assumed that the noise levels already existing or those levels allowed by the existing use permit, whichever are greater, are those levels actually produced by the existing use.

• Existing industry located in industrial zones will be given the benefit of the doubt in being allowed to emit increased noise consistent with the state of the art at the time of expansion. In no case will expansion of an existing industrial operation because to decrease allowable noise emission limits. Increased emissions above those normally allowable should be limited to a one-time 5 dB increase at the discretion of the decision making body.

• The noise level standards applicable to land uses containing incidental residential uses, such as caretaker dwellings at industrial facilities and homes on agriculturally zoned land, shall be the standards applicable to the zone district, not those applicable to residential uses.

• Where no noise level standards have been provided for a specific zone district, it is assumed that the interior and/or exterior spaces of these uses are effectively insensitive to noise.

• Interior spaces are defined as any locations where some degree of noise-sensitivity exists. Examples include all habitable rooms of residences, and areas where communication and speech intelligibility are essential, such as classrooms and offices.

• Noise from industrial operations may be difficult to mitigate in a cost-effective manner. In recognition of this fact, the exterior noise standards for residential zone districts immediately adjacent to industrial, limited industrial, industrial park, and industrial reserve zone districts have been increased by 10 dB as compared to residential districts adjacent to other land uses. For purposes of the Noise Element, residential zone districts are defined to include the following zoning classifications: AR, R-1, R-2, R-3, FR, RP, TR-1, TR-2, TR-3, and TR-4.

• Where a residential zone district is located within an -SP combining district, the exterior noise level standards are applied at the outer boundary of the -SP district. If an existing industrial operation within an -SP district is expanded or modified, the noise level standards at the outer boundary of the -SP district may be increased as described above in these standards.

• Where a new residential use is proposed in an -SP zone, an Administrative Review Permit is required, which may require mitigation measures at the residence for noise levels existing and/or allowed by use permit as described under "NOTES," above, in these standards.
• State of the art should include the use of modern equipment with lower noise emissions, site design, and plant orientation to mitigate offsite noise impacts, and similar methodology.
• Normally, agricultural uses are noise insensitive and will be treated in this way. However, conflicts with agricultural noise emissions can occur where single-family residences exist within agricultural zone districts. Therefore, where effects of agricultural noise upon residences located in these agricultural zones is a concern, an Ldn of 70 dBA will be considered acceptable outdoor exposure at a residence.

Placer County Noise Ordinance

Construction activities are exempt from the noise standards from 6:00 a.m. to 8:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 8:00 p. m. Saturday and Sunday, as long as all construction equipment is fitted with factory-installed muffling devices and is maintained in good working order. (Placer County Code § 9.36.030.A.7.) Article 9.36 of the Placer County Code also sets standards and procedures for regulating noise, including an hourly standard of 55 dB for daytime noise and 45 dB for night time noise. (Placer County Code § 9.36.060.) A maximum level of 70 dB is permitted during the day and 65 dB at night. *See* Table 5 below.

9.36.060 Sound limits for sensitive receptors.

A. It is unlawful for any person at any location to create any sound, or to allow the creation of any sound, on property owned, leased, occupied or otherwise controlled by such person that:

1. Causes the exterior sound level when measured at the property line of any affected sensitive receptor to exceed the ambient sound level by five (5) dBA or
2. Exceeds the sound level standards as set forth in Table 5, whichever is the greater.

Table 5
Sound Level Standards
Non-Transportation Noise Sources

Sound Level Descriptor	Daytime (7 am – 10 pm)	Nighttime (10 pm – 7 am)
Hourly Leq, dB	55	45
Maximum Level (Lmax), dB	70	65

Source: Placer County Noise Ordinance

B. Each of the sound level standards specified in Table 5 shall be reduced by five (5) dB for simple tone noises, consisting of speech and music. However, in no case shall the sound level standard be lower than the ambient sound level plus five (5) dB.

C. If the intruding sound source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient sound level can be measured, the sound level measured while the source is in operation shall be compared directly to the sound level standards of Table 5.

Criteria for the Evaluation of Project-Related Noise Level Increases

It is generally recognized that an increase of at least 3 dB for similar noise sources is usually required before most people will perceive a change in noise levels, and an increase of 6 dB is required before the change will be clearly noticeable (Egan, Architectural Acoustics, page 21, 1988, McGraw Hill).

The Federal Interagency Commission on Noise (FICON) has developed a graduated scale for use in the assessment of project-related noise level increases. Table 6 was developed by FICON as a means of developing thresholds for impact identification for project-related noise level increases. The FICON standards have been used extensively in recent years by the authors of this section in the preparation of the noise sections of Environmental Impact Reports that have been certified in many California Cities and Counties.

The rationale for the graduated scale used in the FICON standards is that test subjects' reactions to increases in noise levels varied depending on the starting level of noise. Specifically, with lower ambient noise environments, such as those below 60 dB L_{dn}, a larger increase in noise levels was required to achieve a negative reaction than was necessary in more elevated noise environments.

The use of the FICON standards are considered conservative relative to thresholds used by other agencies in the State of California. For example, the California Department of Transportation (Caltrans) requires a project-related traffic noise level increase of 12 dB for a finding of significance, and the California Energy Commission (CEC) considers project-related noise level increases between 5-10 dB significant, depending on local factors. Therefore, the use of the FICON standards, which set the threshold for finding of significant noise impacts as low as 1.5 dB, provides a very conservative approach to impact assessment for this project.

Table 6
Significance of Changes in Cumulative Noise Exposure

Ambient 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)

Based on the FICON research, as shown in Table 6, a 5 dB increase in noise levels due to a project is required for a finding of significant noise impact where ambient noise levels without the project are less than 60 dB L_{dn}. Where pre-project ambient conditions are between 60 and 65 dB L_{dn}, a 3 dB increase is applied as the standard of significance. Finally, in areas already exposed to higher noise levels, specifically pre-project noise levels in excess of 65 dB L_{dn}, a 1.5 dB increase is considered by FICON as the threshold of significance.

This graduated scale indicates that in quieter noise environments, test subjects tolerated a higher increase in noise levels due to a project before the onset of adverse noise impacts than did test subjects in louder environments.

According to the FICON study, if screening analysis shows that noise-sensitive areas will be at or above DNL 65 dB and will have an increase of DNL 1.5 or more, further analysis should be conducted. The FICON study also reported the following: every change in the noise environment does not necessarily impact public health and welfare.

Vibration Evaluation Criteria

Placer County has no adopted vibration standards. As a result, Caltrans-recommended criteria are applied for this project, as described below. 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 publication, *Transportation-and Construction-Induced Vibration Guidance Manual*, written for Caltrans by Jones & Stokes in June 2004, provides guidelines for acceptable vibration limits for transportation and construction projects in terms of the induced peak particle velocity (PPV). Those standards are reproduced below in Table 7.

Table 7
Vibration Criteria

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources[1]**	**Continuous or Frequent Intermittent Sources[2]**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old building	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial building	2.00	0.50

Notes:
1. Transient sources create a single isolated vibration event, such as blasting or drop balls.
2. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Current Caltrans research illustrates that there are different thresholds of perception for different types of vibration sources. Section XI(b) of Appendix G of the CEQA guidelines requires that a project result in exposure of persons to, or generation of, *excessive* groundborne vibration levels or groundborne noise levels, for the finding of a significant impact. The CEQA guidelines specifically mention “excessive” vibration, rather than just perceptible vibration. The general range at which vibration becomes distinctly to strongly perceptible is 0.1 – 0.50 in/sec ppv.

Impacts and Mitigation Measures

Standards of Significance

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, whether by the addition of a single vehicle on a roadway, or a tractor in an agricultural field, the use of audibility alone as significance criteria would be unworkable. CEQA requires a substantial increase in noise levels (not simply an audible change) before noise impacts are deemed significant.

The following standards of significance, which are based on the California Environmental Quality Act Guidelines (State CEQA Guidelines) in conjunction with the Placer County General Plan Noise Element and Noise Standards as described above, are applied to this project to establish whether there is a significant increase in noise levels:

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.

> For noise generated by off-site traffic on the proposed residences within this development, the 60 dB L_{dn} exterior and 45 dB L_{dn} interior noise standards of Table 5 are applied.
>
> For noise generated by off-site, non-transportation noise sources, such as activities associated with the Alpine Meadows Ski Resort, the County Noise Ordinance standards of Table 6 (55 dB during daytime, 7am – 10pm and 45 dB during nighttime, 10pm – 7am) are applied as these standards are more restrictive than the County Noise Element standards of Table 4.

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

> The general range at which vibration becomes distinctly to strongly perceptible is 0.1 – 0.50 in/sec ppv.

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

> Substantial increases are defined using the FICON guidelines shown in Table 6. Specifically, project-related noise level increases of 1.5 dB or greater are considered significant for this assessment, depending on the existing ambient conditions without the project.

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

As with Item C above, substantial increases are defined using the FICON guidelines shown in Table 6. Specifically, project-related noise level increases ranging from 1.5 dB or greater are considered significant for this assessment, depending on the existing ambient conditions without the project. Construction activities are exempt from the noise standards from 6:00 a.m. to 8:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 8:00 p. m. Saturday and Sunday, as long as all construction equipment is fitted with factory-installed muffling devices and is maintained in good working order.

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.

Because there are no public airports within 2 miles of this project, an evaluation of aircraft noise impacts associated with public airports is not warranted for this project.

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.

No private airstrips were identified in the project vicinity so an evaluation of aircraft noise impacts associated with such facilities is not warranted for this project.

Methodology

A combination of use of existing literature, noise level measurements, and application of accepted noise prediction and sound propagation algorithms, were used to predict changes in ambient noise levels resulting from development within the project area. Specific noise sources evaluated in this section include traffic, construction-related blasting, and operations at Alpine Meadows Ski Resort. Noise impacts of each of these major noise sources are described below.

Traffic Noise Impact Assessment Methodology

To assess traffic noise impacts, traffic noise levels are predicted at a representative distance for both existing and future, project and no-project conditions. Noise impacts are identified at existing noise-sensitive areas if the noise level increases which result from the project exceed the significance thresholds shown in Table 7. Noise impacts at proposed residences located within the project site are identified if the predicted future plus project traffic noise levels exceed the County's 60 dB L_{dn} exterior noise standard applicable to new residential uses, as described previously in this section.

To describe existing and projected noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The model is based upon the Calveno reference noise 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. To predict traffic noise levels in terms of L_{dn}, it is necessary to adjust the input volume to account for the day/night distribution of traffic.

Traffic volumes for all conditions were obtained from LSC Transportation Consultants. Table 8 shows the predicted traffic noise levels for existing conditions with and without the project, and the changes in traffic noise levels which would result from the project. Table 9 shows the predicted traffic noise levels for future conditions with and without the project, and the changes in traffic noise levels which would result from the project. The tables are provided in terms of L_{dn} at a standard distance of 100 feet from the centerline of the project-area roadways.

Table 8
Predicted Traffic Noise Exposure Levels at 100 Feet from Roadway Centerlines
Alpine Sierra Subdivision – Placer County, California

		Winter Conditions			Summer Conditions		
Roadway	**Segment Description**	**Existing No Project**	**Existing + Project**	**Change**	**Existing No Project**	**Existing + Project**	**Change**
SR 89	North of Alpine Meadows Rd	65.9	65.9	0.0	65.6	65.6	0.0
	South of Alpine Meadows Rd	65.4	65.4	0.0	65.7	65.7	0.0
Alpine Meadows Rd	West of SR 89	60.3	60.4	0.1	55.8	56.2	0.4
	North of Site Access	59.4	59.6	0.2	47.5	49.9	2.4
	South of Site Access	59.4	59.5	0.1	47.5	47.5	0.0

Source: FHWA-RD-77-108 with inputs from Bollard Acoustical Consultants, Inc.
See Appendices C-E for a complete listing.

Table 9
Predicted Future Traffic Noise Exposure Levels at 100 Feet from Roadway Centerlines
Alpine Sierra Subdivision – Placer County, California

		Winter Conditions			Summer Conditions		
Roadway	**Segment Description**	**Future No Project**	**Future + Project**	**Change**	**Future No Project**	**Future + Project**	**Change**
SR 89	North of Alpine Meadows Rd	66.6	66.6	0.0	66.4	66.4	0.0
	South of Alpine Meadows Rd	66.1	66.1	0.0	66.4	66.5	0.1
Alpine Meadows Rd	West of SR 89	60.9	60.9	0.0	56.3	56.7	0.4
	North of Site Access	60.0	60.1	0.1	48.0	50.2	2.2
	South of Site Access	60.0	60.1	0.1	48.0	48.0	0.0

Source: FHWA-RD-77-108 with inputs from Bollard Acoustical Consultants, Inc.
See Appendices C-E for a complete listing.

Construction Noise Impact Assessment Methodology

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. Activities involved in construction would generate maximum noise levels, as indicated in Table 10, ranging from 85 to 90 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours.

Table 10
Typical Construction Equipment Noise

Equipment Description	Maximum Noise Level at 50 feet, dBA
Auger drill rig	85
Backhoe	80
Bar bender	80
Blasting	94
Boring jack power unit	80
Chain saw	85
Clam shovel	93
Compactor (ground)	80
Compressor (air)	80
Concrete batch plant	83
Concrete mixer truck	85
Concrete pump truck	82
Concrete saw	90
Crane (mobile or stationary)	85
Dozer	85
Dump truck	84
Excavator	85
Flatbed truck	84
Front end loader	80
Generator (25 kilovolt-amperes [kVA] or less)	70
Generator (more than 25 kVA)	82
Grader	85
Hydra break ram	90
Impact pile driver (diesel or drop)	95
Jackhammer	85
Mounted impact hammer (hoe ram)	90
Paver	85
Pickup truck	55
Pneumatic tools	85
Pumps	77
Rock drill	85
Scraper	85
Soil mix drill rig	80
Tractor	84
Vacuum street sweeper	80
Vibratory concrete mixer	80
Vibratory pile driver	95
Welder/Torch	73

Source: Federal Highway Administration 2006.

Alpine Meadows Ski Resort Operations Noise Impact Assessment Methodology

The nearest Alpine Meadows Ski Resort operations to the project site is a parking area located approximately 1,000 feet to the south, with the nearest chairlift approximately 1,300 feet from the project site. Aside from increased traffic on Alpine Meadows Road during winter ski conditions, the most significant noise source associated with operations at the Alpine Meadows Ski Resort would be nighttime snow-making. Noise level data contained within the Homewood Mountain Resort Ski Area Master Plan EIR/EIS was used to quantify typical noise emissions associated with snow-making operations. Table 13-16 of that project DEIR indicates that snow-making operations can be expected to generate worst-case noise levels of approximately 78 dB at a distance of 50 feet directly in front of the snow-making nozzle.

At the 1,300 foot distance to the nearest ski run, assuming a 6 dB decrease in sound per doubling of distance and an additional 1.5 dB decrease thousand feet for atmospheric absorption, the resulting maximum noise level due to snow-making operations would be approximately 48 dBA.

As noted in Table 1 for Site 2, measured ambient conditions during the month of April when the ski resort was operating were approximately 40 dB L_{eq} during daytime hours, and approximately 36 dB L_{eq} during nighttime hours.

Specific Project Impacts and Mitigation Measures

Traffic Noise Impacts

Impact 1: Development within the project area will generate a minimal amount of increased traffic on Alpine Meadows Road relative to existing summer and winter conditions without the project. According to Table 8, this increase would range from 0.0 to 2.4 dB L_{dn} during summer conditions, and 0.0 to 0.2 dB L_{dn} during winter conditions.

Pursuant to the project significance criteria, a substantial increase in traffic noise levels is conservatively defined as 1.5 to 5 dB, depending on the pre-project traffic noise level. Existing noise levels on SR 89 exceed 65 dB L_{dn} at 100 feet, so the threshold of significance for that roadway would be 1.5 dB. On Alpine Meadows Road, where the existing noise levels without the project are 60 dB L_{dn} or less, the threshold of significance would be 3-5 dB L_{dn}. Because traffic noise level increases due to the project would be 2.4 dB or less, the project thresholds of significance are not exceeded, and **this impact is considered less than significant.**

Mitigation for Impact 1: *None Required.*

Noise Impacts Associated with Alpine Meadows Ski Resort Operations

Impact 2: Due to the substantial distance between the nearest proposed residential lots in the proposed Alpine Sierra Development and the Alpine Meadows Ski Resort (approximately 1,000+ feet), maximum noise levels generated by unshielded snowmaking activities are predicted to be approximately 48 dB Lmax or less at the those future residential locations. As noted in Table 5, the most restrictive standard of the Placer County Noise Ordinance is 65 dB Lmax during nighttime hours. Because the predicted maximum noise levels, as well as measured maximum noise levels during the April monitoring period when the resort was operating, are below the County noise thresholds, **this impact is considered less than significant.**

Mitigation for Impact 2: *None Required.*

Noise Associated with Construction within the Project Area

Impact 3: Activities associated with construction within the Project Area will result in short-term periods of increased noise levels. Construction activities would be temporary in nature and would occur during normal daytime working hours. Nonetheless, because construction activities would result in short-term periods during which construction noise could substantially exceed existing ambient noise levels at nearby residences, **this impact is considered potentially significant.**

Mitigation for Impact 3:

MM 3a: Construction activities should adhere to the requirements of Placer County Code § 9.36.060 with respect to hours of operation, muffling of internal combustion engines, and other factors which affect construction noise generation and its effects on noise-sensitive land uses in order to qualify for exemption from County Noise Ordinance standards.

MM 3b: All construction equipment powered by internal combustion engines shall be properly muffled and maintained.

MM 3c: All equipment and vehicles shall be turned off when not in use. Unnecessary idling of internal combustion engines is prohibited.

MM 3d: All stationary noise-generating construction equipment, such as air compressors, shall be located as far as practical from the nearby homes. Acoustically shield such equipment when it must be located near adjacent residences.

MM 3e: Select quiet equipment, particularly air compressors, whenever possible. Motorized equipment shall be outfitted with proper mufflers in good working order.

MM 3d: The equipment storage location shall be sited as far as possible from nearby sensitive receptors.

Significance after mitigation: *Less than significant*

Vibration Impacts

Impact 4: **F**ield inspections of the immediate project area revealed no discernable sources of vibration which would adversely affect future sensitive land uses located within the Alpine Sierra development. In addition, the project does not propose any appreciable sources of ongoing vibration, and short-term vibration generated by project construction dissipates rapidly with distance and would be below the vibration criteria cited above. As a result, vibration impacts either due to the project, or upon the project, are not anticipated, and this **impact is considered less than significant.**

Mitigation for Impact 4: *None Required*

Cumulative Setting, Impacts, and Mitigation

The ambient noise environment in the project area following the completion of this project and cumulative development of other reasonably foreseeable projects being considered will continue to be defined primarily by local traffic and ongoing operation of the Alpine Meadows Ski Resort. Because a relatively large increase in traffic volume is required to achieve a noticeable increase in traffic noise levels (i.e. a doubling of traffic volume is required for a barely perceptible 3 dB increase in traffic noise), future ambient noise conditions in the immediate project vicinity are not expected to be appreciably different than existing ambient noise levels.

Increases in Cumulative Traffic Noise Levels Due to the Project

Impact 5: Development within the project area will generate a minimal amount of increased traffic on Alpine Meadows Road relative to predicted future summer and winter conditions without the project. According to Table 9, this increase would range from 0.0 to 2.2 dB L_{dn} during summer conditions, and 0.0 to 0.2 dB L_{dn} during winter conditions.

Pursuant to the project significance criteria, a substantial increase in traffic noise levels is conservatively defined as 1.5 to 5 dB, depending on the pre-project traffic noise level. Future noise levels on SR 89 were predicted to exceed 65 dB L_{dn} at 100 feet, so the threshold of significance for that roadway would be 1.5 dB. On Alpine Meadows Road, where the future traffic noise levels without the project were

predicted to be 60 dB L_{dn} or less, the threshold of significance would be 3-5 dB L_{dn}. Because traffic noise level increases due to the project would be 2.2 dB or less, the project thresholds of significance are not exceeded, and **this impact is considered less than significant.**

Mitigation for Impact 5: *None Required.*

Cumulative Traffic Noise Levels at Proposed Residences within the Alpine Sierra Development

Impact 6: During winter conditions, Table 9 indicates that the predicted future plus project traffic noise level at a distance of 100 feet from the centerline of Alpine Meadows Road would be approximately 60 dB L_{dn}. During summer conditions, Table 9 indicates that Alpine Meadows Road traffic noise levels are approximately 12 dB L_{dn} lower than winter conditions, or approximately 48 dB Ldn. Given the distances from the proposed residences within the Alpine Sierra Development to Alpine Meadows Road, Future (cumulative plus project) traffic noise levels are predicted to be 60 dB L_{dn} or less at the exterior areas and 45 dB L_{dn} or less at interior areas of the residences constructed adjacent to Alpine Meadows Road.

The predicted traffic noise level at the exterior and interior areas of these future residences would be in compliance with the County's 60 dB L_{dn} exterior and 45 dB L_{dn} interior traffic noise level standards. As a result, this impact is considered **less than significant.**

Mitigation for Impact 6: *None Required.*

Cumulative Traffic Noise Levels at Existing Bear Creek Association Community

Impact 7: The FHWA Model, discussed in a previous section of this report, was utilized to determine the future traffic noise generated by the interior roadways (Road A) of the project upon the existing residences to the immediate north project site. The outdoor activities of the existing residences are located approximately 100 feet from the centerline of the future site access roadway, Road A. According to the project traffic study, the project will generate approximately 277 vehicle trips at the site access point over the course of a busy day. Assuming a vehicle speed of 35 mph, 277 daily trips, and a distance of 100 feet from the centerline of Road A, the FHWA Model predicts a traffic noise level of 43 dB L_{dn} at the outdoor activity areas of the nearest existing residences to the north. The predicted Road A traffic noise level at the outdoor activity areas of the nearest existing residences would be well within compliance with the Placer County transportation exterior noise criteria of 60 dB L_{dn} at the nearest existing residences. In addition, average ambient noise levels in the project area nearest to the existing homes just north of Road A were measured to be 48 dB L_{dn} during the summer monitoring period and 55 dB L_{dn} during the winter monitoring period. As a result, noise generated by new project traffic on Roadway

A will also be well below measured existing ambient noise conditions at the nearest existing residences.

The predicted future traffic noise level at the exterior and interior areas of the existing residences to the north would be in compliance with the County's 60 dB L_{dn} exterior and 45 dB L_{dn} interior traffic noise level standards. As a result, this impact is considered **less than significant.**

Mitigation for Impact 7: *None Required.*

Single Event Noise Levels at Existing Bear Creek Association Community due to Alpine Sierra Traffic on Proposed Road A & Reflection of Traffic Noise from Road A Retaining Walls.

Impact 8: Single Event and Reflected Noise from Proposed Road A

The following noise-related comment was received on the project NOP:
It's important that the noise study, in addition to CNEL (Community Noise Equivalent Level) analysis, also look at SENL (Single Event Noise Level) analysis of vehicles on the proposed access Road A connecting Alpine Sierra West and Alpine Sierra East. Reflected sound from the retaining walls of Road A can reinforce the sound (make the sound louder). Given the elevation of Road A (approx. 100 feet) above the Bear Creek Association community, sound may be direct (line of sight) and unmitigated by any geographical features. Nearest homes to Road A are only 100 feet away. During the summer, residents may have open windows, and the reinforced sound from Road A can adversely affect residential tranquility. In particular, residents have designed their homes so that their decks and bedrooms are typically not facing the road. In the proposed project, 17 homes on John Scott Trail now have the fronts of their homes facing John Scott Trail, and the rears of their homes facing Road A. The community pond may also be adversely affected by vehicle noise from Road A. Road A is relatively straight, flat and long (1500 feet), encouraging faster driving and thus more noise, and this also needs to be considered.

Proposed Road A would be elevated relative to existing residences on John Scott Trail, as noted in the comment. The elevation difference between John Scott Trail and proposed Road A is approximately 40 to 100 feet. Due to this elevated position, the Road A tire/pavement interface will not likely be visible from the nearest existing residences on John Scott Trail. Because the effective noise source height for automobiles is at the tire/pavement interface (effective noise sources for trucks is higher), and because the overwhelming majority of vehicles on proposed Road A would be automobiles, the most significant noise generating component of Road A is anticipated to be largely shielded from view of the nearest existing residents.

While the rear property line of the nearest residential lot on the south side of John Scott Trail would be 115 feet from the centerline of proposed Road A, the nearest

building façade of the nearest residence would be approximately 170 feet from the proposed Road A centerline. The distance from the nearest residences on the north side of John Scott Trail to proposed Road A will be approximately 300 feet. By comparison, the nearest building facades of residences constructed on John Scott Trail to the centerline of John Scott Trail are approximately 40 feet. Based on these differences in distance alone, noise from single-event passbys of vehicles on the existing John Scott Trail are predicted to be between 7 and 13 dB louder than single-event vehicle passbys on proposed Road A at the existing residences on John Scott Trail.

Regarding reflections of sound off of the proposed Road A retaining walls back in the direction of existing residences on John Scott Trail, the following analysis is provided:

- The angle of sound reflection off of a barrier is equal to the angle of incidence. As a result, tire noise would impact the proposed retaining wall horizontally and would be reflected in the opposite direction horizontally. Because the elevation of the residential building pads on John Scott Trail are between 40 and 100 feet below the elevation of proposed Road A, any reflected sound would essentially pass above those residences.

- Sound impacting a perfectly reflective surface essentially results in a doubling of sound energy, provided the source of the sound is very close to the reflective surface (as would be the case with the proposed retaining walls). A doubling of sound energy results in a 3 dB increase in noise levels. Therefore, assuming the retaining wall is perfectly reflective, a 3 dB increase in sound levels would result. However, it is unlikely that the retaining wall would be perfectly smooth and 100% reflective. Therefore, reflected sound from the proposed retaining wall back in the northerly direction would be less than 3 dB.

- As noted previously, the elevation difference between Road A and the residences on John Scott Trail is such that reflected sound would essentially be directed above those residences. Even with perfect reflection of sound in the direction of those residences, which is a physical impossibility, single-event passages of vehicles on Road A would still be approximately 4-10 dB lower than sound already generated by single-event passages of vehicles on John Scott Trail at the existing residences along that roadway.

- Even with a perfect, unshielded, reflection of sound from the retaining walls, the predicted Road A traffic noise level at the outdoor activity areas of the nearest existing residences on John Scott Trail would be approximately 46 dB L_{dn} (see Impact 6). This level is well

within compliance with the Placer County transportation exterior noise criteria of 60 dB L_{dn} at the nearest existing residences. In addition, average ambient noise levels in the project area nearest to the existing homes just north of Road A were measured to be 48 dB L_{dn} during the summer monitoring period and 55 dB L_{dn} during the winter monitoring period. As a result, noise generated by new project traffic on Roadway A will also be well below measured existing ambient noise conditions at the nearest existing residences, even after consideration of worst-case reflection of sound from the proposed retaining walls.

Based on the analysis cited above, noise impacts associated with single-event passbys of vehicles on proposed Road A, including reflection of Road A noise levels from proposed retaining walls, are predicted to be **Less than Significant**.

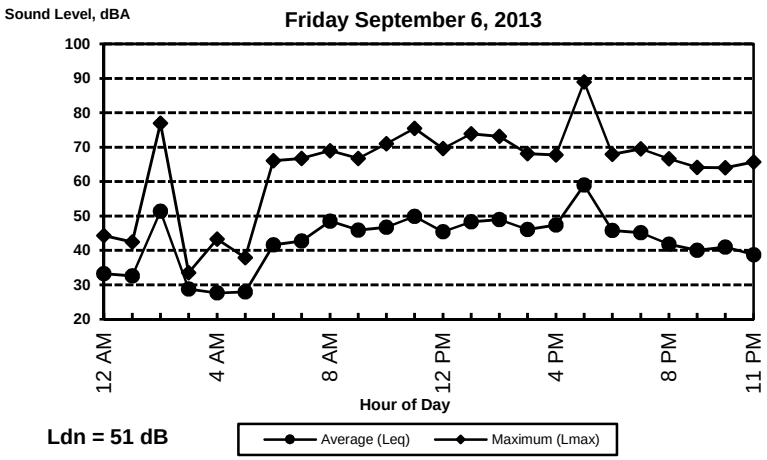
Mitigation for Impact 8: *None Required.*

Appendix A

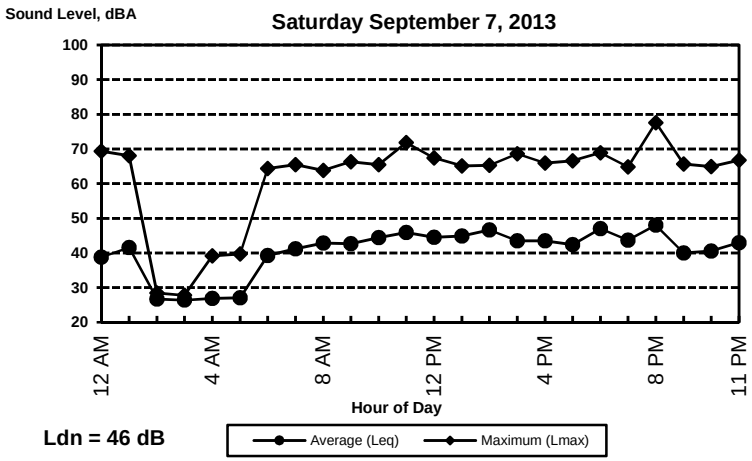
Acoustical Terminology

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.

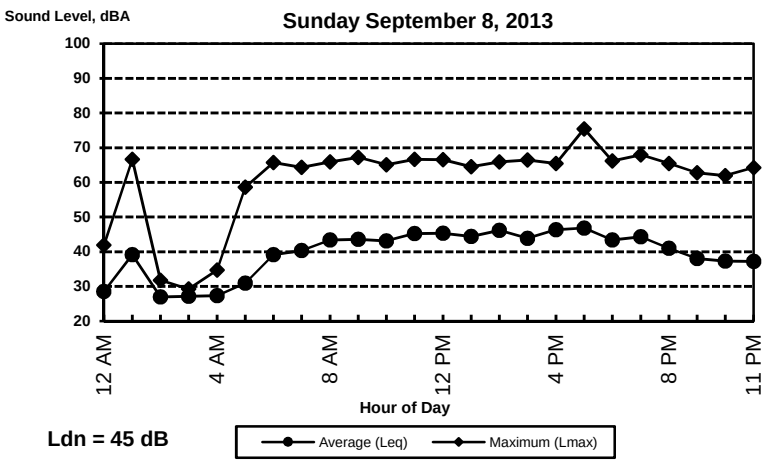
Appendix B-1
Alpine Sierra Subdivision EIR - Placer County, California
Site 1 - September 6-9, 2013



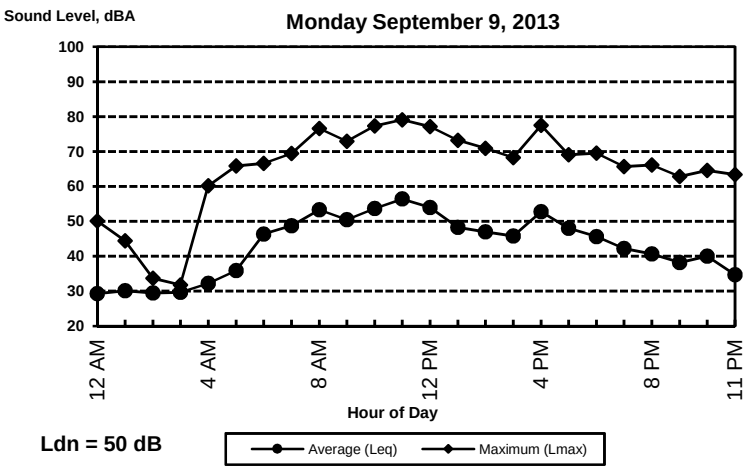
Ldn = 51 dB



Ldn = 46 dB



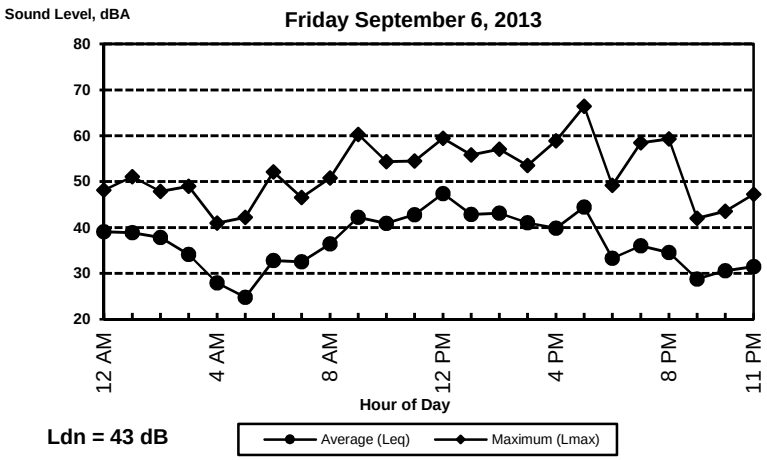
Ldn = 45 dB



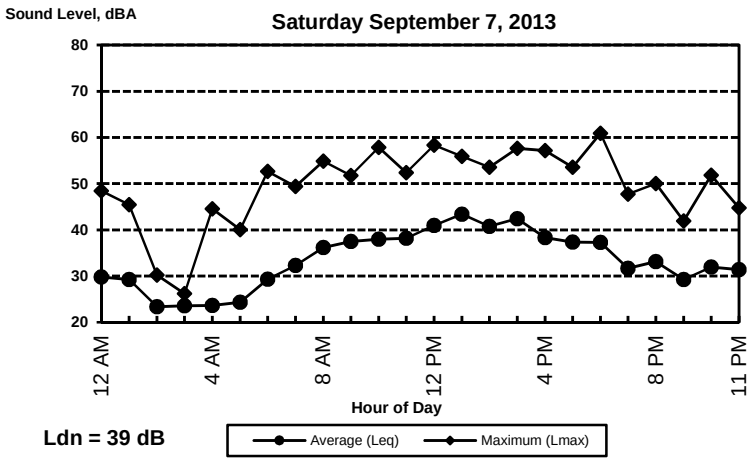
Ldn = 50 dB

BOLLARD
Acoustical Consultants

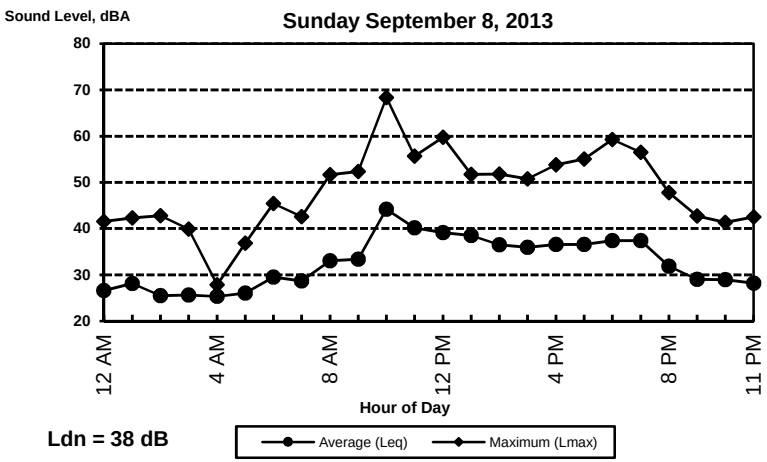
Appendix B-2
Alpine Sierra Subdivision EIR - Placer County, California
Site 2 - September 6-9, 2013



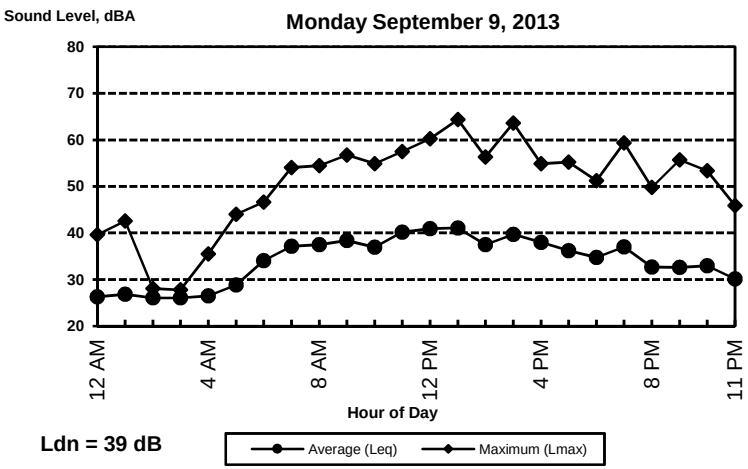
Ldn = 43 dB



Ldn = 39 dB



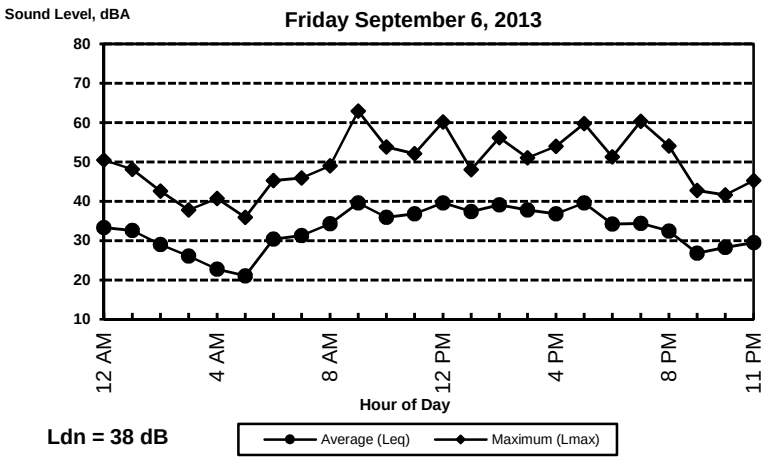
Ldn = 38 dB



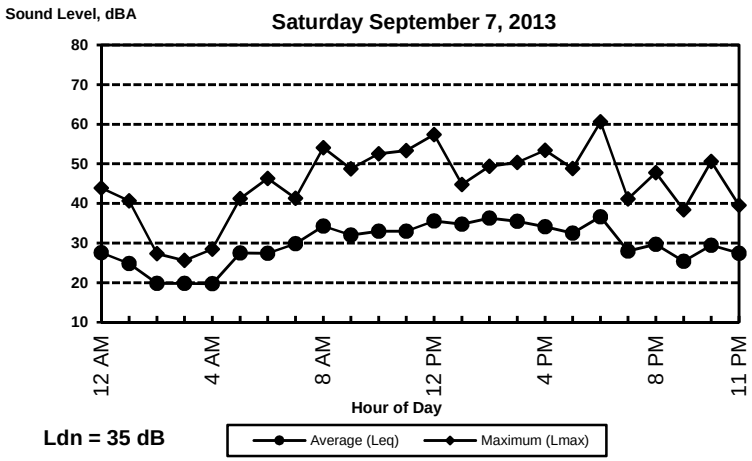
Ldn = 39 dB

BOLLARD
Acoustical Consultants

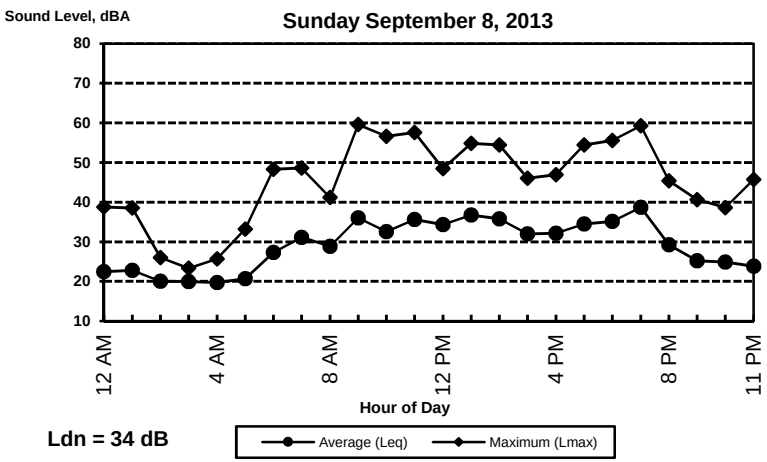
Appendix B-3
Alpine Sierra Subdivision EIR - Placer County, California
Site 3 - September 6-9, 2013



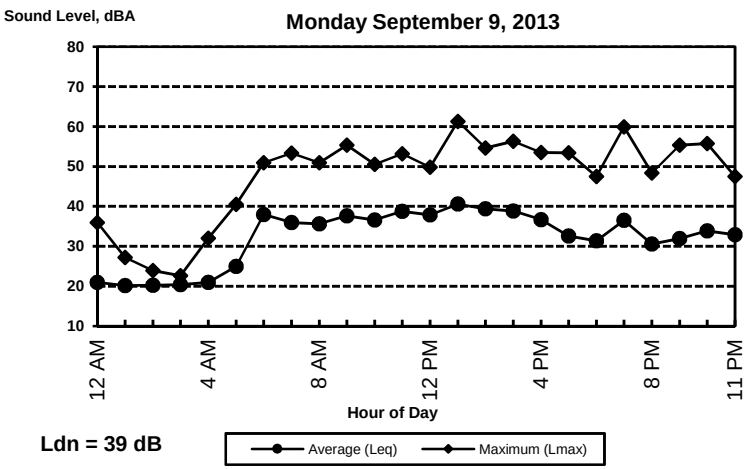
Ldn = 38 dB



Ldn = 35 dB



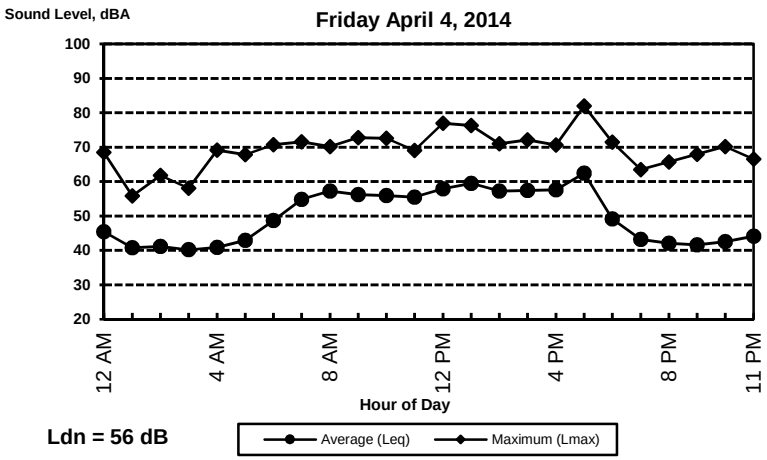
Ldn = 34 dB



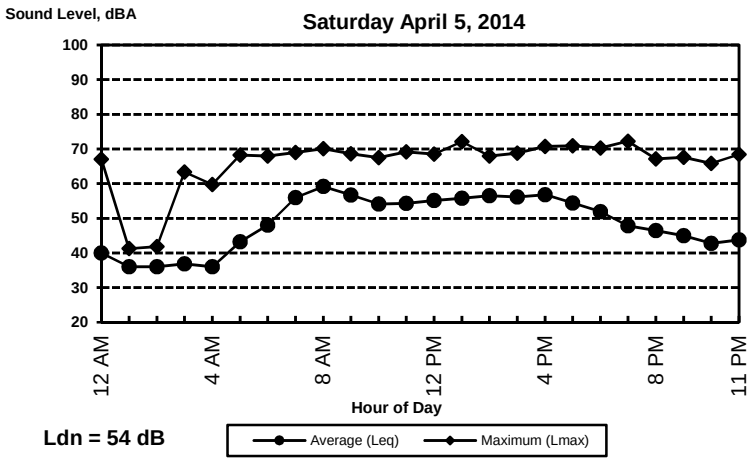
Ldn = 39 dB

BOLLARD
Acoustical Consultants

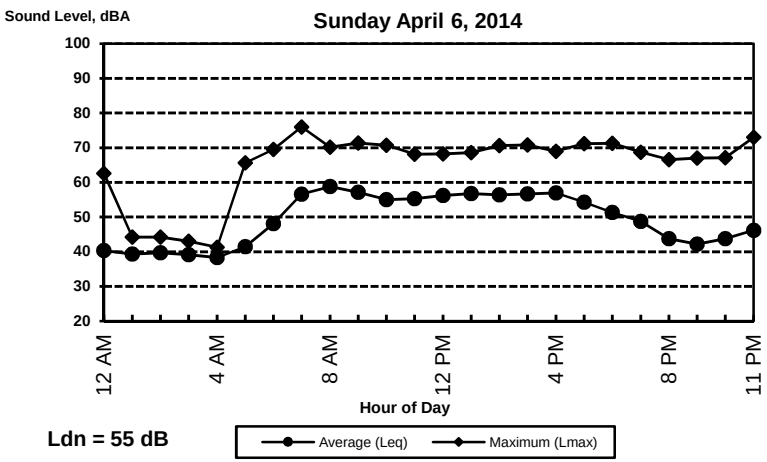
Appendix B-4
Alpine Sierra Subdivision EIR - Placer County, California
Site 1 - April 4-7, 2014



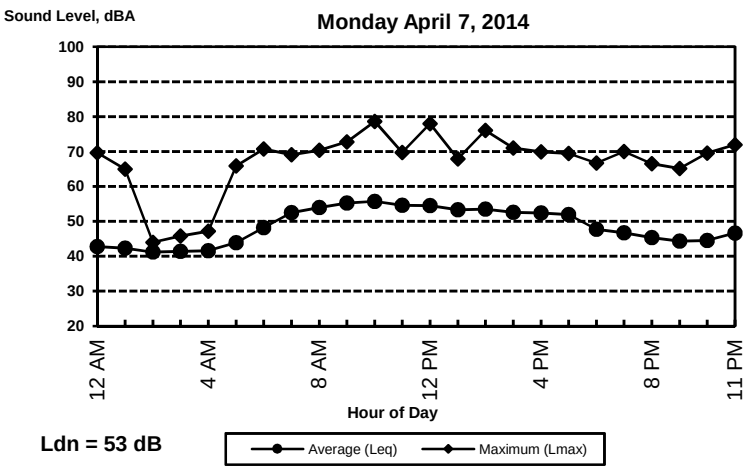
Ldn = 56 dB



Ldn = 54 dB



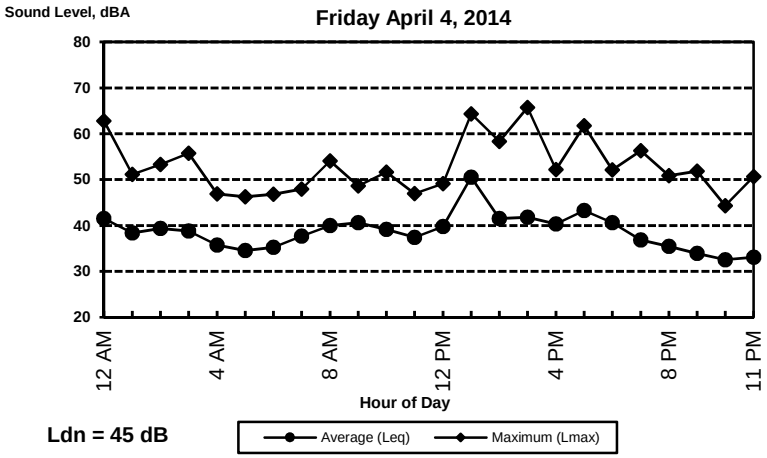
Ldn = 55 dB



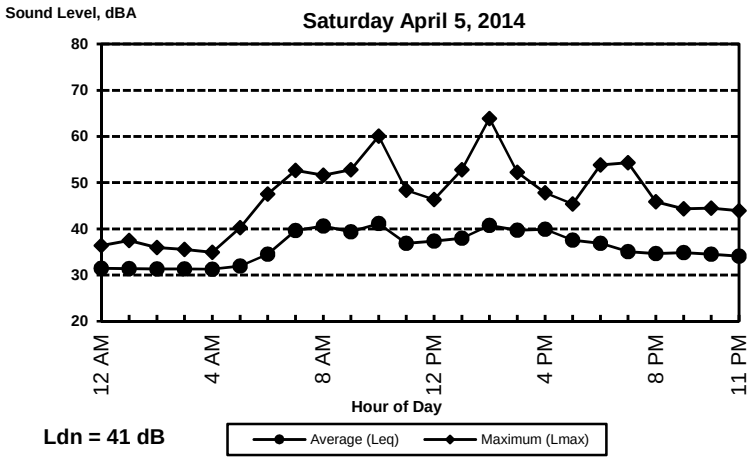
Ldn = 53 dB

BOLLARD
Acoustical Consultants

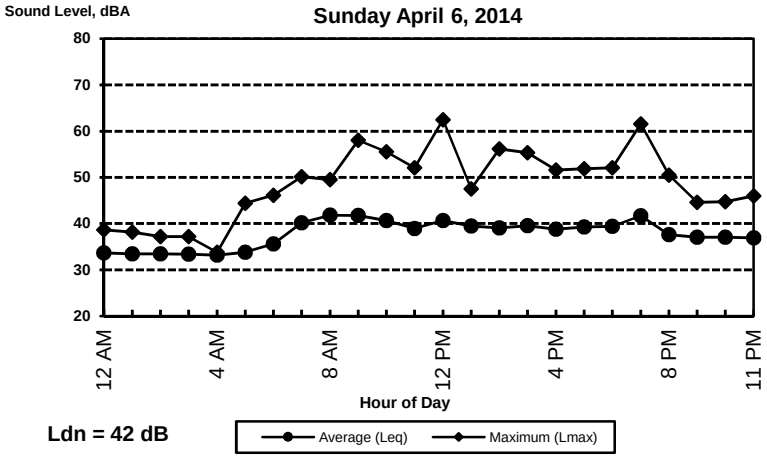
Appendix B-5
Alpine Sierra Subdivision EIR - Placer County, California
Site 2 - April 4-7, 2014



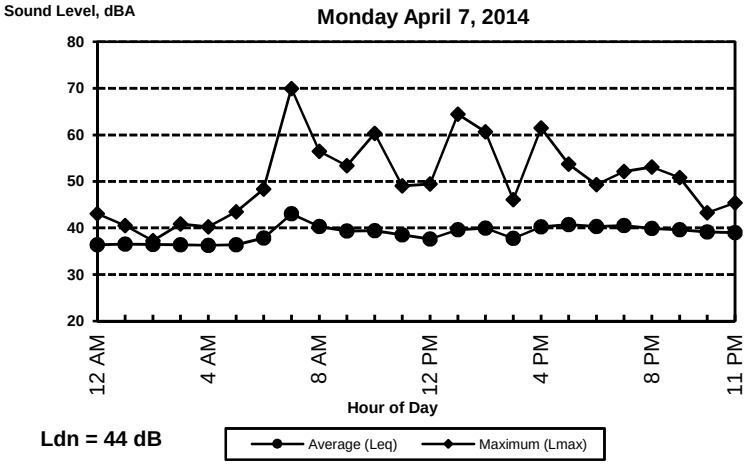
Ldn = 45 dB



Ldn = 41 dB



Ldn = 42 dB



Ldn = 44 dB

BOLLARD
Acoustical Consultants

Appendix C-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	15,110	83		17	5	2	45	100	
2		South	13,410	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	7,140	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	5,810	83		17	2	1	40	100	
6		South	5,810	83		17	2	1	40	100	
7		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix C-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	14,200	83		17	5	2	45	100	
2		South	14,430	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	2,510	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	370	83		17	2	1	40	100	
6		South	370	83		17	2	1	40	100	
7		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix C-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing Plus Project (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	15,190	83		17	5	2	45	100	
2		South	13,470	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	7,280	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	5,950	83		17	2	1	40	100	
6		South	5,940	83		17	2	1	40	100	
7		East	270	83		17	1	1	35	100	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix C-4

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing Plus Project (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	14,340	83		17	5	2	45	100	
2		South	14,550	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	2,770	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	640	83		17	2	1	40	100	
6		South	370	83		17	2	1	40	100	
7		East	270	83		17	1	1	35	100	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix C-5

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	17,820	83		17	5	2	45	100	
2		South	15,900	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	8,060	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	6,550	83		17	2	1	40	100	
6		South	6,550	83		17	2	1	40	100	
7		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix C-6

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	16,950	83		17	5	2	45	100	
2		South	17,220	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	2,830	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	420	83		17	2	1	40	100	
6		South	420	83		17	2	1	40	100	
7		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix C-7

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future Plus Project (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	17,900	83		17	5	2	45	100	
2		South	15,960	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	8,200	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	6,690	83		17	2	1	40	100	
6		South	6,680	83		17	2	1	40	100	
7		East	270	83		17	1	1	35	100	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix C-8

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future Plus Project (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	SR 89 & Alpine Meadows Road	North	17,090	83		17	5	2	45	100	
2		South	17,340	83		17	5	2	45	100	
3		East	0	n/a		n/a	n/a	n/a	n/a	n/a	
4		West	3,090	83		17	2	1	40	100	
5	Alpine Meadows Road & Site Access	North	690	83		17	2	1	40	100	
6		South	420	83		17	2	1	40	100	
7		East	270	83		17	1	1	35	100	
8		West	0	n/a		n/a	n/a	n/a	n/a	n/a	

BOLLARD
Acoustical Consultants

Appendix D-1

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	63.4	59.0	59.5	65.9
2		South	62.9	58.4	59.0	65.4
3		East	n/a	n/a	n/a	n/a
4		West	58.9	50.9	52.7	60.3
5	Alpine Meadows Road & Site Access	North	58.0	50.0	51.9	59.4
6		South	58.0	50.0	51.9	59.4
7		East	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix D-2

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	63.1	58.7	59.2	65.6
2		South	63.2	58.8	59.3	65.7
3		East	n/a	n/a	n/a	n/a
4		West	54.3	46.4	48.2	55.8
5	Alpine Meadows Road & Site Access	North	46.0	38.1	39.9	47.5
6		South	46.0	38.1	39.9	47.5
7		East	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix D-3

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing Plus Project (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	63.4	59.0	59.5	65.9
2		South	62.9	58.5	59.0	65.4
3		East	n/a	n/a	n/a	n/a
4		West	58.9	51.0	52.8	60.4
5	Alpine Meadows Road & Site Access	North	58.1	50.1	52.0	59.6
6		South	58.1	50.1	51.9	59.5
7		East	43.0	32.8	38.0	44.5
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix D-4

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing Plus Project (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	63.2	58.7	59.3	65.6
2		South	63.2	58.8	59.3	65.7
3		East	n/a	n/a	n/a	n/a
4		West	54.8	46.8	48.6	56.2
5	Alpine Meadows Road & Site Access	North	48.4	40.5	42.3	49.9
6		South	46.0	38.1	39.9	47.5
7		East	43.0	32.8	38.0	44.5
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix D-5

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	64.1	59.7	60.2	66.6
2		South	63.6	59.2	59.7	66.1
3		East	n/a	n/a	n/a	n/a
4		West	59.4	51.5	53.3	60.9
5	Alpine Meadows Road & Site Access	North	58.5	50.6	52.4	60.0
6		South	58.5	50.6	52.4	60.0
7		East	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix D-6

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	63.9	59.5	60.0	66.4
2		South	64.0	59.5	60.1	66.4
3		East	n/a	n/a	n/a	n/a
4		West	54.8	46.9	48.7	56.3
5	Alpine Meadows Road & Site Access	North	46.6	38.6	40.4	48.0
6		South	46.6	38.6	40.4	48.0
7		East	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix D-7

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future Plus Project (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	64.1	59.7	60.2	66.6
2		South	63.6	59.2	59.7	66.1
3		East	n/a	n/a	n/a	n/a
4		West	59.5	51.5	53.3	60.9
5	Alpine Meadows Road & Site Access	North	58.6	50.6	52.5	60.1
6		South	58.6	50.6	52.5	60.1
7		East	43.0	32.8	38.0	44.5
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix D-8

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future Plus Project (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Intersection	Direction	Autos	Medium Trucks	Heavy Trucks	Total
1	SR 89 & Alpine Meadows Road	North	63.9	59.5	60.0	66.4
2		South	64.0	59.6	60.1	66.5
3		East	n/a	n/a	n/a	n/a
4		West	55.2	47.3	49.1	56.7
5	Alpine Meadows Road & Site Access	North	48.7	40.8	42.6	50.2
6		South	46.6	38.6	40.4	48.0
7		East	43.0	32.8	38.0	44.5
8		West	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-1

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	25	53	114	246	531
2		South	23	49	106	228	490
3		East	n/a	n/a	n/a	n/a	n/a
4		West	11	23	49	105	227
5	Alpine Meadows Road & Site Access	North	9	20	43	92	198
6		South	9	20	43	92	198
7		East	n/a	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-2

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	24	51	110	236	509
2		South	24	51	111	239	515
3		East	n/a	n/a	n/a	n/a	n/a
4		West	5	11	24	52	113
5	Alpine Meadows Road & Site Access	North	1	3	7	15	32
6		South	1	3	7	15	32
7		East	n/a	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-3

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing Plus Project (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	25	53	115	247	533
2		South	23	49	106	228	492
3		East	n/a	n/a	n/a	n/a	n/a
4		West	11	23	50	107	230
5	Alpine Meadows Road & Site Access	North	9	20	43	93	201
6		South	9	20	43	93	201
7		East	1	2	4	9	20
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-4

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Existing Plus Project (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	24	51	110	238	513
2		South	24	52	112	240	518
3		East	n/a	n/a	n/a	n/a	n/a
4		West	6	12	26	56	121
5	Alpine Meadows Road & Site Access	North	2	5	10	21	45
6		South	1	3	7	15	32
7		East	1	2	4	9	20
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-5

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	28	59	128	275	593
2		South	25	55	118	255	549
3		East	n/a	n/a	n/a	n/a	n/a
4		West	11	25	53	114	246
5	Alpine Meadows Road & Site Access	North	10	21	46	100	214
6		South	10	21	46	100	214
7		East	n/a	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-6

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	27	57	123	266	573
2		South	27	58	125	269	579
3		East	n/a	n/a	n/a	n/a	n/a
4		West	6	12	26	57	123
5	Alpine Meadows Road & Site Access	North	2	3	7	16	34
6		South	2	3	7	16	34
7		East	n/a	n/a	n/a	n/a	n/a
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-7

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future Plus Project (Winter)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	28	59	128	276	594
2		South	26	55	119	256	551
3		East	n/a	n/a	n/a	n/a	n/a
4		West	12	25	54	116	249
5	Alpine Meadows Road & Site Access	North	10	22	47	101	217
6		South	10	22	47	101	217
7		East	1	2	4	9	20
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants

Appendix E-8

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

Project #: 2012-064 Alpine Sierra Subdivision EIR
Description: Future Plus Project (Summer)
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------ Distances to Traffic Noise Contours ------				
Segment	Intersection	Direction	75	70	65	60	55
1	SR 89 & Alpine Meadows Road	North	27	58	124	268	576
2		South	27	58	125	270	582
3		East	n/a	n/a	n/a	n/a	n/a
4		West	6	13	28	60	130
5	Alpine Meadows Road & Site Access	North	2	5	10	22	48
6		South	2	3	7	16	34
7		East	1	2	4	9	20
8		West	n/a	n/a	n/a	n/a	n/a

BOLLARD
Acoustical Consultants