Hat Creek Materials Facility Expansion
Revised Environmental Noise Analysis

Lassen County, California

March 12, 2019

jcb Project # 2018-117 / 2019-109

Prepared for:

VESTRA

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INTRODUCTION

This report describes the existing noise environment in the area of the proposed Hat Creek Materials Facility Expansion Project (HCMFEP). In addition, this report provides an analysis for the potential of the proposed project to generate noise levels exceeding generally accepted exterior noise level standards at noise-sensitive receptors in the project area. Figure 1 shows the location of the project site. Figure 2 shows the project site layout.

The Hat Creek Materials Facility Expansion Project will consist of expanding the existing number of hours per day to 24-hour operations. A current typical day of operations includes 32 material hauling trucks (16 in and 16 out). Peak operations which occur infrequently include up to 700 material hauling trucks (350 in and 350 out) per day.

Existing Project Operations:

The project is an existing quarry which is located east of Ward Lake Road, and north of Center Road in Lassen County. The project includes a materials excavation and crushing operation, recycled asphalt and concrete crushing, and an asphalt batch plant. The current operating hours are from 6;00 a.m. to 6:00 p.m., although during data collection on May 3rd and 4th, 2018, two shifts were operating from 6:00 a.m. to midnight. As stated earlier, at times the current operations do include peak operations of 700 one-way truck trips during the daytime hours. The primary noise sources associated with the existing operations include the following:

- Cement Batch Plant;
- Excavation and Crushing Operations (this includes mobile equipment associated with the operations);
- Cement and Asphalt Batch Plants;
- Truck Traffic to and from the Site on area roadways.

Existing Adjacent Land Uses:

Adjacent uses generally include farm land with single family residential units adjacent to Ward Lake Road. Other land uses to the north, east and west of the site is generally open and undeveloped land, which is primarily BLM property.

ENVIRONMENTAL SETTING

BACKGROUND INFORMATION ON NOISE

Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

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), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this 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, and changes in levels (dB) correspond closely to human perception of relative loudness.

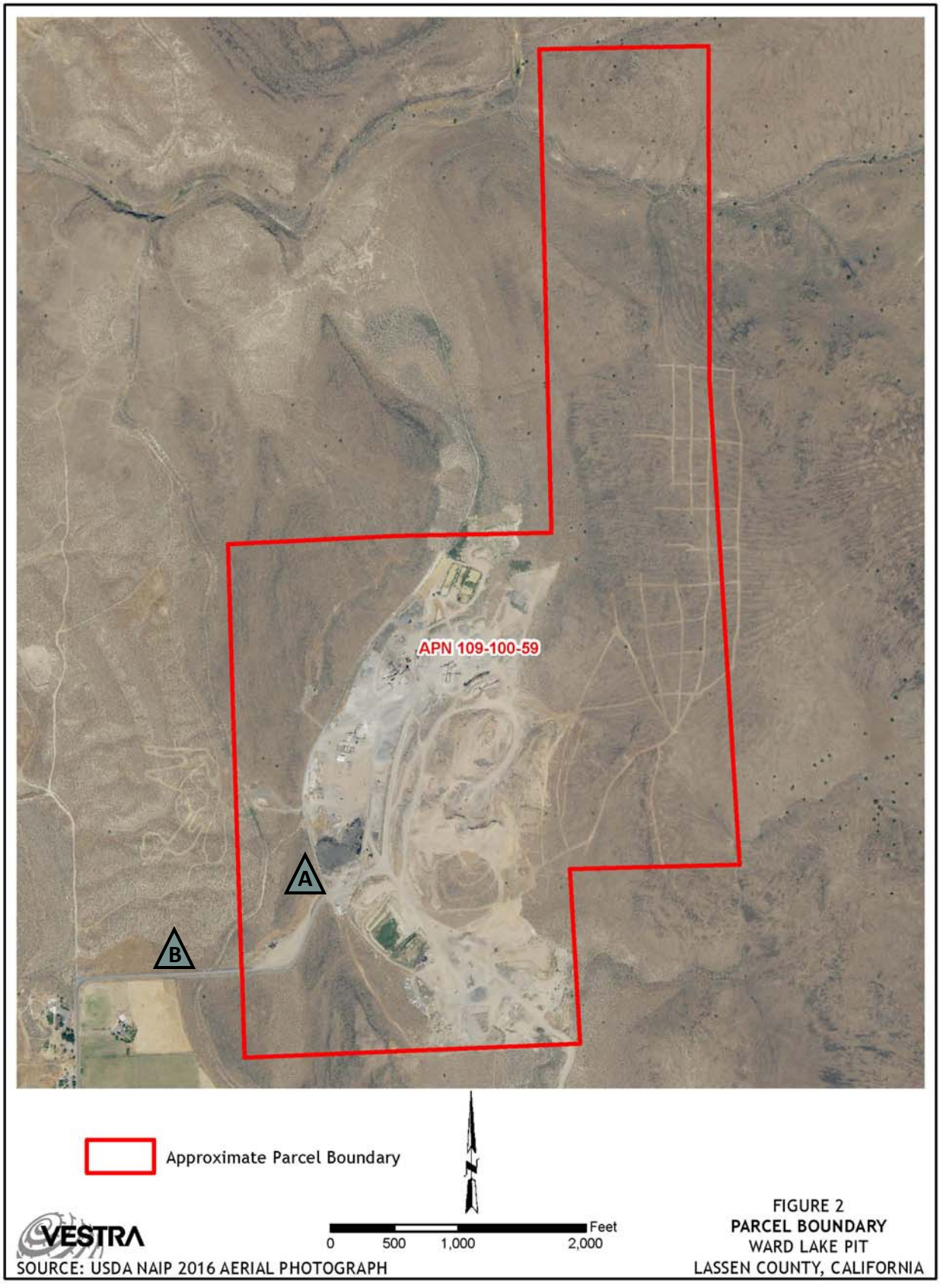
The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

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 environment. A common statistical tool 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 of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of the noise levels associated with common situations. Appendix A provides a summary of acoustical terms used in this report.



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Legend

X : Continuous Noise Measurement Site

Figure 1
Project Boundary / Location
& Noise Measurement Sites

j.c. brennan & associates
consultants in acoustics

Date:
6/15/18

Figure 2
Project Site Layout

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Date:
6/15/18

TABLE 1
TYPICAL NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. November, 20013.

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING CONDITIONS

EXISTING AMBIENT NOISE LEVELS

To quantify the existing ambient noise environment in the project vicinity due to existing operations, j.c. brennan & associates Inc. conducted continuous hourly noise level measurements for a 24-hour period at two locations. One location was on the project site, and adjacent to the entrance near the office building. The other site was adjacent to Ward Lake Road. The noise level measurements were conducted on Thursday May 3rd - Friday May 4th, 2018.

Noise measurement locations are shown on Figure 1. A summary of the noise level measurement survey results are provided in Table 2. Appendix B contains the complete results of the continuous (24-hr) noise monitoring.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted Lmax, represents the highest noise level measured. The average value, denoted Leq, represents the energy average of all of the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L50, represents the sound level exceeded 50 percent of the time during the monitoring period. In addition, the composite 24-hour average noise level (Ldn) was also calculated from the hourly Leq values. The calculated Ldn for each day applies a +10 dBA penalty to all noise which occurs during the nighttime period, which is defined as the hours between 10:00 p.m. and 7:00 a.m.

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after 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 for Type 1 sound level meters (ANSI S1.4).

Table 2
Summary of Existing Continuous Background Noise Measurement Data

MAY 3RD - 4TH, 2018

Site	Ldn	Average Measured Hourly Noise Levels					
		Daytime (7am-10pm)			Nighttime (10pm-7am)		
Site A -Entrance to the Site and Approximately 215-feet from the Scales, and 1,160-feet from the Concrete Plant, and 1,875-feet from the crushing plant	53.5 dBA	Leq	L50	Lmax	Leq	L50	Lmax
		49.4 dBA	39.0 dBA	65.8 dBA	46.5 dBA	33.1 dBA	56.3 dBA
		L2	L8	L25	L2	L8	L25
		47.8 dBA	45.1 dBA	41.9 dBA	40.7 dBA	38.7 dBA	35.9 dBA
Site B - 35-feet from the Ward Lake Road centerline	55.6 dBA	Leq	L50	Lmax	Leq	L50	Lmax
		54.6 dBA	32.7 dBA	78.7 dBA	46.9 dBA	26.8 dBA	68.0 dBA
		L2	L8	L25	L2	L8	L25
		54.6 dBA	42.1 dBA	35.9 dBA	41.5 dBA	34.3 dBA	29.4 dBA

Source: j.c. brennan & associates, Inc., 2018.

EXISTING HAT CREEK MATERIALS FACILITY PLANT OPERATIONS NOISE LEVELS

On May 3rd, 2018, j.c. brennan & associates, Inc. staff conducted noise measurements and observations of the Hat Creek Materials individual operations. The noise measurements were conducted with a Larson Davis Laboratories (LDL) Model 824 precision integrating sound level meter, which was equipped with 1/3 octave and 1/1 octave band filters. The equipment was calibrated prior to, and after the measurements with an LDL Model 200 acoustical calibrator to ensure accuracy of the measurement.. Octave band data was collected, including the hourly average and maximum noise levels. Statistical noise levels were not collected for each individual piece of equipment. It was determined that the overall noise levels collected at Site B, as shown in Table 2 would provide the overall statistical noise levels for the overall operations. Table 3 shows

the results of the individual operations noise measurements. Frequency data was not provided in this report since the noise level standards are based upon A-weighted overall noise levels.

Table 3
Hat Creek Individual Operations Noise Levels

Operation	Location	Sound Level		Source	Photo
		Leq	Lmax		
Sand Plant	**100-feet**	**66.6 dBA**	**74.8 dBA**	**Loader**	
Cement Plant	**100-feet**	**67.7 dBA**	**87.6 dBA**	**Trucks - Plant ops**	
Crushing Ops	**200-feet**	**85.6 dBA**	**88.7 dBA**	**Crushers - Loaders**	
Asphalt Plant	**Center of Site 50-feet from**	**85.6 dBA**	**87.5 dBA**	**Plant - Diesel Generator**	

Table 3
Hat Creek Individual Operations Noise Levels

	Burner **40-feet from Generator**				 

Source: j.c. brennan & associates, Inc., 2018

EXISTING TRAFFIC NOISE LEVELS

To describe existing 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 Leq values for free-flowing traffic conditions. Traffic volumes for existing conditions were obtained from the project traffic consultant. The traffic noise analysis contains the following assumptions:

- Baseline traffic includes an average of 32 one way truck trips per day, which are evenly distributed from 6:00 a.m. to 7:00 p.m.;
- The distribution of truck trips on a typical day (Existing) includes 40 percent traveling east on Center Road, and 60 percent traveling west on Center Road;
- During peak operations, there are up to 700 one way truck trips per day, which are evenly distributed from 6:00 a.m. to 7:00 p.m., with the same trip distribution shown above.

The analysis contained in Table 4 includes the overall 24-hour Ldn, the daytime peak hour, and the nighttime peak hour. Existing traffic noise levels are summarized in Table 4. Appendix C shows the inputs to the FHWA Model.

TABLE 4
PREDICTED EXISTING TRAFFIC NOISE LEVELS

Roadway	Location	Traffic Noise Level @ 75'*	Distance to Noise Contours	
			55 dBA	60 dBA
Traffic Noise Levels During an Average Day with 32 one-way truck trips (6:00 a.m. to 7:00 p.m.)				
Ward Lake Road	Entire Length	48.3 dBA Ldn	23-feet	10-feet
Center Road	West of Ward Lake	51.4 dBA Ldn	43-feet	20-feet
Center Road	East of Ward Lake	48.7 dBA Ldn	28-feet	13-feet
Center Road	East of Cutoff Road	48.3 dBA Ldn	27-feet	12-feet
Traffic Noise Levels During Peak Times with 700 one-way daily truck trips (6:00 a.m. to 7:00 p.m.)				
Ward Lake Road	Entire Length	60.1 dBA Ldn	134-feet	62-feet
Center Road	West of Ward Lake	57.9 dBA Ldn	108-feet	50-feet
Center Road	East of Ward Lake	55.1 dBA Ldn	71-feet	33-feet
Center Road	East of Cutoff Road	55.3 dBA Ldn	71-feet	33-feet
Traffic Noise Levels During an Average Day (Peak Hour Daytime Leq)				
Ward Lake Road	Entire Length	46.1 dBA Leq	19-feet	9-feet
Center Road	West of Ward Lake	52.2 dBA Leq	48-feet	22-feet
Center Road	East of Ward Lake	50.2 dBA Leq	35-feet	16-feet
Center Road	East of Cutoff Road	49.7 dBA Leq	33-feet	15-feet
Traffic Noise Levels During Peak Times (Peak Hour Daytime Leq)				
Ward Lake Road	Entire Length	61.8 dBA Leq	166-feet	77-feet
Center Road	West of Ward Lake	60.0 dBA Leq	145-feet	68-feet
Center Road	East of Ward Lake	57.1 dBA Leq	96-feet	44-feet
Center Road	East of Cutoff Road	57.3 dBA Leq	95-feet	44-feet
Traffic Noise Levels During an Average Day (Peak Hour Nighttime Leq)				
Ward Lake Road	Entire Length	45.7 dBA Leq	18-feet	8-feet
Center Road	West of Ward Lake	48.3 dBA Leq	27-feet	12-feet
Center Road	East of Ward Lake	48.3 dBA Leq	27-feet	12-feet
Center Road	East of Cutoff Road	46.9 dBA Leq	22-feet	10-feet
Traffic Noise Levels During Peak Times (Peak Hour Nighttime Leq)				
Ward Lake Road	Entire Length	45.7 dBA Leq	18-feet	8-feet
Center Road	West of Ward Lake	48.3 dBA Leq	27-feet	12-feet
Center Road	East of Ward Lake	48.3 dBA Leq	27-feet	12-feet
Center Road	East of Cutoff Road	46.9 dBA Leq	22-feet	10-feet

Sources: j.c. brennan & associates, Inc., and FHWA RD-77-108
***** - Roadway noise levels are calculated from the roadway centerline

Materials Facility On-Site Operations Noise Levels at the Nearest Residences

On-site operations associated with Materials Facility on-site activities are generally represented by the measured hourly L50 values. During the daytime, the measured hourly background L50 noise levels due to on-site activities ranged between 27 dBA and 44 dBA at Site B, which represents the nearest residence. The average measured hourly L50 value was 33 dBA at Site B.

During the nighttime hours, the Materials Facility on-site operations resulted in measured

background L50 noise levels ranging from 28 dBA to 45 dBA at Site B, while the plant was operating, which represents the nearest residence. (During the noise measurements, the plant operated during the nighttime hours until approximately 12:00 a.m. to 1:00 a.m.). The noisiest hours occurred during the start-up of operations between the hours of 6:00 a.m. and 8:00 a.m. Otherwise plant operations were represented by the average measured L50 value of 33 dBA.

The noisiest operations associated with the materials facility on-site facilities are the crushing operations, and the asphalt plant operations.

Overall Measured Background Noise Levels

The overall measured background hourly noise levels at Site B, which represents the nearest residence, ranged between 39 dBA and 61 dBA Leq. This included all background noise sources, including the roadway traffic, Materials Facility on-site operations, aircraft overflights, and neighborhood activities.

The measured 24-hour Ldn at Site B was 55.6 dBA.

Maximum noise levels experienced at the nearest residences are due to truck traffic along Ward Lake Road. Based upon signage at one residence along Ward Lake Road, there is concern about the use of engine brakes (jake brakes) from trucks descending the grade as they exit the site.

REGULATORY CONTEXT

LASSEN COUNTY GENERAL PLAN NOISE LEVEL CRITERIA

Lassen County's General Plan Noise element includes noise level policies for land use compatibility. The following summarizes the policies and criteria applicable to the proposed project:

Goal: The overall goals of the Lassen County Noise Element are to protect the citizens of Lassen County from the harmful and annoying effects of exposure to excessive noise, and to protect the economic base of Lassen County by preventing the encroachment of incompatible land uses within areas affected by existing noise-producing uses.

Objectives: The general objectives of the Lassen County Noise Element are to:

1. *Develop and adopt specific policies and an effective implementation program to abate and avoid excessive noise exposures in the county by requiring that effective noise mitigation measures be incorporated into the design of new noise-generating and new noise- sensitive land uses.*

2. *Provide sufficient noise exposure information so that existing and potential noise impacts may be effectively addressed in the land use planning and project review processes.*

3. *Protect areas within the county where the present noise environment is within acceptable limits.*

Implementation

Policy 1: Noise created by locally-regulated noise sources associated with new projects or

developments shall be controlled so as not to exceed the noise level standards as set forth below as measured at any affected residentially designated lands or land use situated in either the incorporated or unincorporated areas. New residential development shall not be allowed where the ambient noise level due to locally-regulated noise sources will exceed the noise level standards as set forth below [Table 5 of this report]. These standards do not apply to residential units established in conjunction with industrial or commercial uses.

Policy 2: The compatibility of proposed projects with existing and future noise levels due to traffic on public roadways, railroad line operations and aircraft in flight shall be evaluated by comparison to [Figure 3 of this report].

Policy 3: Areas within Lassen County shall be defined as noise-impacted if exposed to existing or projected exterior noise levels exceeding either 60 dB L_{dn}/CNEL or the performance standards of Table 5 of this report.

Policy 8: Noise produced by industrial uses shall not exceed 70 dB Ldn at the nearest property line.

Table 5
Lassen County General Plan Noise Level Performance Standards for New Projects and Developments

		Exterior Noise Level Standard, dBA		
Category	Cumulative Number of Minutes in Any One-Hour Time Period	Interpretation	Daytime (7:00 a.m. – 10:00 p.m.)	Nighttime (10:00 p.m. – 7:00 a.m.)
1	30	L50	50	40
2	15	L25	55	45
3	5	L8	60	50
4	1	L1.5	65	55
5	0	Lmax	70	60
Each of the noise level standards specified above shall be reduced by 5 dBA for simple tone noise sources, noises consisting primarily of speech or music, or for recurring impulsive noises.				

DETERMINATION OF A SIGNIFICANT INCREASE IN NOISE LEVELS

California Environmental Quality Act (CEQA) guidelines define a significant impact of a project if it "increases substantially the ambient noise levels for adjoining areas." Table 6 is based upon recommendations made in August 1992 by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon 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}.

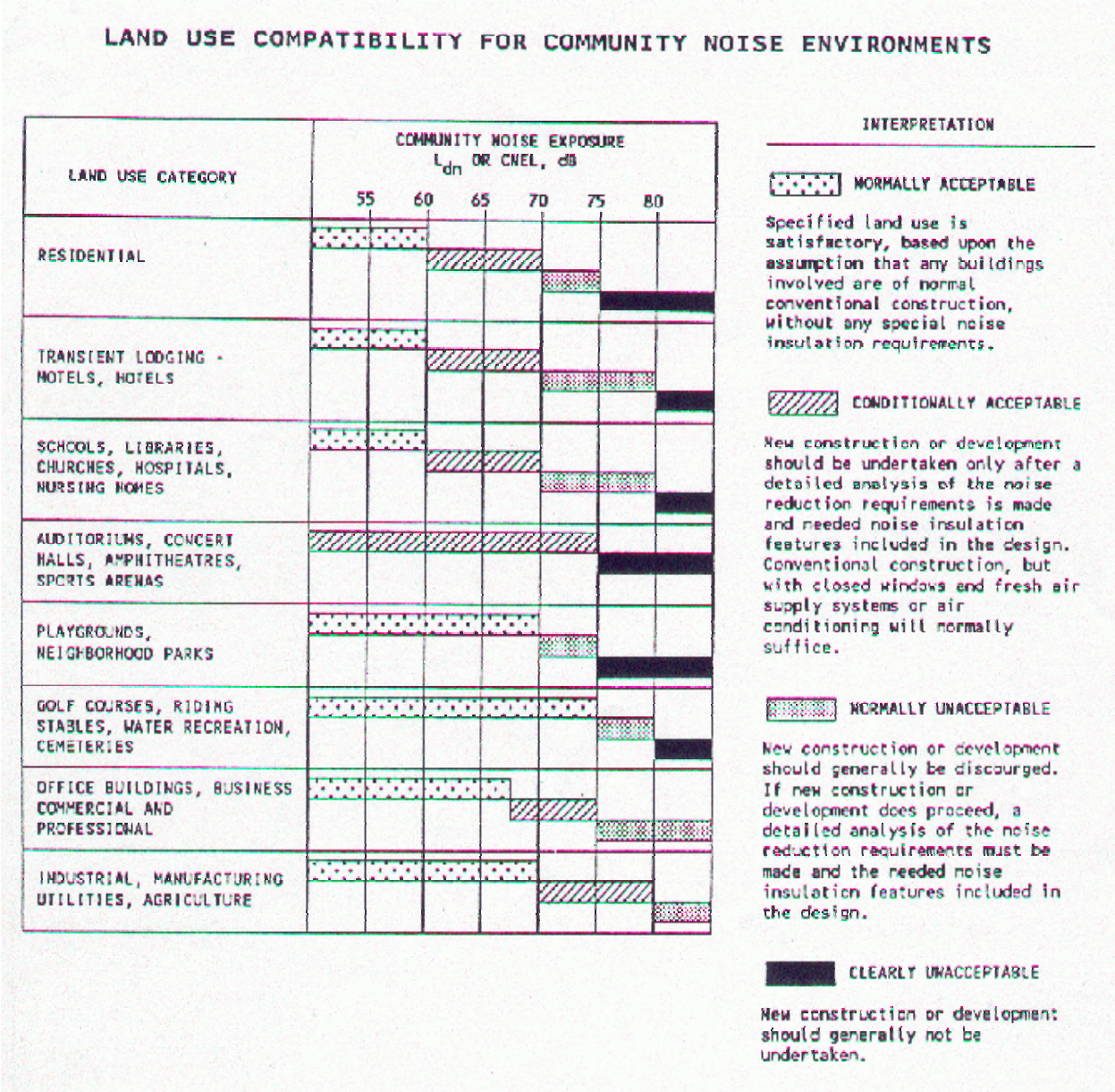
Based upon the Table 6 criteria, an increase in the traffic noise level of 1.5 dB or more would be significant where the ambient noise level exceeds 65 dB L_{dn}. The rationale for the Table 3 criteria is that, as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause significant annoyance.

Table 6
Determination of a Significant Increase in Noise Levels

Ambient Noise Level Without Project, L_{dn}/CNEL	Increase Required for Significant Impact
<60 dBA	+5.0 dB or more
60-65 dBA	+3.0 dB or more
>65 dBA	+1.5 dB or more

Source: FICON, August 1992.

Figure 3



Source: Lassen County General Plan

STANDARDS OF SIGNIFICANCE

CEQA Guidelines define a significant adverse impact on the environment as an impact that would:

a. Exposure of persons to or generation of noise levels in excess of standards established in the Lassen County General Plan. Specifically, exterior noise levels exceeding 60 dBA Ldn, or the performance standards contained in Table 5.

b. Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels. Specifically, a threshold of 0.1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage and human annoyance.

b. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, as defined by the FICON criteria contained in Table 6.

c. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project, as defined by the FICON criteria contained in Table 6.

d. For a project located within an airport land use plan or, where such a plan has not be adopted, within two miles of a public airport or public use airport, where the project would expose people residing or working in the area to excessive noise levels.

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

PROJECT IMPACTS

FUTURE MATERIALS FACILITY NOISE IMPACTS

The potential for the project operations to result in noise impacts are expected to be due to the extended hours of operations of the on-site plant activities, and the additional hours of materials haul trucks on the local roadway system.

Extended Hours of Operations

During the extended hours of operations, the asphalt batch plant, cement batch plant and crushing operations are expected to occur. The sand plant will not operate during the extended hours of operations. Based upon the measured background noise levels at Site B, it is expected that the on-site activities, which include the batch plants and crushing operations, will result in hourly noise levels equal to, or less than, 45 dBA L50. As stated earlier, the primary increase in L50 values occurred between 6:00 a.m. and 8:00 a.m. during the start-up operations. Once operations occur, they are generally in the mid 30 dBA L50 range.

Based upon the analysis, the nighttime noise levels could exceed the noise level criteria shown on Table 5 of 40 dBA L50, if start-up operations occur during the nighttime hours of 10:00 p.m. to 7:00 a.m.

Materials Haul Truck Operations

To describe project impact noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was once again 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 Leq values for free-flowing traffic conditions. Traffic volumes for existing conditions were obtained from the project traffic consultant. The analysis contained in Table 7 includes the Existing plus Project overall 24-hour Ldn, the daytime peak hour, and the nighttime peak hour. Existing plus Project traffic noise levels are summarized in Table 7. Appendix C shows the inputs to the FHWA Model.

As stated earlier in this report, the traffic noise analysis contains the following assumptions:

- Baseline traffic includes an average of 32 one way truck trips per day, which are evenly distributed from 6:00 a.m. to 7:00 p.m. Also peak period of 700 trips during 6:00 a.m. to 7;00 p.m..;
- Truck trips during peak conditions (Plus Project) includes 700 one-way truck trips per day, which are evenly distributed over a 24-hour period;
- The distribution of truck trips on a typical day (Existing) includes 40 percent traveling east on Center Road, and 60 percent traveling west on Center Road;
- Under "Project" conditions, there is no changes to the existing average daily truck trips (32 one-way);
- Under "Project" conditions, during nighttime operations, all nighttime truck traffic will be required to turn west on Center Road.

TABLE 7
PREDICTED EXISTING + PROJECT (700 TRUCK TRIPS) TRAFFIC NOISE LEVELS

Roadway	Location	Traffic Noise Level @ 75'*	Distance to Noise Contours	
			55 dBA	60 dBA
Traffic Noise Levels with 700 Truck Trips Distributed Evenly Over 24-hours (24-hour Ldn)				
Ward Lake Road	Entire Length	66.6 dBA Ldn	445-feet	207-feet
Center Road	West of Ward Lake	67.9 dBA Ldn	545-feet	253-feet
Center Road	East of Ward Lake	56.8 dBA Ldn	99-feet	46-feet
Center Road	East of Cutoff Road	54.7 dBA Ldn	72-feet	33-feet
Traffic Noise Levels (Peak Hour Daytime Leq)				
Ward Lake Road	Entire Length	59.1 dBA Leq	141-feet	66-feet
Center Road	West of Ward Lake	57.7 dBA Leq	113-feet	53-feet
Center Road	East of Ward Lake	54.8 dBA Leq	73-feet	34-feet
Center Road	East of Cutoff Road	54. 7dBA Leq	71-feet	33-feet
Traffic Noise Levels (Peak Hour Nighttime Leq)				
Ward Lake Road	Entire Length	59.7 dBA Leq	106-feet	49-feet
Center Road	West of Ward Lake	60.2 dBA Leq	125-feet	58-feet
Center Road	East of Ward Lake	46.2 dBA Leq	19-feet	9-feet
Center Road	East of Cutoff Road	43.3 dBA Leq	12-feet	6-feet

Sources: j.c. brennan & associates, Inc., and FHWA RD-77-108
***** - Roadway noise levels are calculated from the roadway centerline

Based upon Table 7, the project would exceed the 60 dBA Ldn noise level standard along Ward Lake Road, and a portion of Center Road, west of Ward Lake Road.

Also, based upon comparison of Table 7 to Table 4, the project would result in significant increases in traffic noise levels along the Material Haul Truck routes during typical operating operations. The project would result in significant increases in peak hour traffic noise levels during the daytime hours during typical operating operations. During the nighttime hours, the peak hour traffic associated with the project would result in significant increases the nighttime peak hour noise level along Ward Lake Road and Center Road, west of Ward Lake.

The increases in traffic noise levels would exceed the acceptable increases in traffic noise as for a significant impact under CEQA.

Applicant Reduced Project and Caltrans Project Requirements Scenario

The project applicant has stated that as a reduced project alternative, while meeting Caltrans roadway project requirements, there would be a total of 550 one-way truck trips over a 24-hour period, with 260 trucks occurring between the hours of 6:00 p.m. and 6:00 a.m. Therefore, there would be a total of 377 truck trips during the daytime hours of 7:00 a.m. to 10:00 p.m., and 173 truck trips during the nighttime hours. All nighttime trucks would turn west on Center Road during the nighttime hours.

Table 8 shows the results of this analysis.

TABLE 8
REDUCED PROJECT/CALTRANS PROJECT TRAFFIC NOISE LEVELS

Roadway	Location	Traffic Noise Level @ 75'*	Distance to Noise Contours	
			55 dBA	60 dBA
Traffic Noise Levels (24-hour Ldn)				
Ward Lake Road	Entire Length	64.6 dBA Ldn	328-feet	152-feet
Center Road	West of Ward Lake	65.0 dBA Ldn	350-feet	162-feet
Center Road	East of Ward Lake	55.1 dBA Ldn	77-feet	36-feet
Center Road	East of Cutoff Road	53.9 dBA Ldn	64-feet	30-feet
Sources: j.c. brennan & associates, Inc., and FHWA RD-77-108 * - Roadway noise levels are calculated from the roadway centerline				

Based upon Table 8, the project would result in noise levels which exceed the County noise level standard of 60 dB Ldn along Ward Lake Road and Center Road, west of Ward Lake. However, the overall noise levels would decrease from the proposed project. The County Noise Element does provide for exceptions up to 70 dB Ldn, as contained in Figure 3 of this report. Based upon the calculations, the noise levels would not exceed 65 dB Ldn with the reduced project.

MITIGATION MEASURES

Materials Facility Operations

Mitigation measures for the Materials Facility operations to reduce on-site operations to a less than significant level include the following:

1. Restrict the start-up operations to between the hours of 7:00 a.m. to 10:00 p.m;
2. Shield the asphalt plant generator noise levels by either placing the generator behind a berm, or barrier, and orient the generator opening to the north. The berm or barrier shall extend to a height even with the top of the generator enclosure.

Material Haul Truck Traffic

Due to the number of Material Haul Trucks utilizing the facility, the project can reduce the noise impacts to comply with the 60 dB Ldn noise level standard with the following mitigation measures.

1. Restrict the use of engine brakes leaving the project site;

2. Request that the County provide an allowance for up to 65 dB Ldn, based upon the Reduced Project Alternative.

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 (Hz).
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
$L_{(n)}$	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L_{50} is the sound level exceeded 50% of the time during the one hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
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 AMaximum@ 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	Sound Exposure Level. SEL is s rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations.
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.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B
Ward Lake Quarry Expansion
24hr Continuous Noise Monitoring - Site A
May 3-4, 2018

Hour	Leq	Lmax	L50	L90
10:00	50.1	75.4	39.4	36.3
11:00	48.8	71.4	40.4	38.5
12:00	45.1	67.4	40.6	38.4
13:00	47.3	70.5	41.5	39.2
14:00	45.4	67.5	39.3	36.2
15:00	42.1	57.9	36.9	33.6
16:00	40.4	56.5	34.6	29.0
17:00	50.5	76.3	33.3	28.5
18:00	38.6	61.1	28.8	26.4
19:00	33.0	53.4	28.9	25.5
20:00	40.8	56.3	39.1	34.5
21:00	42.4	48.1	42.6	36.6
22:00	37.3	55.5	32.9	28.6
23:00	42.0	64.7	38.5	34.4
0:00	40.4	55.9	37.6	31.3
1:00	39.7	60.7	35.4	27.1
2:00	32.5	56.3	21.8	20.7
3:00	23.6	35.6	21.3	20.2
4:00	30.0	56.5	20.8	20.1
5:00	40.3	58.6	35.6	25.8
6:00	55.4	63.2	53.7	43.8
7:00	55.5	75.6	49.4	44.9
8:00	56.2	79.9	49.3	44.0
9:00	47.4	69.5	41.2	38.9

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	56.2	33.0	49.4	55.4	23.6	46.5
Lmax (Maximum)	79.9	48.1	65.8	64.7	35.6	56.3
L50 (Median)	49.4	28.8	39.0	53.7	20.8	33.1
L90 (Background)	44.9	25.5	35.4	43.8	20.1	28.0

Computed Ldn, dB	53.5
% Daytime Energy	76%
% Nighttime Energy	24%

j.c. brennan & associates
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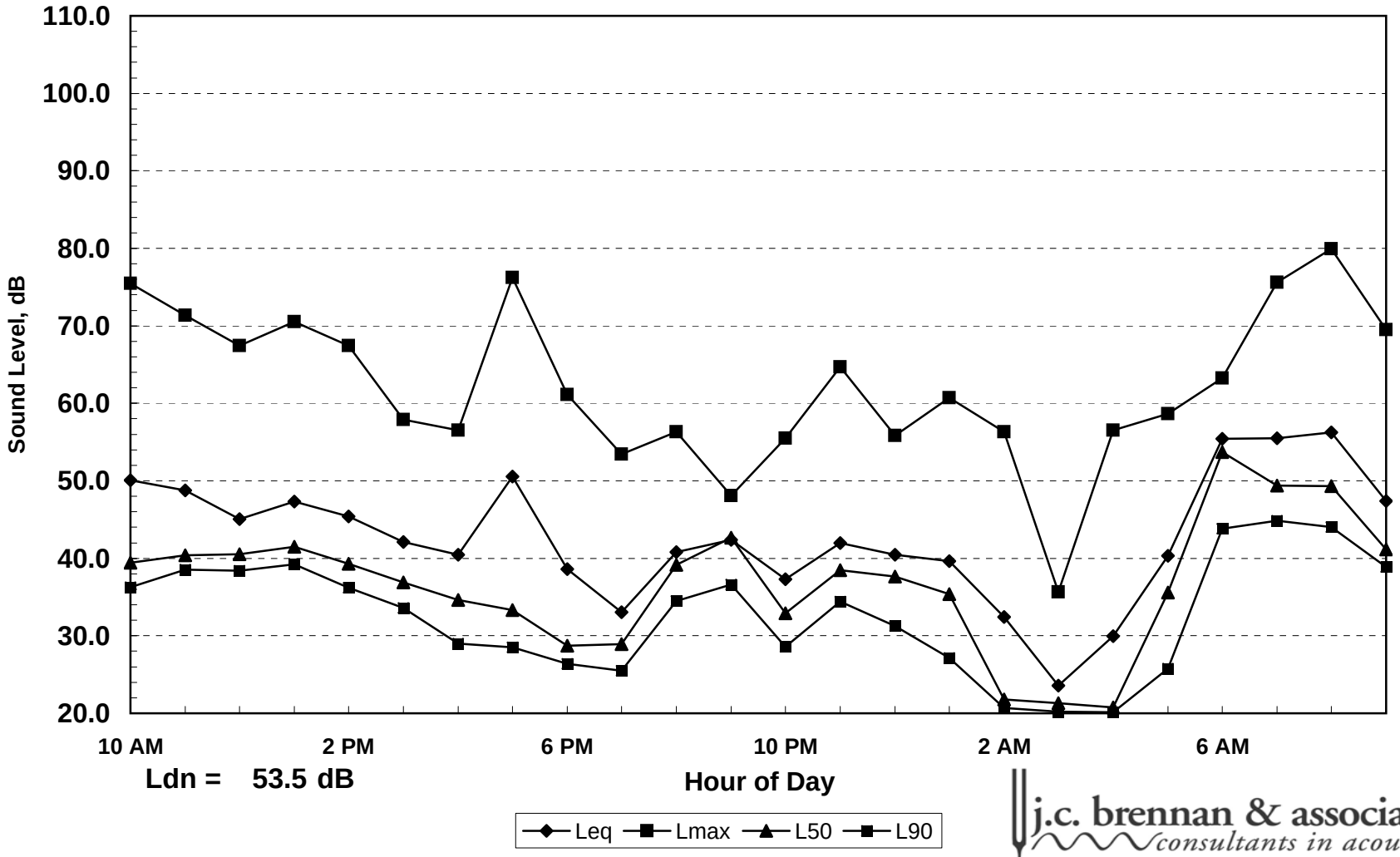
Appendix B

Ward Lake Quarry Expansion

24hr Continuous Noise Monitoring - Site A

May 3-4, 2018



Ldn = 53.5 dB

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Appendix B
Ward Lake Quarry Expansion
24hr Continuous Noise Monitoring - Site B
May 3-4, 2018

Hour	Leq	Lmax	L50	L90
10:00	54.4	81.7	32.9	29.9
11:00	55.7	83.2	33.3	31.1
12:00	50.2	75.8	32.9	29.7
13:00	56.0	86.7	34.7	32.1
14:00	61.1	91.0	30.8	27.4
15:00	50.5	77.0	31.2	27.7
16:00	50.2	74.3	31.4	26.3
17:00	50.4	78.3	32.2	26.1
18:00	46.8	73.9	28.7	24.6
19:00	44.4	72.1	29.1	24.8
20:00	45.5	76.9	28.8	25.1
21:00	39.2	61.6	26.5	24.1
22:00	43.9	72.8	24.4	21.9
23:00	46.6	76.4	26.8	23.2
0:00	30.2	48.9	26.5	23.1
1:00	43.2	74.2	22.8	20.7
2:00	42.2	70.9	22.5	20.5
3:00	23.4	38.4	21.2	19.9
4:00	39.8	70.2	20.7	19.6
5:00	51.3	79.6	31.3	21.3
6:00	52.6	80.1	45.4	32.9
7:00	54.0	81.1	44.1	39.0
8:00	54.3	79.8	38.3	35.8
9:00	59.8	87.2	35.0	32.6

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61.1	39.2	54.6	52.6	23.4	46.9
Lmax (Maximum)	91.0	61.6	78.7	80.1	38.4	68.0
L50 (Median)	44.1	26.5	32.7	45.4	20.7	26.8
L90 (Background)	39.0	24.1	29.1	32.9	19.6	22.6

Computed Ldn, dB	55.6
% Daytime Energy	91%
% Nighttime Energy	9%

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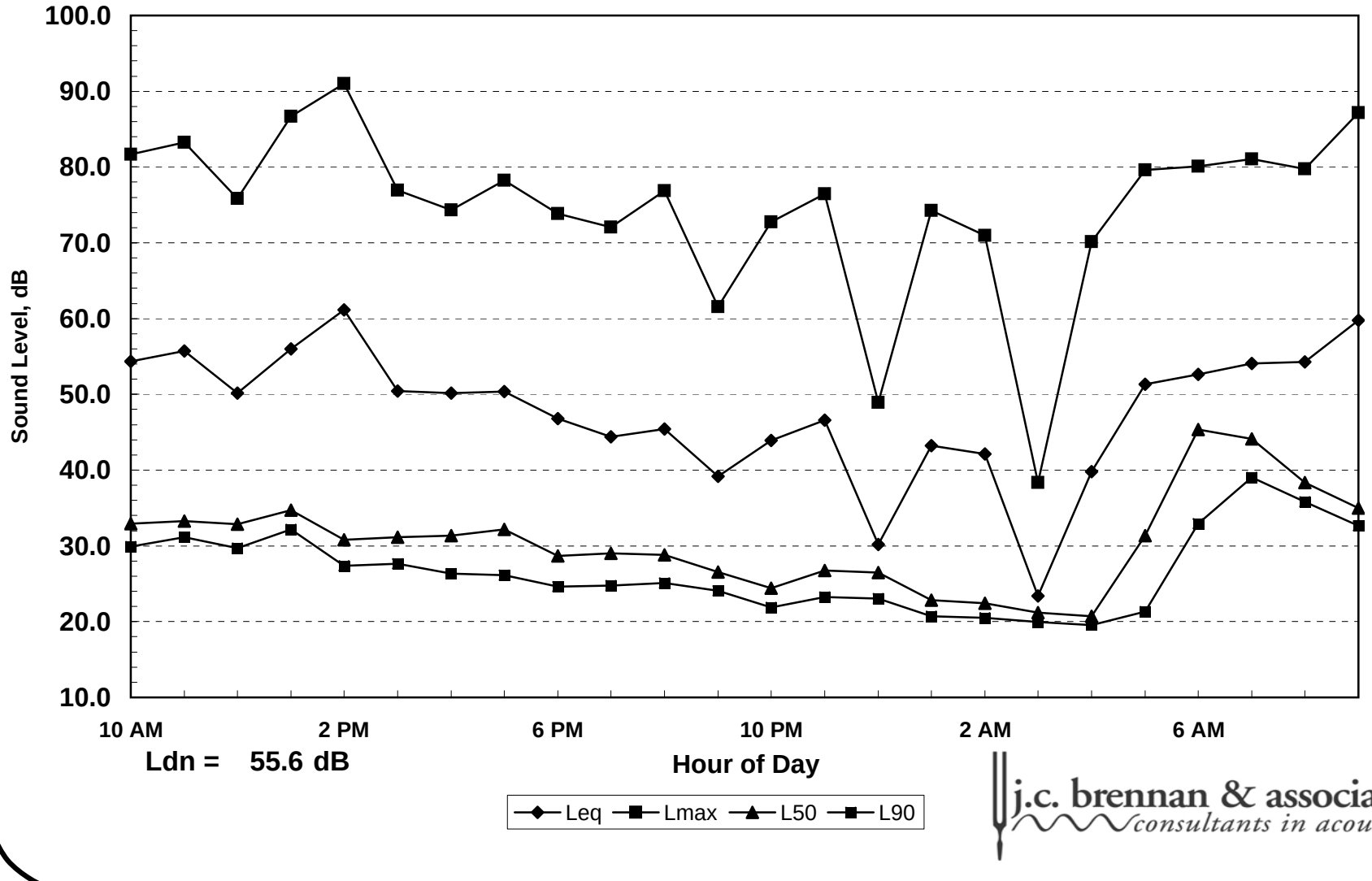
Appendix B

Ward Lake Quarry Expansion

24hr Continuous Noise Monitoring - Site B

May 3-4, 2018



Ldn = 55.6 dB

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

Project #: 2018-117
Description: Existing ADT
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	156	90		10	2.0	14.0	25	75	
2	Center Road	West of Ward Lake	520	90		10	1.0	2.3	45	75	
3	Center Road	East of Ward Lake	556	90		10	1.0	1.5	35	75	
4	Center Road	East of Cutoff Road	500	90		10	1.0	1.6	35	75	
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2018-117
Description: Existing ADT
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	36.4	31.8	47.9	48.3
2	Center Road	West of Ward Lake	49.6	38.0	46.1	51.4
3	Center Road	East of Ward Lake	46.8	36.6	43.5	48.7
4	Center Road	East of Cutoff Road	46.3	36.1	43.3	48.3

Appendix C

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

Noise Contour Output

Project #: 2018-117
Description: Existing ADT
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	1	3	6	12	27
2	Center Road	West of Ward Lake	2	4	9	20	43
3	Center Road	East of Ward Lake	1	3	6	13	29
4	Center Road	East of Cutoff Road	1	3	6	13	27

Appendix C
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Data Input Sheet - Peak Hour Leq
Peak Hour Leq daytime

Project #: 2018-117
Description: Existing Conditions
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Peak Hour Volume	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	16	1.0	7.0	25	75	
2	Center Road	West of Ward Lake	52	1.0	2.0	45	75	
3	Center Road	East of Ward Lake	56	1.0	2.0	35	75	
4	Center Road	East of Cutoff Road	50	1.0	2.0	35	75	
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Appendix C

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

Predicted Levels

Peak Hour Leq daytime

Project #: 2018-117

Description: Existing Conditions

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	37.9	29.9	46.0	46.7
2	Center Road	West of Ward Lake	50.6	39.0	46.5	52.2
3	Center Road	East of Ward Lake	47.8	37.6	45.8	50.2
4	Center Road	East of Cutoff Road	47.3	37.1	45.3	49.7
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Appendix C

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

Noise Contour Output

Peak Hour Leq daytime

Project #: 2018-117

Description: Existing Conditions

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	1	2	5	10	21
2	Center Road	West of Ward Lake	2	5	11	23	49
3	Center Road	East of Ward Lake	2	4	8	17	36
4	Center Road	East of Cutoff Road	2	3	7	15	33

Appendix C
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Data Input Sheet - Peak Hour Leq
Peak Hour Leq Nighttime

Project #: 2018-117
Description: Existing Conditions
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Peak Hour Volume	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	5	1.0	0.1	25	75	
2	Center Road	West of Ward Lake	12	1.0	0.1	45	75	
3	Center Road	East of Ward Lake	27	1.0	0.1	35	75	
4	Center Road	East of Cutoff Road	14	1.0	0.1	35	75	
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Appendix C

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

Predicted Levels

Peak Hour Leq Nighttime

Project #: 2018-117

Description: Existing Conditions

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	33.2	24.8	22.5	34.1
2	Center Road	West of Ward Lake	44.3	32.6	27.1	44.7
3	Center Road	East of Ward Lake	44.7	34.4	29.6	45.2
4	Center Road	East of Cutoff Road	41.8	31.6	26.8	42.4
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Appendix C

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

Noise Contour Output

Peak Hour Leq Nighttime

Project #: 2018-117

Description: Existing Conditions

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	0	0	1	1	3
2	Center Road	West of Ward Lake	1	2	3	7	15
3	Center Road	East of Ward Lake	1	2	4	8	17
4	Center Road	East of Cutoff Road	1	1	2	5	11

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

Project #: 2018-117
Description: Existing + Project ADT 700 trucks
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	910	72		28	1.0	97.0	25	75	
2	Center Road	West of Ward Lake	1,210	72		28	1.0	80.0	45	75	
3	Center Road	East of Ward Lake	993	90		10	1.0	15.0	35	75	
4	Center Road	East of Cutoff Road	583	90		10	1.0	16.0	35	75	
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2018-117

Description: Existing + Project ADT 700 trucks

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	30.5	39.1	66.6	66.6
2	Center Road	West of Ward Lake	48.9	44.3	67.8	67.9
3	Center Road	East of Ward Lake	48.6	39.1	56.0	56.8
4	Center Road	East of Cutoff Road	46.3	36.8	54.0	54.7

Appendix C

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

Noise Contour Output

Project #: 2018-117

Description: Existing + Project ADT 700 trucks

Ldn/CNEL: Ldn

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	21	45	96	207	445
2	Center Road	West of Ward Lake	25	55	117	253	545
3	Center Road	East of Ward Lake	5	10	21	46	99
4	Center Road	East of Cutoff Road	3	7	16	33	72

Appendix C
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Data Input Sheet - Peak Hour Leq
Peak Hour Leq daytime

Project #: 2018-117
Description: Existing + Project Conditions daytime Leq
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Peak Hour Volume	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	44	1.0	52.0	25	75	
2	Center Road	West of Ward Lake	69	1.0	15.0	45	75	
3	Center Road	East of Ward Lake	67	1.0	10.0	35	75	
4	Center Road	East of Cutoff Road	61	1.0	11.0	35	75	
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Appendix C

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

Predicted Levels

Peak Hour Leq daytime

Project #: 2018-117

Description: Existing + Project Conditions daytime Leq

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	39.4	34.3	59.1	59.1
2	Center Road	West of Ward Lake	51.2	40.2	56.5	57.7
3	Center Road	East of Ward Lake	48.2	38.4	53.6	54.8
4	Center Road	East of Cutoff Road	47.7	38.0	53.6	54.7
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Appendix C

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

Noise Contour Output

Peak Hour Leq daytime

Project #: 2018-117

Description: Existing + Project Conditions daytime Leq

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	7	14	30	66	141
2	Center Road	West of Ward Lake	5	11	24	53	113
3	Center Road	East of Ward Lake	3	7	16	34	73
4	Center Road	East of Cutoff Road	3	7	15	33	71

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

Project #: 2018-117
Description: Existing Peak ADT with Peak Conditions 700 Daily Trucks
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	649	95		5	1.0	74.0	25	75	
2	Center Road	West of Ward Lake	875	97		3	1.0	27.0	45	75	
3	Center Road	East of Ward Lake	752	97		3	1.0	21.0	35	75	
4	Center Road	East of Cutoff Road	727	97		3	1.0	23.0	35	75	
5										75	
6										75	
7										75	
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2018-117

Description: Existing Peak ADT with Peak Conditions 700 Daily Trucks

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	36.1	33.8	60.1	60.1
2	Center Road	West of Ward Lake	48.8	38.5	57.3	57.9
3	Center Road	East of Ward Lake	45.4	36.1	54.5	55.1
4	Center Road	East of Cutoff Road	45.1	36.0	54.8	55.3

Appendix C

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

Noise Contour Output

Project #: 2018-117

Description: Existing Peak ADT with Peak Conditions 700 Daily Trucks

Ldn/CNEL: Ldn

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	8	16	36	77	165
2	Center Road	West of Ward Lake	5	12	25	54	117
3	Center Road	East of Ward Lake	4	8	16	35	76
4	Center Road	East of Cutoff Road	4	8	17	36	78

Appendix C
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Data Input Sheet - Peak Hour Leq
Peak Hour Leq daytime

Project #: 2018-117
Description: Existing Conditions Peak Conditions with 700 daily trucks
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Peak Hour Volume	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	62	1.0	68.0	25	75	
2	Center Road	West of Ward Lake	80	1.0	25.0	45	75	
3	Center Road	East of Ward Lake	75	1.0	17.0	35	75	
4	Center Road	East of Cutoff Road	72	1.0	19.0	35	75	
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Appendix C

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

Predicted Levels

Peak Hour Leq daytime

Project #: 2018-117

Description: Existing Conditions Peak Conditions with 700 daily trucks

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	39.1	35.8	61.7	61.8
2	Center Road	West of Ward Lake	51.3	40.9	59.3	60.0
3	Center Road	East of Ward Lake	48.3	38.9	56.4	57.1
4	Center Road	East of Cutoff Road	48.0	38.7	56.7	57.3
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Appendix C

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

Noise Contour Output

Peak Hour Leq daytime

Project #: 2018-117

Description: Existing Conditions Peak Conditions with 700 daily trucks

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	10	21	46	98	212
2	Center Road	West of Ward Lake	8	16	35	75	162
3	Center Road	East of Ward Lake	5	10	22	48	103
4	Center Road	East of Cutoff Road	5	11	23	50	107

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

Project #: 2018-117
Description: Existing + Caltrans Project 550 Trucks
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Ward Lake Road	Entire Length	760	72		28	1.0	73.0	25	75	
2	Center Road	West of Ward Lake	950	75		25	1.0	55.0	45	75	
3	Center Road	East of Ward Lake	673	90		10	1.0	15.0	35	75	
4	Center Road	East of Cutoff Road	483	90		10	1.0	16.0	35	75	
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2018-117

Description: Existing + Caltrans Project 550 Trucks

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Ward Lake Road	Entire Length	40.8	38.3	64.6	64.6
2	Center Road	West of Ward Lake	51.1	42.9	64.8	65.0
3	Center Road	East of Ward Lake	46.9	37.4	54.3	55.1
4	Center Road	East of Cutoff Road	45.5	35.9	53.2	53.9

Appendix C

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

Noise Contour Output

Project #: 2018-117

Description: Existing + Caltrans Project 550 Trucks

Ldn/CNEL: Ldn

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Ward Lake Road	Entire Length	15	33	71	152	328
2	Center Road	West of Ward Lake	16	35	75	162	350
3	Center Road	East of Ward Lake	4	8	17	36	77
4	Center Road	East of Cutoff Road	3	6	14	30	64