Quick Quack Car Wash (Store #26-066) – Sierra College Blvd and Brace Rd

Noise Impact Study

City of Loomis, CA

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this noise impact study is to evaluate the potential noise impacts for the project study area and compare results to City and CEQA thresholds. The assessment was conducted and compared to the noise standards set forth by the Federal, State, and Local agencies. Consistent with the California Environmental Quality Act (CEQA) and CEQA Guidelines, a significant impact related to noise would occur if a proposed project is determined to result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance or applicable agencies.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the Project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the Project.

The following is provided in this report:

- A description of the study area and the proposed Project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An evaluation of the existing ambient noise environment
- An analysis of stationary noise impacts from the project site to adjacent land uses
- Construction noise and vibration evaluation

1.2 Site Location and Study Area

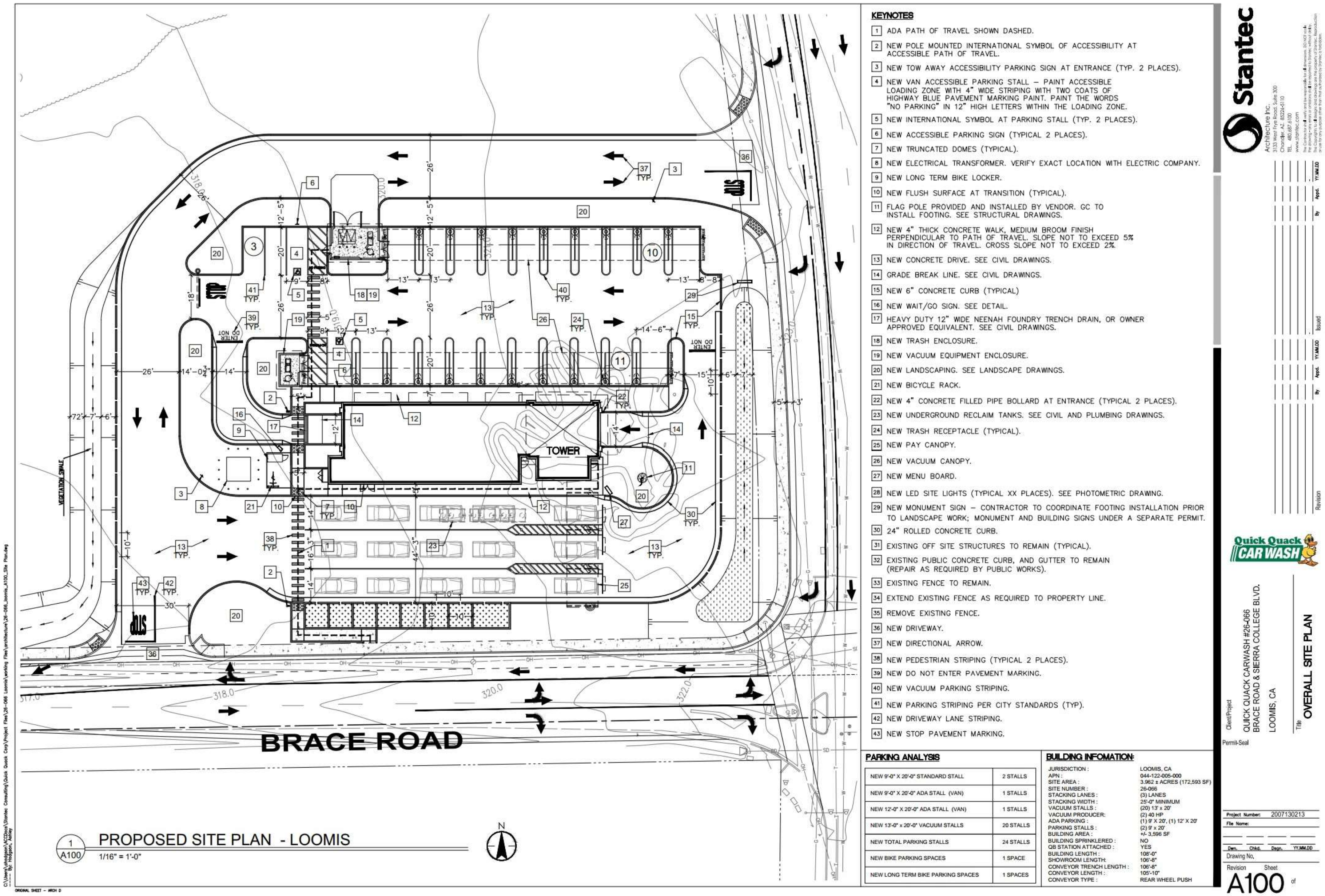
The project site is located at Sierra College Blvd. and Brace Rd. in the City of Loomis, CA, as shown in Exhibit A. The land uses directly surrounding the Project are general commercial. There are residential properties east and west beyond the general commercial surrounding the Project. To the south is an office building Rocklin.

1.3 Proposed Project Description

The Project proposes to develop a 108-foot-long car wash tunnel with twenty-one (21) vacuum bays. The site plan used for this is illustrated in Exhibit B. The project car wash is proposed to operate during daytime hours (7AM to 9PM).

Exhibit A
Location Map

Exhibit B
Site Plan



2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used in the report.

2.1 Sound, Noise, and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

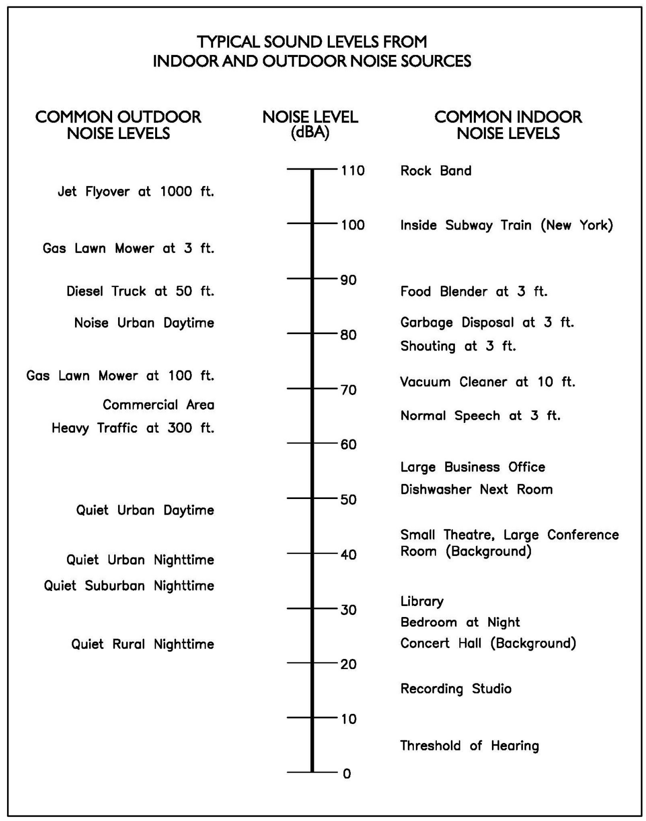
2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter ($\mu N/m^2$), also called micro-Pascal (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels, abbreviated dB. Exhibit C illustrates reference sound levels for different noise sources.

Exhibit C: Typical A-Weighted Noise Levels



2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA), a scale designed to account for the frequency-dependent sensitivity of the ear. Typically, the human ear can barely perceive a change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns; others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after the addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time-varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations, which is intended to be used for sleeping, living, cooking, or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90, and L99, etc.

Noise: *A*ny unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by the use of a sound level meter having a standard frequency filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level, which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet or more from a noise source. Wind, temperature, air humidity, and turbulence can further impact have far sound can travel.

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

3.3 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground’s surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a “push-pull” fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed Project is located in the City of Loomis, California and noise regulations are addressed through the efforts of various federal, state and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible for regulating noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible for regulating noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers. The Housing and Urban Development (HUD) is responsible for establishing noise regulations as it relates to exterior/interior noise levels for new HUD-assisted housing developments near high noise areas.

The federal government advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

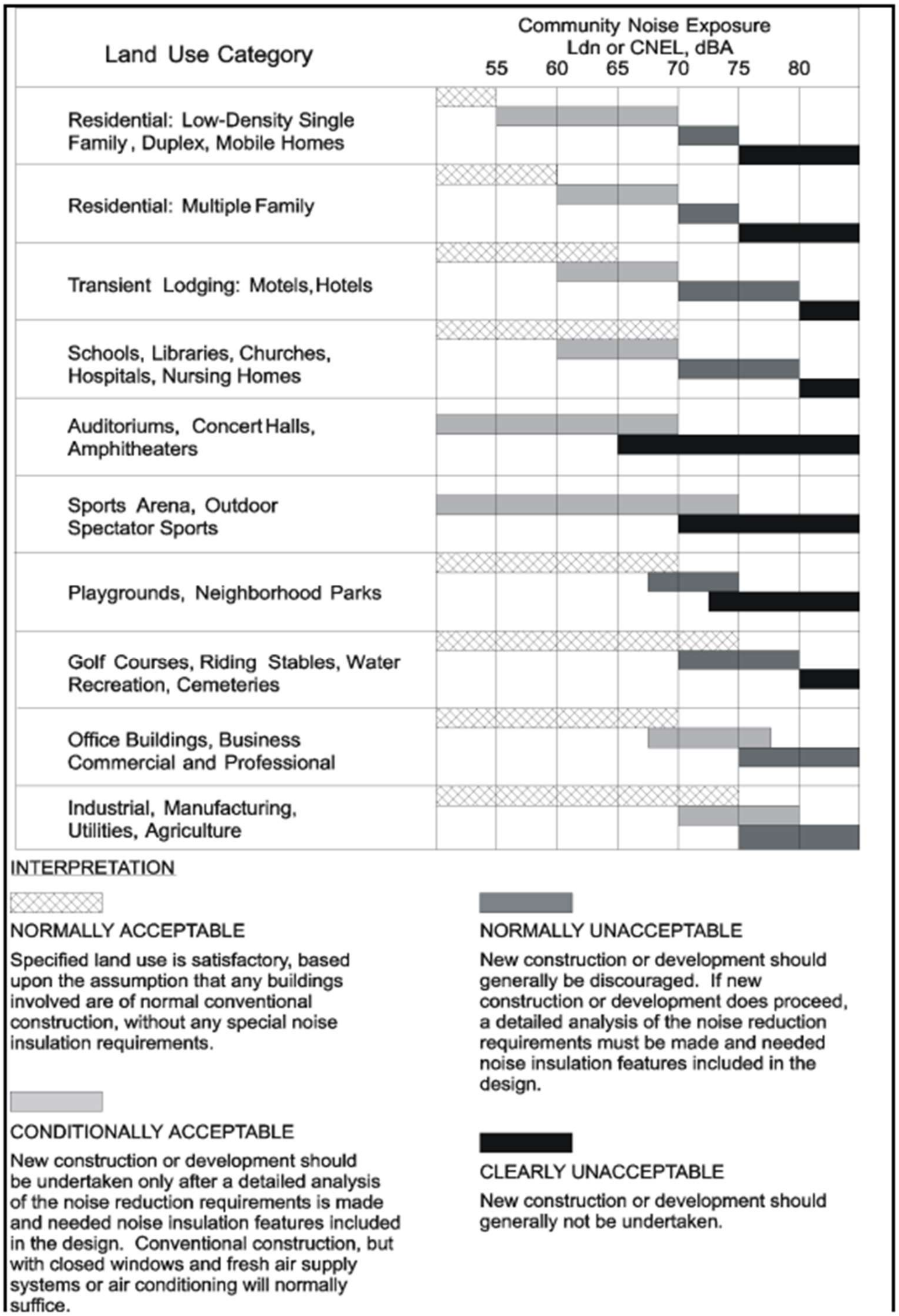
Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the “Land Use Compatibility for Community Noise Environments Matrix.” The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the California Building Code (CBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D.

Exhibit D: Land Use Compatibility Guidelines



4.3 City of Loomis Noise Regulations

The City of Loomis outlines their noise regulations and standards within the Municipal Code and the Noise Element of the City of Loomis General Plan.

City of Loomis Noise Ordinance

Section 13.30.070 Table 3-2 of the Loomis noise ordinance outlines the acceptable noise standards as 65 dBA Ldn exterior limit and 45 dBA Ldn interior. Offices have an interior noise limit of 45 dBA Leq during operational hours with no exterior limit. *If the measured ambient noise level exceeds the applicable noise level standard in any category shown in Table 3-2, the applicable standards shall be adjusted to equal the ambient noise level.*

Table 3-3 outlines the limits for short-duration events near residential areas. Since the Project is not short-duration and is far enough from residential areas to not increase the ambient, Table 3-2 will be used as the comparable standards.

Table 3-4 outlines the allowable hours on construction. Construction must occur between 7AM and 7PM Monday through Friday and 8AM and 7PM on Saturday. Construction on Sundays or national holidays must be allowed by the commission or council.

City of Loomis General Plan

Table 8-3 is identical to Table 3-2 from the municipal code. The General Plan also outlines the road and rail contours. The Project and surrounding properties fall within the 65 dBA Ldn noise contour.

City of Rocklin General Plan

The City of Rocklin's General Plan Noise Element contains Table 2-2, which is similar to Table 3-2 of the Loomis Municipal Code.

Regulatory Summary

The proposed Project is surrounded by commercial property with residential properties just beyond. The southern office building must not exceed an interior 45 dBA, Leq. The residential receptors must not exceed an exterior of 65 dBA, Ldn and interior of 45 dBA, Ldn. If the existing ambient levels already exceed these levels from Table 3-2, the Project must not increase the existing ambient level.

Construction must occur between 7AM and 7PM Monday through Friday and 8AM and 7PM on Saturday.

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to Federal Highway Transportation (FHWA) and Caltrans (TeNS) technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on "A" and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

Noise monitoring locations were selected based on the nearest sensitive receptors relative to the proposed onsite noise sources. Three (3) short-term 10-minute noise measurements were conducted at or near the project site and are illustrated in Exhibit E. Appendix A includes photos, field sheet, and measured noise data.

5.3 Stationary Noise Modeling

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and reference equipment noise level data) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using referenced sound level data for the various stationary on-site sources (vacuums, vacuum turbine motors and car wash blowers at the exit). The model assumes that the car wash tunnel has an approximate 10-foot-tall by 10-foot-wide exit opening.

The blowers (a 12 Sonny Blower System) were modeled at 7 to 10 feet high as a point source. It is anticipated that blowers will be located approximately 5 to 10 feet inside the exit of the tunnel. The reference equipment sound level data is provided in Appendix B.

The SP model (see Situation 1, Appendix B) assumes a total of 21 vacuums and the 12-blower dryer system are operating simultaneously (worst-case scenario) when the noise will actually be intermittent and lower in noise level. The Project proposes to house the vacuum turbine motor (25 HP or 30 HP turbine) inside a 4-sided 8-foot tall CMU enclosure with a roof and venting at the top. The reference vacuum equipment sound level data is provided in Appendix B. All other noise-producing equipment (e.g., compressors, pumps) will be housed within mechanical equipment rooms.

Modeling assumes that project operations occur during daytime hours of 7AM to 9PM.

5.4 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's facade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows closed". MD estimated the interior noise level by subtracting the building shell design from the predicted exterior noise level.

5.5 FHWA Roadway Construction Noise Model

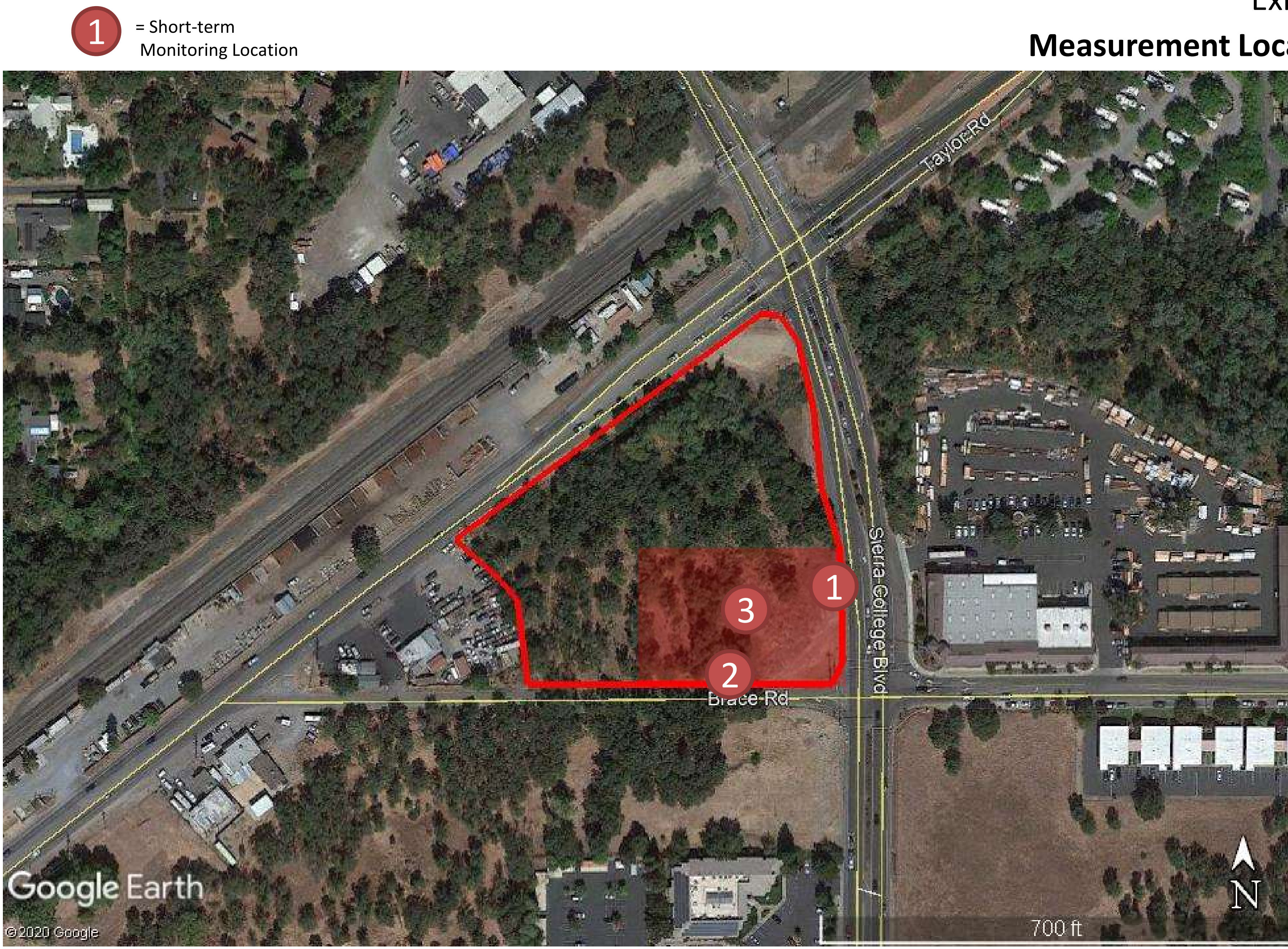
The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The Project was analyzed based on the different construction phases. Construction noise is expected to be loudest during the grading, concrete and building phases of construction. The construction noise calculation output worksheet is located in Appendix D. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 7-month time period. Construction noise is expected to be the loudest during the grading, concrete, and building phases.

Exhibit E

Measurement Locations



6.0 Existing Noise Environment

Three (3) 10-minute ambient noise measurements were performed at or near the project site on 3/26/2020. Noise measurements were taken to determine the existing ambient noise levels. Noise data indicates that traffic and rail are the primary sources of noise impacting the site and the surrounding area.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 1.

Table 1: Short-Term Noise Measurement Data (dBA)[1]

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90	Estimated Ldn
ST1	4:52 PM	5:02 PM	70.9	92.6	48.0	78.2	74.5	70.4	66.1	54.8	71.2
ST2	5:09 PM	5:19 PM	61.7	78.7	47.0	68.9	63.8	60.8	57.7	51.7	62.0
ST3	5:21 PM	5:31 PM	59.0	68.9	46.2	67.1	63.2	59.7	55.6	49.7	59.3

Notes:

1. Short-term noise monitoring locations (ST1) are illustrated in Exhibit E.
2. Ldn estimated based off typical traffic patterns. See Appendix A.

Noise data indicates the ambient noise level ranges between 59.3 dBA Ldn to 71.2 dBA Ldn. Additional field notes, photographs, and estimated Ldn calculations are provided in Appendix A. Estimated Ldn levels are based on typical hour-to-hour traffic conditions.

6.2 Existing Condition Calculations

Because schools and many businesses were closed due to the statewide lockdown, the measurements don't represent a normal existing condition for the area without adjustment. MD used traffic counts to estimate the existing 2020 baseline and confirmed them with the noise measurements extrapolated to a normal condition.

MD used traffic counts referenced by KD Anderson & Associates, Inc. taken in 2007 (*Traffic/Parking Impact Analysis for the Loomis Town Center Implementation Plan, Loomis, CA, Feb 2010*) and traffic counts taken by Fehr & Peers in 1998 referenced in the Loomis General Plan noise element (July 2001). In 1998, Sierra College Boulevard had an ADT of 12,300. In 2007, the ADT was 15,724. This is a 2.77% growth each year. Projecting 2.77% yearly growth to 2020, the ADT is 22,429. Table 2 shows the 2020 noise contours based on this projected ADT and the vehicle mix data used in the General Plan. The ADTs and contour calculations are in Appendix C.

Table 2: Sierra College Boulevard Noise Contours

2020 NOISE CONTOURS (FT)				
NOISE LEVELS	**70 dBA**	**65 dBA**	**60 dBA**	**55 dBA**
Ldn	111	238	514	1107

Based on observations, traffic levels were about 2.5X less than the normal expected condition on 3/26/2020. To compensate for the lack of traffic, a 4 dBA adjustment factor will be added to each estimated Ldn given in Table 1 (10log(2.5)=4). These levels will be compared to the contours in Table 2.

ST1 is 40 ft from the centerline of Sierra College Boulevard and within the 70 dBA noise contour. The estimated Ldn is 75 dBA. ST2 is 220 ft from the centerline of Sierra College Boulevard and within the 65 dBA noise contour. The estimated Ldn is 66 dBA. ST3 is 240 ft from the centerline of Sierra College Boulevard and within the 60 dBA noise contour. The estimated Ldn is 63.

The estimated Ldn and noise contours are consistent, so these noise contours will be used to give a baseline condition for this Project. In areas closer to the rail (the western residences), the existing rail noise contours from the General Plan will be used.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts as a result of the Project. The analysis details the estimated exterior/interior noise levels. Stationary noise impacts are analyzed from the on-site noise sources such as dryers/blowers (associated with car wash equipment).

7.1 Future Exterior Noise

The following outlines the exterior noise levels associated with the proposed Project.

7.1.1 Noise Impacts to Off-Site Receptors Due to Stationary Sources

Sensitive receptors that may be affected by project operational noise include residential to the southeast and west and office building to the south. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. Worst-case assumes the blowers are always operational when in reality the noise will be intermittent and cycle on/off depending on customer usage. Project car wash operational hours are assumed to be 7AM to 9PM. SoundPLAN inputs and outputs and Leq to Ldn calculations are in Appendix B.

A total of three (3) receptors were modeled to evaluate the proposed Project's operational impact. A receptor is denoted by a yellow dot. All yellow dots represent either a calibration point, property line or a sensitive receptor such as an outdoor sensitive area (courtyard, patio, backyard, etc.).

This study compares the Project's operational noise levels to two (2) different noise assessment scenarios: 1) Project Only operational noise level projections and 2) Project plus ambient noise level projections.

Project Operational Noise Levels
Exhibit F shows the "project only" operational Leq noise levels at nearby sensitive receptor area. The operational noise level at the southern office building (R2) is anticipated to be 51 dBA Leq(h). The Leq(h) levels from the SoundPLAN model were converted to Ldn levels for receptors 1 and 3. The operational noise levels at the nearby residences (R1 and R3) are anticipated to be 52 dBA Ldn (54 dBA Leq(h)) and 45 dBA Ldn (47 dBA Leq(h)).

Project Plus Ambient Operational Noise Levels
Table 3 demonstrates the Project plus the ambient (determined by traffic counts) noise levels. Project plus ambient noise level projections are anticipated to be 63 dBA Ldn and 70 dBA Ldn at nearby residential receptors (R1 and R3) and 64 dBA Leq at the office building (R2). The "project plus ambient" will not increase the ambient noise and therefore does not exceed limits as outlined within the City's noise ordinance (see Section 4.1).

The predicted interior noise level will be 43 and 45 dBA Ldn at the residential receptors and 44 dBA Leq at the office building. This assumes a minimum 20 dB reduction shell design at R2 and R3 and a shell design at R1, which meets the 45 dBA standards at the existing condition per the City's municipal code.

Ambient level projections are shown in Appendix C. R2 and R3 ambient levels are projected from the Sierra College Blvd traffic counts. R1 is right on the 70 dBA noise contour, as shown in the existing rail noise contours in the General Plan.

Table 3: Worst-case Predicted Operational Noise Level[7]

Receptor[1]	Noise Metric	Existing Ambient Noise Level (dBA)[2]	Project Noise Level (dBA)[3]	Total Combined Noise Level (dBA)	Noise Limit Exterior/ Interior (dBA)[4]	Interior Noise Level Windows Closed (dBA)[5]	Exceeds Exterior/ Interior Standard[6]	Change in Noise Level as Result of Project
R1	Ldn	70	52	70	**70/45**	45	No/No	0
R2	Leq	64	51	64	**--/45**	44	--/No	0
R3	Ldn	63	45	63	**65/45**	43	No/No	0

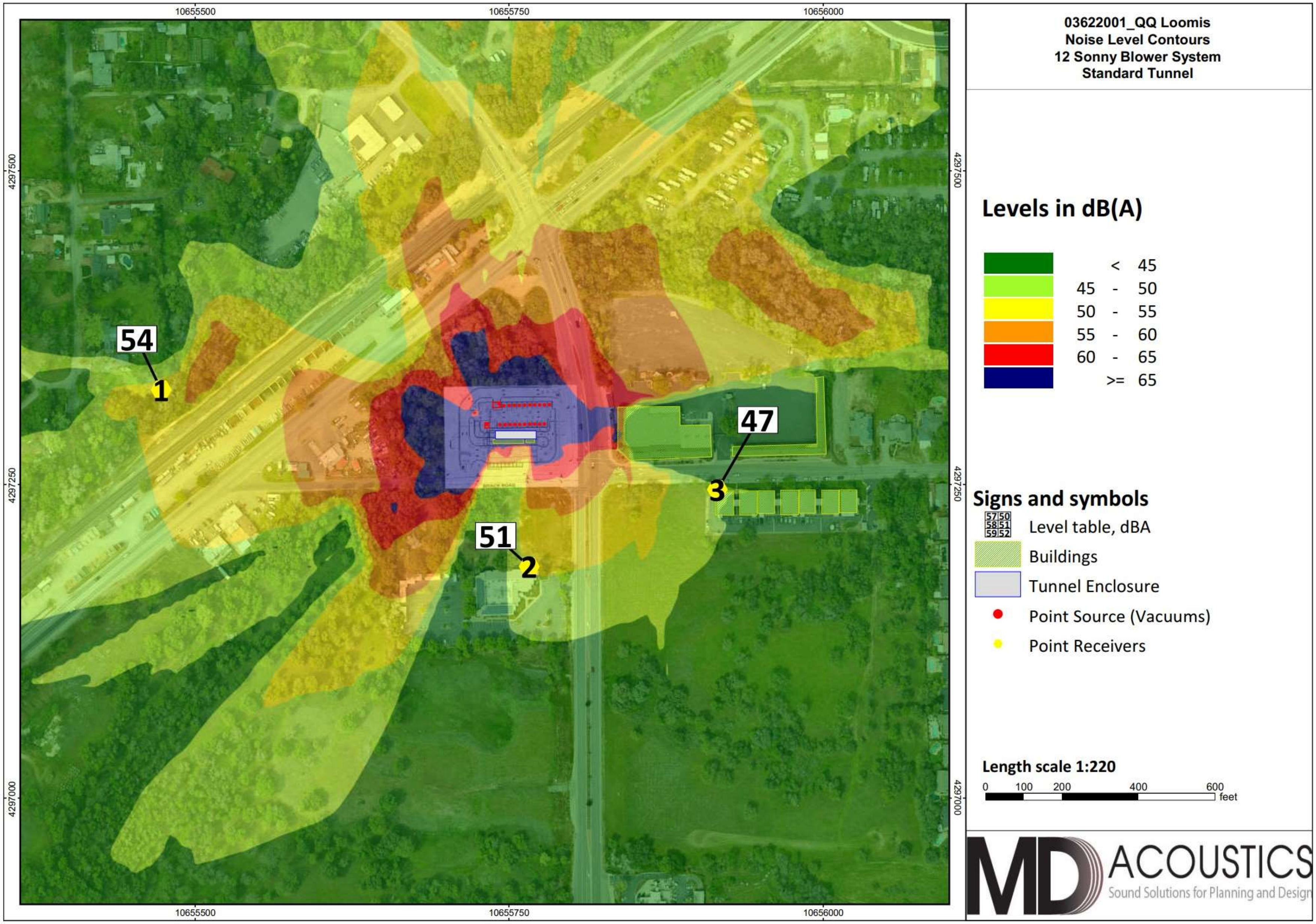
Notes:
1. Receptors 1 and 3 are residential, and 2 is an office.
2. See Tables 2 and 3. Representative ambient noise condition based on noise measurements and traffic data.
3. See Exhibit F for the operational noise level projections at said receptors.
4. Per Section 13.30.070 from the City's Municipal Code. If levels from Table 3-2 are exceeded, then ambient is listed.
5. Interior noise level assume a minimum 20 dBA noise reduction or existing 45 dBA interior based on the Municipal Code.
6. The noise projections are compared to ambient level as laid out in 13.30.070.C.1.a of the Loomis Municipal Code
7. Receptors 1 and 3 are converted to Ldn. Receptor 3 is in Leq.

As shown in Table 3, the Project does not exceed the City's exterior and interior noise limit. The limit for residences is 65 dBA Ldn for the exterior and 45 dBA Ldn for the interior, except when the ambient already exceeds these limits (such as R2). The limit for offices is 45 dBA Leq for the interior.

The Project was compared to the existing condition based on the noise contours in Table 2, which has been confirmed by measurements and traffic data. MD assumes that these receptors currently meet the interior limits as outlined in the municipal code. Table 3 shows that the existing noise levels are not anticipated to change at the receptors. No mitigation is required.

Exhibit F

Operational Noise Levels Leq(h)



8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 4.

Table 4: Typical Construction Equipment Noise Levels[1]

Type	Lmax (dBA) at 50 Feet
Backhoe	80
Truck	88
Concrete Mixer	85
Pneumatic Tool	85
Pump	76
Saw, Electric	76
Air Compressor	81
Generator	81
Paver	89
Roller	74

Notes:
[1] Referenced Noise Levels from FTA noise and vibration manual.

Construction noise is considered a short-term impact and would be considered significant if construction activities are taken outside the allowable times as described in the City's Noise Standards Table 3-4. Construction is anticipated to occur during the permissible hours according to the City's Municipal Code. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Furthermore, noise reduction measures are provided to further reduce construction noise. The impact is considered less than significant, however, construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of a grader, a dozer, an excavator, and a backhoe operating at 250 feet from the nearest office building and 400 feet from the nearest residence.

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels have the potential to reach 68 dBA Leq at the nearest office building 250 ft away and 63 dBA Leq at the nearest residence 400 ft away. Assuming 12 hours of 63 dBA Leq a day, this residence will be 65 dBA Ldn, meeting the 65 dBA Ldn requirement. See Appendix D for calculations.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed Project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a bulldozer. A large bulldozer has a vibration impact of 0.089 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref} (100/D_{rec})^{n}$$

Where: PPV_{ref} = reference PPV at 100ft.
D_{rec} = distance from equipment to receiver in ft.
n = 1.1 (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 5 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 5: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 7 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 6: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

At a distance of 100 feet (distance of nearest structure from the property line), a large bulldozer would yield a worst-case 0.019 PPV (in/sec) which is well below any threshold of damage. The impact is less than significant, and no mitigation is required. The vibration calculations are in Appendix D.

8.3 Construction Noise Reduction Measures

Construction operations must follow the City's General Plan and the Noise Ordinance, which states that construction, repair or excavation work performed must occur within the permissible hours. To further ensure that construction activities do not disrupt the adjacent land uses, the following measures should be taken:

1. Construction shall occur during the permissible hours as defined in Table 3-4 of the Municipal Code.

2. During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices.

3. The contractor shall locate equipment staging areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.

4. Idling equipment shall be turned off when not in use.

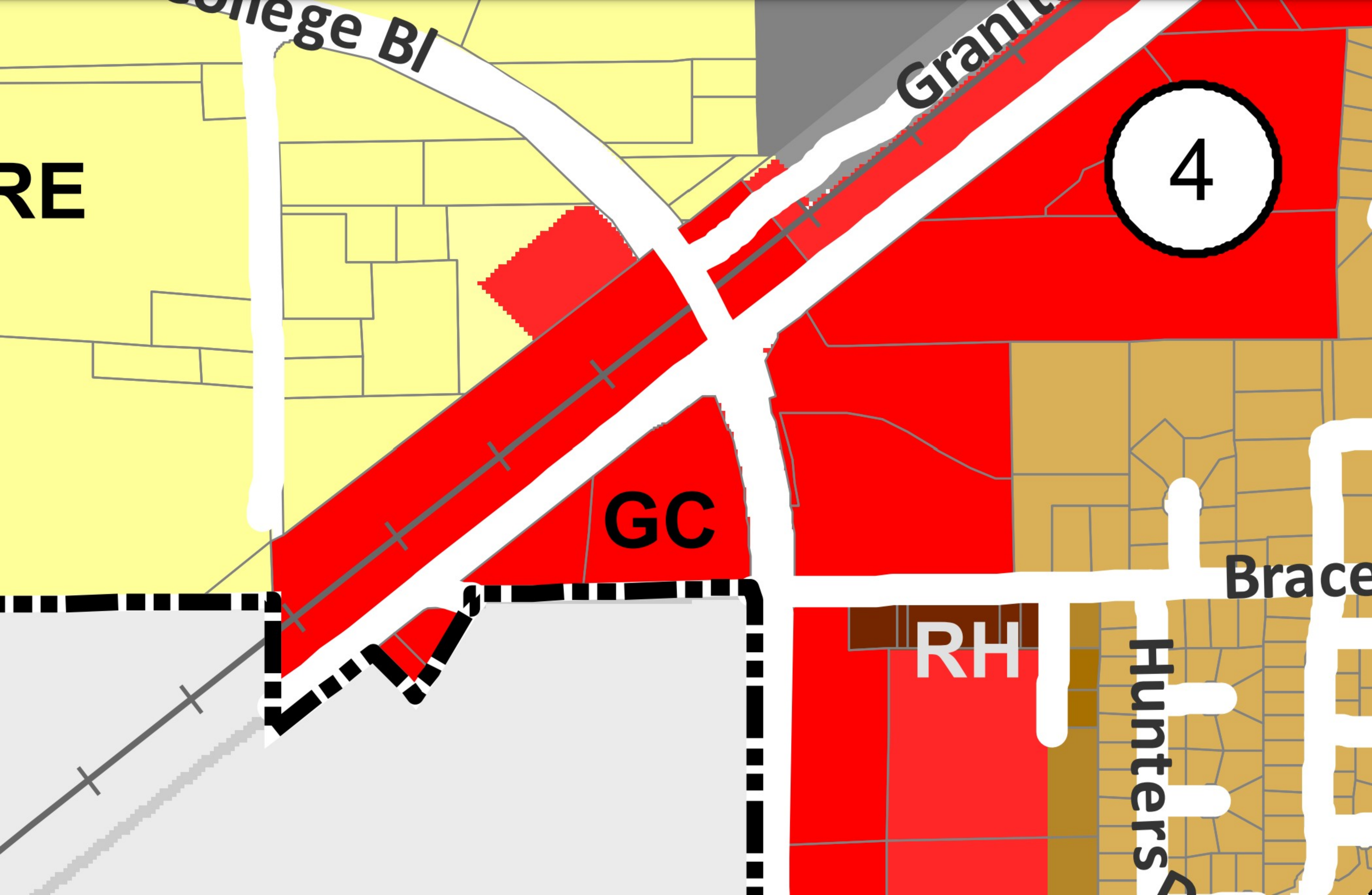
5. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research
City of Loomis: Municipal Code
City of Loomis: General Plan Noise Element
Traffic / Parking Impact Analysis for the Loomis Town Center Implementation Plan, Loomis, CA 2010
FTA Transit Noise and Vibration Impact Assessment Manual 2018

Appendix A:

Photographs and Field Measurement Data


College Bl
Granit
RE
4
GC
RH
Brace
Hunters

AZ Office
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Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

10-Minute Continuous Noise Measurement Datasheet

Project: Quick Quack Loomis
Site Address/Location: Corner of Sierra College and Brace Rd. Loomis, CA
Date: 3/26/2020
Field Tech/Engineer: Jason Schuyler, Claire Pincock

Site Observations: Clear skys temps in the mid 60's beautiful weather. Scattered clouds, winds in the 2-5MPH range. Meters were placed on either road and in the centerish area of the lot. Roughly 100 ft from the traffic light pole on the South east portion of the lot. Traffic about half of expected normal condition.

General Location:
Sound Meter: NTi Audio **SN:** A2A-07095-E0
Settings: A-weighted, slow, 1-sec, 10-minute interval
Meteorological Con.: 64 degrees F, 2 to 5 mph wind from the South, SE
Site ID: ST1 thru ST3

Site Topo: Flat
Ground Type: Hard site conditions, reflective

Noise Source(s) w/ Distance:
1 - C/L of Sierra College away 36' from ST1
2 - C/L of Brace Rd is roughly 21' away from ST2
3 - is 100' away from stop light pole @ corner of Brace and Sierra

Figure 1: Monitoring Locations

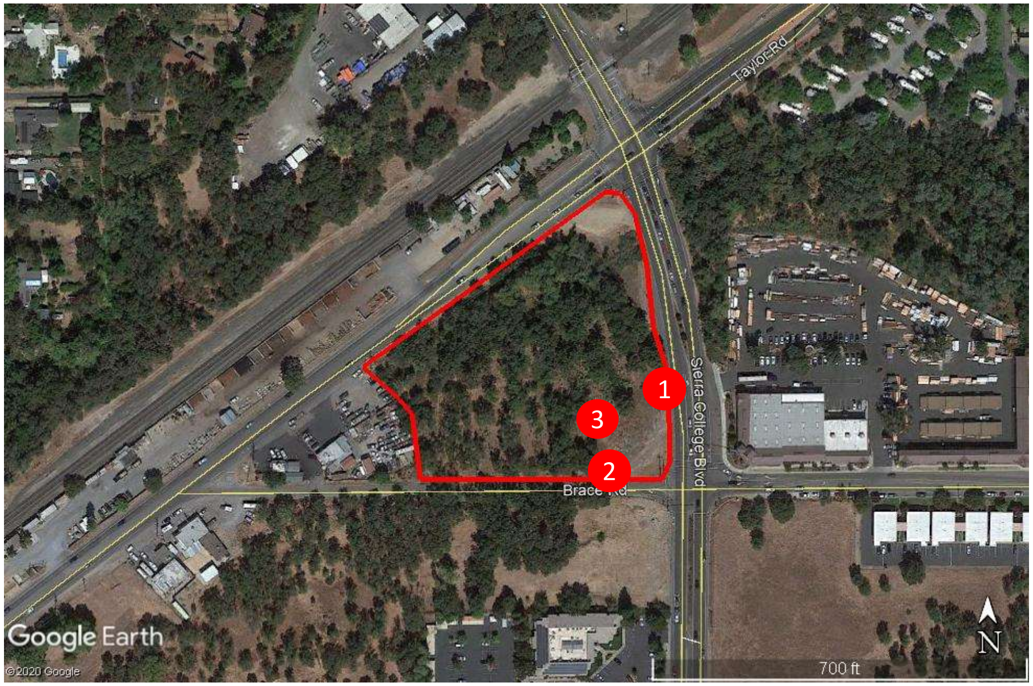

Figure 2: ST1 Photo

Figure 3: ST2 Photo

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10-Minute Noise Measurement Datasheet - Cont.

Project: Quick Quack Loomis
Site Address/Location: Corner of Sierra College and Brace Rd. Loomis, CA
Site ID: ST1 thru ST3

Figure 4: ST3 Photo

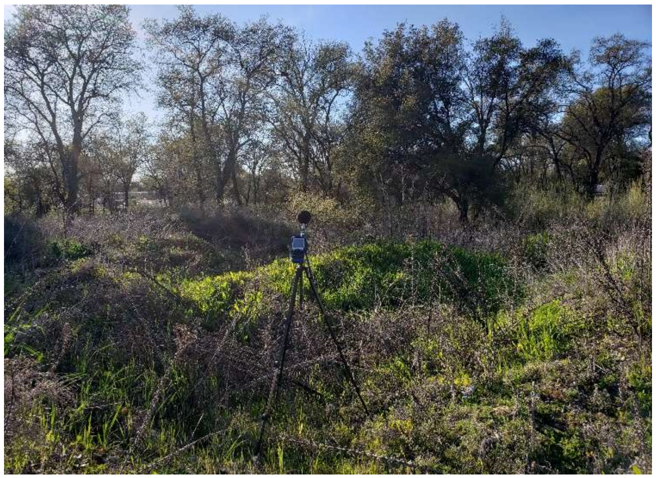

Table 1: Morning - Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90	Estimated CNEL
ST1	4:52 PM	5:02 PM	70.9	92.6	48	78.2	74.5	70.4	66.1	54.8	71.2
ST2	5:09 PM	5:19 PM	61.7	78.7	47.0	68.9	63.8	60.8	57.7	51.7	62.0
ST3	5:21 PM	5:31 PM	59.0	68.9	46.2	67.1	63.2	59.7	55.6	49.7	59.3

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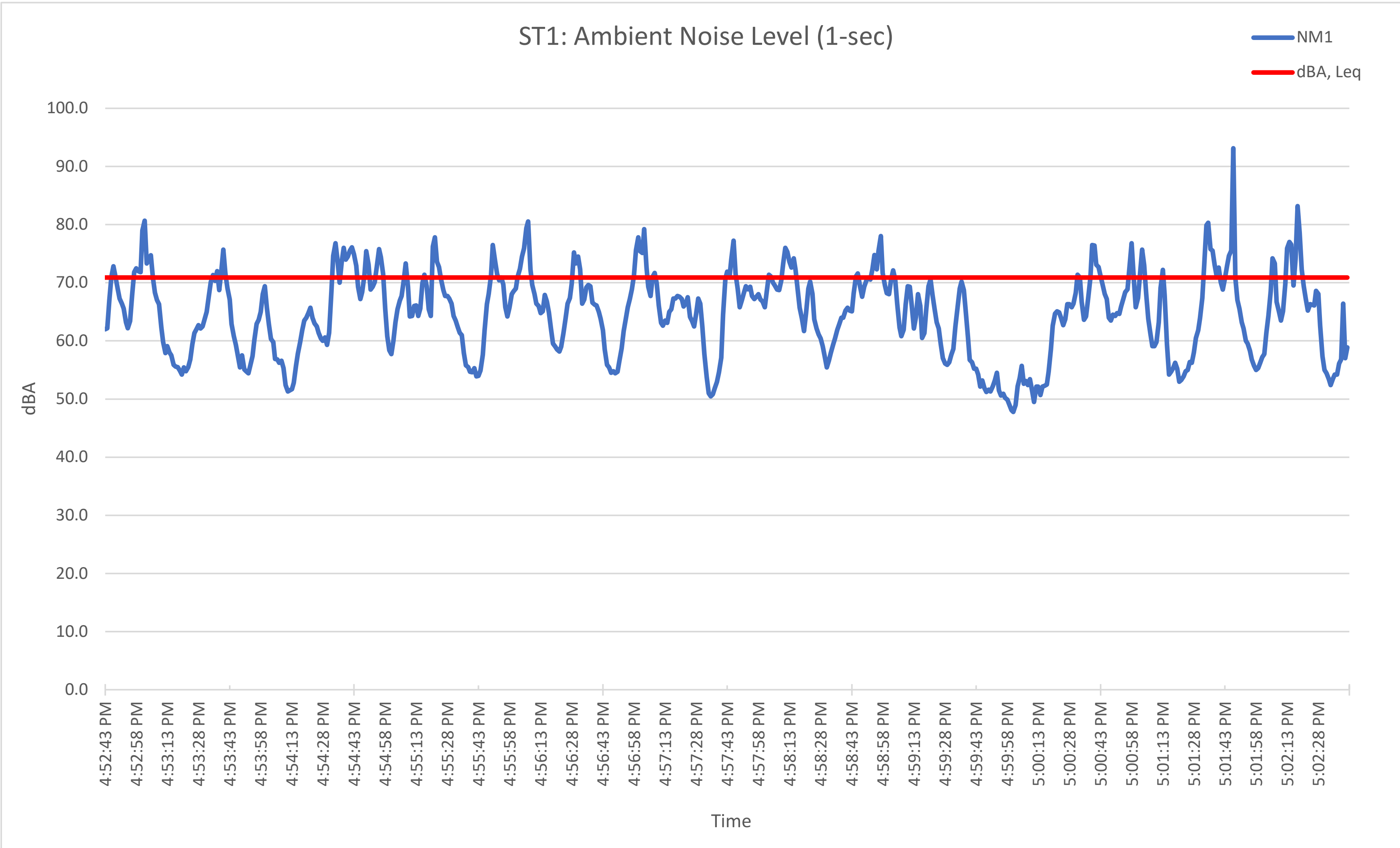
10-Minute Noise Measurement Datasheet - Cont.

Project: Quick Quack Loomis
Site Address/Location: Corner of Sierra College and Brace Rd. Loomis, CA
Site ID: ST1



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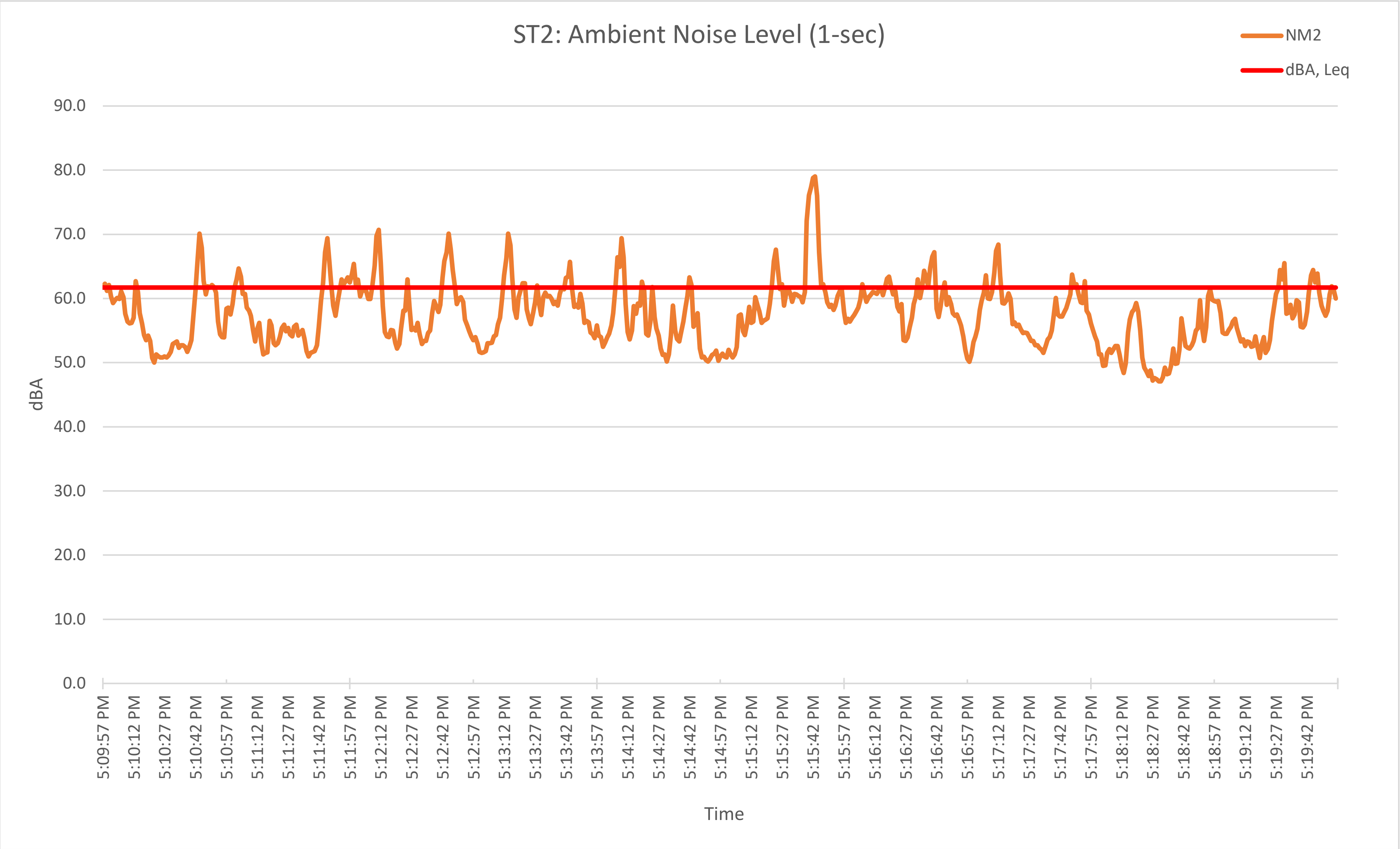
10-Minute Noise Measurement Datasheet - Cont.

Project: Quick Quack Loomis
Site Address/Location: Corner of Sierra College and Brace Rd. Loomis, CA
Site ID: ST2



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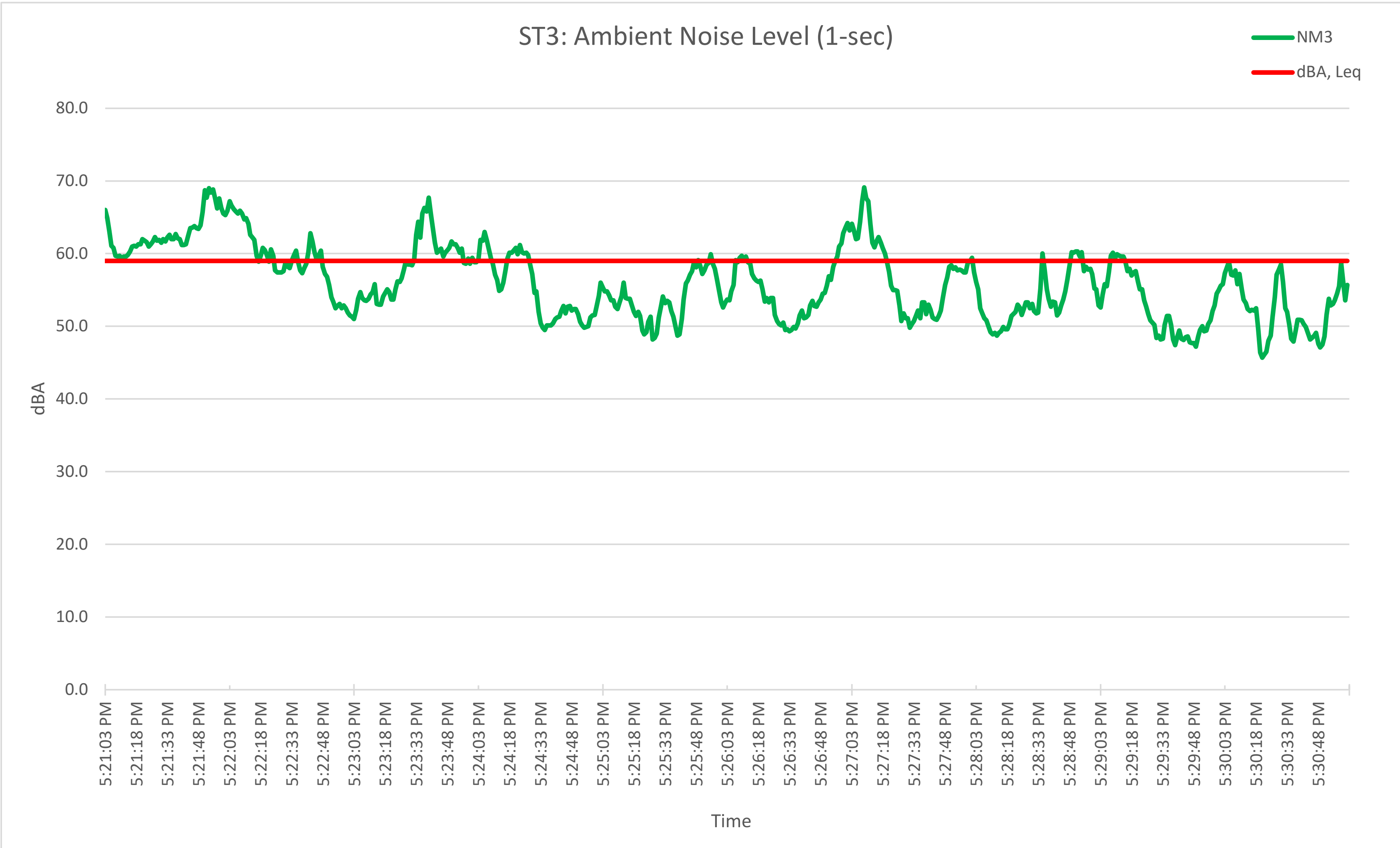
10-Minute Noise Measurement Datasheet - Cont.

Project: Quick Quack Loomis
Site Address/Location: Corner of Sierra College and Brace Rd. Loomis, CA
Site ID: ST3



CNEL CALCULATED FROM SITE MEASUREMENTS

PROJECT: Loomis Quick Quack
LOCATION: ST1

DATE: 31-Mar-20
JN: 0362-20-01

TIME BEGINNING	HOURLY LEQ		HOURLY LEQ WEIGHTING	ADJUSTED HOURLY LEQ
0000	62.9		10.0	72.9
0100	60.4		10.0	70.4
0200	59.2		10.0	69.2
0300	57.4		10.0	67.4
0400	58.4		10.0	68.4
0500	62.2		10.0	72.2
0600	68.6		10.0	78.6
0700	70.9		0.0	70.9
0800	69.0		0.0	69.0
0900	68.0		0.0	68.0
1000	67.9		0.0	67.9
1100	68.1		0.0	68.1
1200	68.2		0.0	68.2
1300	68.3		0.0	68.3
1400	68.6		0.0	68.6
1500	69.7		0.0	69.7
1600	71.3		0.0	71.3
1700	70.9	*	0.0	70.9
1800	69.2		0.0	69.2
1900	67.8		0.0	67.8
2000	66.7		0.0	66.7
2100	66.0		0.0	66.0
2200	65.0		10.0	75.0
2300	64.4		10.0	74.4
Ldn (dBA)				71.2

HR. MEASURED: 1700 *
MEASURED LEQ: 70.9 *

CNEL CALCULATED FROM SITE MEASUREMENTS

PROJECT: Loomis Quick Quack | DATE: 31-Mar-20
LOCATION: ST2 | JN: 0362-20-01

TIME BEGINNING	HOURLY LEQ		HOURLY LEQ WEIGHTING	ADJUSTED HOURLY LEQ
0000	53.7		10.0	63.7
0100	51.2		10.0	61.2
0200	50.0		10.0	60.0
0300	48.2		10.0	58.2
0400	49.2		10.0	59.2
0500	53.0		10.0	63.0
0600	59.4		10.0	69.4
0700	61.7		0.0	61.7
0800	59.8		0.0	59.8
0900	58.8		0.0	58.8
1000	58.7		0.0	58.7
1100	58.9		0.0	58.9
1200	59.0		0.0	59.0
1300	59.1		0.0	59.1
1400	59.4		0.0	59.4
1500	60.5		0.0	60.5
1600	62.1		0.0	62.1
1700	61.7	*	0.0	61.7
1800	60.0		0.0	60.0
1900	58.6		0.0	58.6
2000	57.5		0.0	57.5
2100	56.8		0.0	56.8
2200	55.8		10.0	65.8
2300	55.2		10.0	65.2
Ldn (dBA)				62.0

HR. MEASURED: 1700 *
MEASURED LEQ: 61.7 *

CNEL CALCULATED FROM SITE MEASUREMENTS

PROJECT: Loomis Quick Quack
LOCATION: ST3

DATE: 31-Mar-20
JN: 0362-20-01

TIME BEGINNING	HOURLY LEQ		HOURLY LEQ WEIGHTING	ADJUSTED HOURLY LEQ
0000	51.0		10.0	61.0
0100	48.5		10.0	58.5
0200	47.3		10.0	57.3
0300	45.5		10.0	55.5
0400	46.5		10.0	56.5
0500	50.3		10.0	60.3
0600	56.7		10.0	66.7
0700	59.0		0.0	59.0
0800	57.1		0.0	57.1
0900	56.1		0.0	56.1
1000	56.0		0.0	56.0
1100	56.2		0.0	56.2
1200	56.3		0.0	56.3
1300	56.4		0.0	56.4
1400	56.7		0.0	56.7
1500	57.8		0.0	57.8
1600	59.4		0.0	59.4
1700	59.0	*	0.0	59.0
1800	57.3		0.0	57.3
1900	55.9		0.0	55.9
2000	54.8		0.0	54.8
2100	54.1		0.0	54.1
2200	53.1		10.0	63.1
2300	52.5		10.0	62.5
Ldn (dBA)				59.3

HR. MEASURED: 1700 *
MEASURED LEQ: 59.0 *

Appendix B:

SoundPLAN Input/Outputs

R3 Ldn Calculation

Time	Existing	Project	Project Plus Existing	Energy E		Energy E+P	Ldn E+P
0:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
1:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
2:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
3:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
4:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
5:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
6:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
7:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
8:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
9:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
10:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
11:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
12:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
13:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
14:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
15:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
16:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
17:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
18:00	56.9	47.0	57.3	489778.819	50118.7234	539897.543	539897.543
19:00	53.1	47.0	54.1	204173.794	50118.7234	254292.518	254292.518
20:00	53.1	47.0	54.1	204173.794	50118.7234	254292.518	254292.518
21:00	53.1	0.0	53.1	204173.794	1	204174.794	204174.794
22:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
23:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
				44882023.9	701672.127		45583777
Ldn	63	45	63				

R1 Ldn Calculation

Time	Existing	Project	Project Plus Existing	Energy E		Energy E+P	Ldn E+P
0:00		0.0			1		
1:00		0.0			1		
2:00		0.0			1		
3:00		0.0			1		
4:00		0.0			1		
5:00		0.0			1		
6:00		0.0			1		
7:00		54.0			251188.643		
8:00		54.0			251188.643		
9:00		54.0			251188.643		
10:00		54.0			251188.643		
11:00		54.0			251188.643		
12:00		54.0			251188.643		
13:00		54.0			251188.643		
14:00		54.0			251188.643		
15:00		54.0			251188.643		
16:00		54.0			251188.643		
17:00		54.0			251188.643		
18:00		54.0			251188.643		
19:00		54.0			251188.643		
20:00		54.0			251188.643		
21:00		0.0			1		
22:00		0.0			1		
23:00		0.0			1		
					3516651		
Ldn	70	52	70	10000000	146527.125		

R2 Ldn Calculation

Time	Existing	Project	Project Plus Existing	Energy E		Energy E+P	Ldn E+P
0:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
1:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
2:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
3:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
4:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
5:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
6:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
7:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
8:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
9:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
10:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
11:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
12:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
13:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
14:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
15:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
16:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
17:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
18:00	63.5	51.0	63.7	2238721.14	125892.541	2364613.68	2364613.68
19:00	59.7	51.0	60.2	933254.301	125892.541	1059146.84	1059146.84
20:00	59.7	51.0	60.2	933254.301	125892.541	1059146.84	1059146.84
21:00	59.7	0.0	59.7	933254.301	1	933255.301	933255.301
22:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
23:00	62.9	0.0	62.9	19498446	1	1949845.6	19498456
				205150431	1762505.58		206913017
Ldn	69	49	69				

QQ 26-066 Loomis
Contribution spectra - 001 - 12 Sonny - Standard: Outdoor SP

Time slice	Sum dB(A)	25Hz dB(A)	31.5Hz dB(A)	40Hz dB(A)	50Hz dB(A)	63Hz dB(A)	80Hz dB(A)	100Hz dB(A)	125Hz dB(A)	160Hz dB(A)	200Hz dB(A)	250Hz dB(A)	315Hz dB(A)	400Hz dB(A)	500Hz dB(A)	630Hz dB(A)	800Hz dB(A)	1kHz dB(A)	1.25kHz dB(A)	1.6kHz dB(A)	2kHz dB(A)	2.5kHz dB(A)	3.15kHz dB(A)	4kHz dB(A)	5kHz dB(A)	6.3kHz dB(A)	8kHz dB(A)	10kHz dB(A)	12.5kHz dB(A)	16kHz dB(A)	20kHz dB(A)
Receiver 10655473,4297325 Fl G Lr,lim dB(A) Leq,d 53.8 dB(A) Sigma(Leq,d) 0.0 dB(A)																															
Leq,d	6.2					1.8			-8.4			-0.9			-0.9			-2.5			-4.9			-23.5			-57.9				
Leq,d	-9.6					-14.1			-25.2			-14.1			-16.2			-24.9			-35.6			-61.6							
Leq,d	5.8					1.7			-8.7			-0.8			-0.8			-4.9			-7.6			-26.2			-60.2				
Leq,d	0.7					-3.8			-13.9			-7.1			-6.5			-7.7			-9.2			-27.4			-59.9				
Leq,d	3.9					-0.6			-11.0			-3.3			-3.3			-4.5			-6.7			-25.3			-59.6				
Leq,d	53.7					21.7			25.6			34.4			41.0			48.7			51.4			36.3			1.8				
Leq,d	39.0					14.4			17.3			30.7			34.4			34.9			29.6			5.1			-34.4				
Leq,d	13.6	-20.7	-17.7	-10.7	-6.7	-3.7	0.3	-2.9	-2.0	1.0	3.7	4.7	0.6	-1.2	2.8	-3.4	0.5	1.3	-1.1	3.1	2.2	0.8	-1.4	-4.8	-12.1	-21.2	-36.3	-56.9	-83.6		
Leq,d	13.8	-20.6	-17.6	-10.6	-6.6	-3.6	0.4	-2.8	-1.8	1.1	3.9	4.8	0.7	-1.0	2.9	-3.2	0.6	1.4	-1.0	3.3	2.4	1.0	-1.1	-4.5	-11.7	-20.6	-35.6	-55.9	-82.2		
Leq,d	13.9	-20.5	-17.5	-10.5	-6.5	-3.5	0.5	-2.6	-1.7	1.3	4.0	4.9	0.8	-0.9	3.0	-3.1	0.8	1.5	-0.8	3.4	2.5	1.2	-0.9	-4.2	-11.4	-20.2	-35.0	-55.1	-81.1		
Leq,d	13.5	-20.8	-17.8	-10.8	-6.8	-3.8	0.2	-3.1	-2.1	0.8	3.6	4.5	0.5	-1.3	2.6	-3.5	0.3	1.1	-1.3	2.9	2.0	0.5	-1.7	-5.2	-12.6	-21.9	-37.2	-58.1	-85.2		
Leq,d	-0.1				-22.3	-15.0	-11.7	-13.4	-10.9	-10.2	-17.6	-15.3	-16.2	-18.7	-20.9	-17.0	-16.3	-14.3	-11.5	-9.7	-10.4	-13.6	-10.8	-12.4	-16.9	-22.9	-33.1	-51.3	-74.2		
Leq,d	-0.8				-28.0	-21.0	-14.1	-13.1	-10.4	-9.6	-14.5	-15.6	-16.7	-19.4	-21.6	-20.1	-20.0	-19.8	-13.5	-10.2	-10.8	-14.0	-11.2	-13.0	-17.7	-24.0	-34.8	-53.8	-77.9		
Leq,d	13.4	-20.9	-17.9	-10.9	-6.9	-3.9	0.1	-3.2	-2.2	0.7	3.5	4.4	0.3	-1.4	2.5	-3.6	0.3	1.0	-1.4	2.8	1.9	0.5	-1.8	-5.3	-12.7	-22.0	-37.4	-58.5	-85.8		
Leq,d	14.0	-20.3	-17.4	-10.4	-6.4	-3.4	0.6	-2.5	-1.5	1.4	4.1	5.0	0.9	-0.8	3.1	-3.0	0.9	1.6	-0.7	3.5	2.7	1.3	-0.8	-4.0	-11.1	-19.8	-34.4	-54.4	-80.0		
Leq,d	15.0	-20.3	-17.3	-10.3	-6.3	-3.3	0.7	-2.3	-1.3	1.6	4.2	5.1	1.0	-0.7	3.2	-2.9	1.6	2.5	0.4	5.0	4.6	3.8	2.7	0.9	-6.1	-14.7	-29.2	-49.0	-74.4		
Leq,d	15.9	-20.4	-17.3	-10.3	-6.3	-3.3	0.7	-2.4	-1.4	1.6	4.1	5.0	0.9	-0.8	3.1	-3.0	2.2	3.5	1.8	7.0	7.4	6.1	4.0	0.7	-6.4	-15.1	-29.8	-49.7	-75.5		
Leq,d	15.8	-20.5	-17.5	-10.4	-6.4	-3.4	0.6	-2.5	-1.5	1.5	3.9	4.9	0.8	-0.9	3.0	-3.2	2.1	3.3	1.6	6.8	7.3	5.9	3.8	0.5	-6.7	-15.6	-30.4	-50.5	-76.6		
Leq,d	14.9	-20.2	-17.2	-10.2	-6.2	-3.2	0.8	-2.2	-1.2	1.8	4.3	5.2	1.1	-0.6	3.3	-2.8	1.6	2.5	0.3	4.8	4.3	3.4	2.0	-0.3	-5.8	-14.3	-28.7	-48.2	-73.3		
Leq,d	15.6	-15.1	-12.1	-5.1	-1.1	1.9	4.9	1.8	2.6	5.4	4.7	5.6	1.5	-0.2	3.7	-2.4	2.9	3.3	0.5	4.3	3.0	1.1	-1.5	-5.3	-12.7	-21.8	-36.4	-56.1	-81.1		
Leq,d	16.4	-15.2	-12.2	-5.2	-1.2	1.8	4.9	1.9	2.7	5.5	4.5	5.5	1.4	-0.3	3.6	-2.5	4.0	4.7	2.2	6.3	5.3	3.8	1.6	-1.8	-9.0	-17.7	-32.2	-51.7	-76.7		
Leq,d	14.8	-20.1	-17.1	-10.1	-6.1	-3.1	0.9	-2.1	-1.1	1.9	4.4	5.3	1.3	-0.5	3.5	-2.7	1.6	2.5	0.2	4.7	4.0	3.0	1.4	-1.2	-7.3	-14.5	-28.1	-47.4	-72.1		
Leq,d	12.5	-20.1	-17.1	-10.2	-6.3	-3.4	0.4	-2.7	-1.9	0.8	4.5	5.4	1.3	-1.0	2.5	-4.1	-2.5	-2.4	-5.4	-1.8	-3.4	-5.5	-8.3	-12.3	-20.1	-29.4	-44.4	-64.6	-90.2		
Leq,d	13.6	-20.1	-17.2	-10.2	-6.2	-3.2	0.7	-2.3	-1.4	1.5	4.3	5.3	1.2	-0.5	3.4	-2.7	0.2	0.7	-1.9	2.1	0.9	-0.8	-3.3	-7.0	-14.6	-23.7	-38.7	-58.9	-84.6		
Leq,d	14.1	-20.2	-17.2	-10.2	-6.3	-3.3	0.7	-2.4	-1.4	1.5	4.2	5.1	1.1	-0.7	3.2	-2.9	0.9	1.6	-0.8	3.4	2.5	1.1	-1.0	-4.4	-11.5	-20.3	-35.0	-54.9	-80.5		
Leq,d	8.9	-20.4	-17.7	-11.0	-7.3	-4.8	-1.3	-4.8	-4.5	-2.2	1.7	1.9	-2.9	-5.8	-2.8	-9.7	-8.5	-8.6	-11.9	-8.5	-10.3	-12.5	-15.5	-19.5	-27.3	-36.6	-51.5	-71.2	-95.5		
Leq,d	15.6	-20.6	-17.6	-10.6	-6.5	-3.5	0.5	-2.7	-1.7	1.3	3.8	4.7	0.7	-1.1	2.8	-3.3	2.0	3.2	1.5	6.7	7.1	5.7	3.6	0.2	-7.0	-16.0	-30.9	-51.3	-77.7		
Leq,d	15.4	-20.7	-17.7	-10.7	-6.7	-3.6	0.4	-2.8	-1.8	1.2	3.7	4.6	0.5	-1.2	2.7	-3.4	1.8	3.0	1.2	6.3	6.8	5.6	3.4	0.0	-7.3	-16.4	-31.5	-52.2	-78.9		
Leq,d	13.8	-20.8	-17.8	-10.8	-6.8	-3.8	0.2	-3.1	-2.1	0.9	3.6	4.5	0.4	-1.3	2.6	-3.5	0.6	1.5	-0.8	3.5	2.8	1.6	-0.3	-3.4	-10.2	-18.6	-32.5	-52.9	-80.0		
Receiver 10655766,4297185 Fl G Lr,lim dB(A) Leq,d 50.6 dB(A) Sigma(Leq,d) 0.0 dB(A)																															
Leq,d	6.7					2.9			-7.1			0.4			0.3			-5.7			-8.9			-23.4			-42.6				
Leq,d	1.6					-1.9			-11.2			-3.9			-5.7			-13.8			-25.4			-47.8			-70.9				
Leq,d	8.0					5.0			-5.2			1.1			0.6			-5.4			-7.3			-22.5			-42.5				
Leq,d	-2.4					-4.2			-15.7			-10.1			-11.5			-22.0			-24.8			-39.4			-58.5				
Leq,d	5.2					2.0			-8.0			-1.7			-2.1			-7.3			-9.7			-24.5			-43.9				

QQ 26-066 Loomis
Contribution spectra - 001 - 12 Sonny - Standard: Outdoor SP

Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Leq,d	41.0					21.3			23.8			31.4			36.0			34.5			35.8			24.2			3.1				
Leq,d	50.0					27.4			32.1			40.8			44.9			46.6			39.0			19.0			-4.1				
Leq,d	23.9	-14.2	-11.2	-4.2	-0.2	2.8	6.8	5.4	6.4	9.4	11.5	12.5	8.5	6.8	10.7	4.7	9.2	10.4	8.7	13.7	14.3	15.1	14.2	12.7	8.4	4.0	-4.2	-14.7	-27.2	-45.2	-68.6
Leq,d	20.7	-9.5	-6.5	0.5	3.3	6.1	9.8	8.1	8.8	11.4	11.3	11.8	7.1	4.5	7.8	0.9	6.8	7.0	3.9	7.4	6.1	4.6	2.8	0.4	-4.8	-10.1	-19.1	-30.4	-43.8	-62.5	-86.7
Leq,d	19.8	-9.5	-6.5	0.5	4.5	6.2	9.9	8.0	8.6	11.1	11.2	11.5	6.7	3.8	6.7	-0.5	3.8	3.4	-0.1	3.0	1.4	-0.4	-2.4	-5.0	-10.3	-15.4	-24.3	-35.4	-48.5	-67.0	-90.9
Leq,d	22.9	-14.3	-11.3	-4.3	-0.3	2.7	6.7	5.3	6.3	9.3	11.5	12.5	8.4	6.7	10.7	4.6	8.6	9.7	7.7	12.4	12.4	12.3	12.0	11.6	8.4	4.0	-4.2	-14.7	-27.3	-45.3	-68.8
Leq,d	5.8				-21.3	-14.4	-7.6	-7.8	-5.2	-4.5	-7.3	-8.4	-9.4	-12.0	-14.1	-12.6	-12.7	-12.3	-9.7	-8.0	-4.8	-7.5	-3.8	-4.0	-6.1	-8.4	-12.8	-22.5	-33.5	-49.4	
Leq,d	-2.0				-23.6	-17.3	-11.1	-12.2	-10.3	-10.2	-14.0	-15.7	-17.1	-20.2	-22.7	-21.5	-21.5	-21.4	-18.9	-15.7	-16.1	-19.4	-16.0	-16.2	-18.0	-19.9	-24.1	-33.8	-45.1	-62.0	
Leq,d	23.6	-14.3	-11.3	-4.3	-0.3	2.7	6.7	5.3	6.3	9.3	11.5	12.4	8.4	6.7	10.6	4.6	9.0	10.1	8.3	13.2	13.6	14.1	14.1	12.6	8.3	3.9	-4.3	-14.9	-27.5	-45.6	-69.1
Leq,d	25.5	-9.5	-6.5	0.5	4.5	7.5	11.5	10.0	11.0	14.0	11.6	12.5	8.5	6.8	10.7	4.7	12.9	13.8	11.7	16.1	15.7	15.1	14.2	12.7	8.5	4.1	-4.1	-14.6	-27.1	-45.0	-68.4
Leq,d	18.8	-11.1	-8.3	-1.6	2.1	4.7	8.3	6.7	7.2	9.6	9.5	9.7	4.8	2.0	5.0	-2.1	3.5	3.5	0.5	5.9	4.8	3.4	1.5	-1.1	-6.4	-11.7	-20.2	-30.5	-42.4	-59.4	-81.3
Leq,d	25.6	-13.3	-10.3	-3.3	0.7	3.7	7.7	6.5	7.5	10.6	12.8	13.8	9.8	8.0	12.0	6.0	10.6	11.9	10.4	15.9	17.0	16.4	15.6	14.3	10.3	6.2	-1.3	-10.9	-22.1	-38.4	-59.7
Leq,d	19.0	-8.6	-5.6	1.4	5.4	5.9	9.4	7.6	8.0	10.4	9.9	10.0	5.0	2.0	4.8	-2.6	1.9	1.4	-2.1	4.3	3.1	1.6	-0.5	-3.3	-9.0	-14.6	-23.2	-33.4	-45.0	-61.7	-83.3
Leq,d	16.3	-12.0	-9.4	-2.9	0.5	2.9	6.3	4.3	4.5	6.7	7.9	7.9	2.8	-0.4	2.3	-5.1	-1.9	-2.1	-5.4	2.9	1.8	0.4	-1.6	-4.5	-10.4	-16.1	-24.5	-34.5	-46.0	-62.6	-84.1
Leq,d	15.3	-12.6	-10.1	-3.7	-0.3	2.0	5.3	3.2	3.4	5.4	7.1	7.0	1.9	-1.4	1.2	-6.3	-4.1	-4.6	-8.1	1.9	0.9	-0.5	-2.7	-5.7	-11.8	-17.6	-25.9	-35.9	-47.4	-63.9	-85.6
Leq,d	15.2	-12.8	-10.4	-4.0	-0.6	1.7	5.0	2.9	3.1	5.2	7.1	7.0	1.9	-1.4	1.2	-6.3	-4.3	-4.7	-8.1	2.0	1.0	-0.4	-2.5	-5.6	-11.7	-17.4	-25.8	-35.7	-47.1	-63.6	-85.2
Leq,d	15.5	-12.6	-10.1	-3.7	-0.3	2.0	5.3	3.3	3.4	5.5	7.4	7.3	2.1	-1.1	1.5	-5.9	-3.6	-4.0	-7.4	2.3	1.2	-0.2	-2.3	-5.3	-11.3	-17.0	-25.4	-35.4	-46.8	-63.3	-84.8
Leq,d	16.9	-12.0	-9.4	-2.8	0.8	3.3	6.7	4.7	5.1	7.3	9.3	9.5	4.5	1.4	4.1	-3.2	-1.0	-1.3	-4.7	-1.4	-2.9	-4.6	-6.5	-9.0	-13.9	-18.8	-27.3	-38.2	-51.0	-69.2	-92.8
Leq,d	17.8	-11.6	-8.9	-2.2	1.5	4.1	7.7	5.7	6.2	8.6	9.9	10.1	5.1	2.1	4.9	-2.3	1.1	0.9	-2.3	1.0	-0.4	-2.0	-3.9	-6.4	-11.5	-16.6	-25.4	-36.4	-49.4	-67.8	-91.6
Leq,d	20.1	-11.3	-8.4	-1.6	2.2	5.0	8.8	7.1	7.8	10.4	10.9	11.3	6.6	3.9	7.1	0.2	6.0	6.3	3.5	7.3	6.2	4.8	3.1	0.9	-4.2	-9.5	-18.4	-29.7	-43.0	-61.8	-85.9
Leq,d	16.5	-12.3	-9.7	-3.2	0.4	2.8	6.3	4.2	4.5	6.8	9.0	9.1	4.1	1.0	3.7	-3.7	-1.9	-2.3	-5.7	-1.4	-2.7	-4.6	-6.9	-9.7	-14.7	-19.6	-28.1	-38.9	-51.6	-69.8	-93.5
Leq,d	22.1	-8.6	-5.6	1.4	3.4	6.1	9.8	8.3	9.0	11.7	11.0	11.5	6.9	4.6	8.1	1.7	8.8	9.4	7.0	11.6	10.9	10.0	8.7	6.8	2.2	-2.5	-10.6	-20.9	-32.9	-49.9	-72.0
Leq,d	25.7	-13.3	-10.3	-3.3	0.7	3.7	7.7	6.5	7.5	10.6	12.8	13.8	9.7	8.0	12.0	5.9	11.0	12.5	11.2	17.1	16.8	16.3	15.5	14.2	10.2	6.2	-1.4	-11.0	-22.2	-38.6	-59.9
Leq,d	24.6	-13.4	-10.4	-3.4	0.6	3.6	7.6	6.4	7.4	10.4	12.7	13.7	9.7	8.0	11.9	5.9	9.9	11.0	9.1	13.9	14.1	14.3	14.6	14.2	10.2	6.1	-1.4	-11.1	-22.4	-38.8	-60.2
Receiver 10655916,4297246 Fl G Lr,lim dB(A) Leq,d 47.1 dB(A) Sigma(Leq,d) 0.0 dB(A)																															
Leq,d	2.3					-1.3			-11.4			-5.0			-5.2			-7.7			-10.1			-25.6			-48.8				
Leq,d	-3.1					-8.1			-17.3			-7.5			-9.4			-16.3			-28.0			-51.3			-78.1				
Leq,d	10.6					6.0			-3.1			3.5			3.6			2.0			-0.4			-16.2			-40.3				
Leq,d	-3.4					-5.1			-17.1			-11.8			-13.0			-24.1			-29.4			-45.6			-70.9				
Leq,d	5.9					1.8			-7.8			-1.1			-1.2			-3.5			-5.9			-21.6			-45.3				
Leq,d	38.2					20.6			22.4			29.5			34.2			31.9			30.5			18.4			-8.8				
Leq,d	46.3					20.4			25.0			37.1			41.1			43.2			35.5			14.5			-12.4				
Leq,d	13.9	-13.8	-11.1	-4.5	-1.0	1.4	4.7	2.1	2.3	4.4	5.4	5.4	0.5	-2.5	0.5	-6.5	-3.0	-3.1	-6.3	-2.8	-4.3	-6.0	-8.1	-10.8	-16.3	-22.0	-31.7	-44.1	-59.2	-80.4	
Leq,d	14.2	-13.8	-11.1	-4.4	-0.8	1.6	5.0	2.4	2.6	4.8	5.8	5.8	0.8	-2.1	0.9	-6.1	-2.5	-2.6	-5.8	-2.3	-3.8	-5.5	-7.6	-10.4	-16.2	-22.0	-31.9	-44.6	-60.0	-81.7	
Leq,d	14.5	-13.9	-11.1	-4.4	-0.8	1.7	5.2	2.6	2.9	5.1	6.0	6.1	1.1	-1.8	1.3	-5.7	-2.1	-2.1	-5.3	-1.8	-3.3	-5.0	-7.2	-10.0	-15.8	-22.0	-32.1	-45.1	-60.8	-82.9	
Leq,d	13.5	-13.8	-11.2	-4.6	-1.2	1.2	4.4	1.8	2.0	4.0	5.1	5.1	0.1	-2.9	0.1	-6.9	-3.5	-3.6	-6.8	-3.3	-4.8	-6.4	-8.5	-11.2	-16.4	-21.9	-31.4	-43.6	-58.4	-79.2	

QQ 26-066 Loomis
Contribution spectra - 001 - 12 Sonny - Standard: Outdoor SP

Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Leq,d	-0.1				-25.0	-18.2	-11.5	-12.6	-10.1	-9.5	-12.0	-13.0	-14.0	-16.7	-18.9	-16.9	-16.9	-16.2	-13.7	-12.1	-12.7	-15.9	-12.7	-11.3	-14.6	-17.2	-24.5	-38.5	-55.3	-79.3	
Leq,d	-6.5				-29.8	-23.5	-17.2	-18.8	-16.7	-16.4	-22.6	-24.1	-25.6	-28.6	-31.1	-24.9	-21.0	-20.8	-18.4	-16.9	-17.6	-20.6	-17.4	-18.3	-21.4	-24.8	-31.3	-44.5	-60.6	-83.9	
Leq,d	13.3	-13.8	-11.2	-4.7	-1.3	1.0	4.2	1.6	1.7	3.8	5.0	5.0	0.0	-3.0	0.0	-7.0	-3.9	-4.0	-7.1	-3.7	-5.1	-6.8	-8.8	-11.3	-16.4	-21.8	-31.1	-43.1	-57.5	-77.9	
Leq,d	14.7	-13.9	-11.1	-4.4	-0.7	1.9	5.3	2.8	3.1	5.3	6.2	6.2	1.3	-1.6	1.5	-5.5	-1.6	-1.7	-4.8	-1.3	-2.8	-4.5	-6.7	-9.6	-15.5	-21.8	-32.1	-45.4	-61.5	-84.0	
Leq,d	22.5	-15.8	-12.8	-5.7	-1.7	1.4	5.6	3.9	5.1	8.4	9.1	10.1	6.1	4.4	8.3	2.2	10.7	11.6	9.4	13.8	13.3	12.6	11.4	9.5	4.6	-0.8	-10.4	-23.0	-38.5	-60.4	-88.7
Leq,d	20.2	-13.1	-10.2	-3.2	0.7	3.6	7.5	5.5	6.3	9.1	9.4	10.3	6.1	3.7	7.2	0.7	6.9	7.6	5.2	9.5	8.9	8.1	6.8	4.9	0.0	-5.4	-14.9	-27.4	-42.7	-64.4	-92.4
Leq,d	19.7	-13.0	-10.0	-3.1	0.8	3.7	7.6	5.6	6.4	9.2	9.6	10.3	5.6	3.1	6.4	-0.2	6.3	7.0	4.5	8.7	8.0	6.9	5.4	3.3	-1.9	-7.6	-17.5	-30.2	-45.7	-67.5	-95.6
Leq,d	21.8	-16.2	-13.1	-6.1	-2.1	0.9	4.9	3.0	4.0	7.1	8.9	9.9	5.9	4.2	8.1	2.0	7.6	9.1	7.8	13.6	13.1	12.3	11.1	9.2	4.3	-1.2	-11.0	-23.8	-39.6	-61.9	-90.7
Leq,d	20.4	-16.7	-13.7	-6.7	-2.6	0.4	4.4	2.3	3.3	6.4	8.3	9.3	5.2	3.5	7.5	1.4	6.1	7.5	5.6	10.5	10.7	11.1	10.4	8.3	3.2	-2.6	-12.8	-26.3	-43.0	-66.6	-96.9
Leq,d	20.7	-16.5	-13.5	-6.5	-2.5	0.5	4.5	2.5	3.5	6.6	8.5	9.5	5.4	3.7	7.7	1.6	6.4	7.5	5.7	10.7	11.0	11.5	10.6	8.6	3.5	-2.2	-12.2	-25.5	-41.9	-65.0	-94.8
Leq,d	21.2	-16.3	-13.3	-6.3	-2.3	0.7	4.7	2.8	3.8	6.8	8.7	9.7	5.6	3.9	7.9	1.8	6.8	8.1	6.4	11.6	12.4	12.1	10.9	8.9	3.9	-1.7	-11.6	-24.7	-40.8	-63.5	-92.8
Leq,d	15.4	-14.1	-11.2	-4.4	-0.6	2.1	5.7	3.3	3.7	6.1	6.6	6.7	1.8	-1.0	2.1	-4.8	0.1	0.1	-3.0	0.5	-0.9	-2.7	-4.9	-7.8	-13.9	-20.6	-31.6	-45.6	-62.8	-86.7	
Leq,d	15.1	-14.0	-11.2	-4.4	-0.7	2.0	5.6	3.1	3.5	5.8	6.4	6.5	1.6	-1.2	1.8	-5.1	-0.6	-0.6	-3.7	-0.2	-1.7	-3.4	-5.6	-8.6	-14.6	-21.2	-31.9	-45.7	-62.5	-86.0	
Leq,d	14.9	-14.0	-11.1	-4.4	-0.7	2.0	5.5	3.0	3.3	5.6	6.3	6.4	1.4	-1.4	1.6	-5.3	-1.1	-1.1	-4.2	-0.8	-2.2	-4.0	-6.2	-9.1	-15.0	-21.6	-32.0	-45.6	-62.0	-85.0	
Leq,d	16.0	-14.2	-11.3	-4.4	-0.6	2.2	5.8	3.4	3.9	6.4	6.9	7.0	2.1	1.2	4.3	-2.7	1.5	1.6	-1.5	2.1	0.6	-1.1	-3.4	-6.4	-12.5	-19.3	-30.6	-44.9	-62.4	-86.8	
Leq,d	19.0	-12.8	-9.9	-3.0	0.9	3.7	7.6	5.6	6.4	9.1	9.4	9.7	5.0	2.4	5.6	-1.1	5.5	5.9	3.3	7.2	6.3	5.0	3.2	0.8	-4.6	-10.5	-20.4	-33.2	-48.6	-70.1	-97.7
Leq,d	18.3	-12.7	-9.8	-2.9	0.9	3.7	7.5	5.5	6.2	8.8	8.9	9.1	4.3	1.6	4.9	-1.9	4.5	4.8	2.0	5.7	4.6	3.2	1.3	-1.2	-6.7	-12.5	-22.4	-34.9	-50.0	-71.1	-98.2
Leq,d	17.5	-12.7	-9.8	-2.9	0.9	3.6	7.3	5.3	5.8	8.3	8.2	8.3	3.5	0.8	4.0	-2.9	3.2	3.4	0.5	4.1	2.9	1.4	-0.6	-3.1	-8.5	-14.3	-24.0	-36.3	-51.0	-71.7	-98.2

Source	Source type	Leq,d dB(A)
Receiver 10655473,4297325 Fl G Lr,lim dB(A) Leq,d 53.8 dB(A) Sigma(Leq,d) 0.0 dB(A)		
001 - 12 Sonny - Standard Tunnel-Transmissive area 01	Area	53.7
001 - 12 Sonny - Standard Tunnel-Transmissive area 02	Area	39.0
Vacs	Point	16.4
Vacs	Point	15.9
Vacs	Point	15.8
Vacs	Point	15.6
Vacs	Point	15.6
Vacs	Point	15.4
Vacs	Point	15.0
Vacs	Point	14.9
Vacs	Point	14.8
Vacs	Point	14.1
Vacs	Point	14.0
Vacs	Point	13.9
Vacs	Point	13.8
Vacs	Point	13.8
Vacs	Point	13.6
Vacs	Point	13.6
Vacs	Point	13.5
Vacs	Point	13.4
Vacs	Point	12.5
Vacs	Point	8.9
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	6.2
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	5.8
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	3.9
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	0.7
Vacs	Point	-0.1
Vacs	Point	-0.8
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	-9.6
Receiver 10655766,4297185 Fl G Lr,lim dB(A) Leq,d 50.6 dB(A) Sigma(Leq,d) 0.0 dB(A)		
001 - 12 Sonny - Standard Tunnel-Transmissive area 02	Area	50.0
001 - 12 Sonny - Standard Tunnel-Transmissive area 01	Area	41.0
Vacs	Point	25.7
Vacs	Point	25.6
Vacs	Point	25.5
Vacs	Point	24.6
Vacs	Point	23.9
Vacs	Point	23.6
Vacs	Point	22.9
Vacs	Point	22.1
Vacs	Point	20.7
Vacs	Point	20.1
Vacs	Point	19.8

Source	Source type	Leq,d dB(A)	
Vacs	Point	19.0	
Vacs	Point	18.8	
Vacs	Point	17.8	
Vacs	Point	16.9	
Vacs	Point	16.5	
Vacs	Point	16.3	
Vacs	Point	15.5	
Vacs	Point	15.3	
Vacs	Point	15.2	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	8.0	
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	6.7	
Vacs	Point	5.8	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	5.2	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	1.6	
Vacs	Point	-2.0	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	-2.4	
Receiver 10655916,4297246 Fl G Lr,lim dB(A) Leq,d 47.1 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Sonny - Standard Tunnel-Transmissive area 02	Area	46.3	
001 - 12 Sonny - Standard Tunnel-Transmissive area 01	Area	38.2	
Vacs	Point	22.5	
Vacs	Point	21.8	
Vacs	Point	21.2	
Vacs	Point	20.7	
Vacs	Point	20.4	
Vacs	Point	20.2	
Vacs	Point	19.7	
Vacs	Point	19.0	
Vacs	Point	18.3	
Vacs	Point	17.5	
Vacs	Point	16.0	
Vacs	Point	15.4	
Vacs	Point	15.1	
Vacs	Point	14.9	
Vacs	Point	14.7	
Vacs	Point	14.5	
Vacs	Point	14.2	
Vacs	Point	13.9	
Vacs	Point	13.5	
Vacs	Point	13.3	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	10.6	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	5.9	
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	2.3	
Vacs	Point	-0.1	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	-3.1	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	-3.4	

QQ 26-066 Loomis
Contribution level - 001 - 12 Sonny - Standard: Outdoor SP

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Source	Source type	Leq,d dB(A)	
Vacs	Point	-6.5	

QQ 26-066 Loomis
Octave spectra of the sources in dB(A) - 001 - 12 Sonny - Standard: Outdoor SP

Name	Source type	I or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	178.42	100.6	57.0	46.3	68.9	0.0	0.0		3	100%/24h	72_Facade 01_	58.1	52.8	63.6	65.8	57.3	52.7	40.7	30.2	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	19.43	92.1	57.0	41.5	54.4	0.0	0.0		3	100%/24h	73_Facade 02_	42.7	36.8	50.9	51.0	36.8	22.9	3.0	-11.2	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	178.42	100.6	57.0	46.3	68.9	0.0	0.0		3	100%/24h	74_Facade 03_	58.1	52.8	63.6	65.8	57.3	52.7	40.7	30.2	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	25.74	103.5	57.0	48.5	62.6	0.0	0.0		3	100%/24h	75_Facade 04_	52.0	46.7	56.9	59.7	52.0	47.8	35.8	25.9	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	206.64	100.5	57.0	46.3	69.4	0.0	0.0		0	100%/24h	70_Roof 01_	58.6	53.3	64.2	66.4	57.9	53.3	41.2	30.8	
001 - 12 Sonny - Standard Tunnel-Transmissive area 01	Area	9.29	103.5	0.0	103.5	113.2	0.0	0.0		3	100%/24h	106_Transmissive area 01_	77.5	86.3	98.4	107.2	108.6	108.4	99.5	87.6	
001 - 12 Sonny - Standard Tunnel-Transmissive area 02	Area	15.61	91.7	0.0	91.7	103.6	0.0	0.0		3	100%/24h	107_Transmissive area 02_	71.2	79.3	95.7	101.6	96.5	86.5	68.9	54.7	
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				72.6	72.6	0.0	0.0		0	100%/24h	Vacutech Turbine	44.9	57.3	55.1	52.0	55.6	59.5	66.2	69.5	63.7
Vacs	Point				72.6	72.6	0.0	0.0		0	100%/24h	Vacutech Turbine	44.9	57.3	55.1	52.0	55.6	59.5	66.2	69.5	63.7
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1

QQ 26-066 Loomis
Octave spectra of the sources in dB(A) - 001 - 12 Sonny - Standard: Outdoor SP

Name	Source type	I or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1
Vacs	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6	67.6	58.1

Appendix C:
Traffic Counts and Calcs

Table 8-6 serves as a guide when applying traffic noise exposure contour information to areas with varying topography. The table is used by adding the correction factor to the predicted noise level for a given location. The factors included in this table present conservative (worst-case) results, and complex situations should be evaluated by an acoustical consultant when the potential for a significant noise impact exists.

· **Roadways.** Roadway traffic is the primary source of noise in the Loomis community. Interstate 80 carries by far the most traffic through the area, and is consequently the major noise contributor. The 60 dBA Ldn contour from I-80 ranges from 1,650 to 1,750 feet from centerline. However, this distance is likely much less than modeled, because of topographic attenuation (see Table 8-6) and intervening buildings.

Taylor Road and Sierra College Boulevard are the only other roadways that carry sufficient traffic to produce audible noise at a significant distance. The 60 dBA Ldn contour for these roads typically ranges from 200 to 400 feet, and less where there are intervening structures. Horseshoe Bar Road, King Road and Rocklin Road carry moderate traffic (4,000-5,000 ADT), but not enough to produce far-reaching noise contours. The noise model predicts that the 60 dBA Ldn contour would be less than 100 feet from the center of those roadways. Figure 8-5 and Table 8-5 provide more detailed information.

Table 8-5 - Existing Traffic Noise Levels

Roadway Segment	**Traffic (ADT)**	**Distance to Ldn Contour from Centerline (feet)**		
		70 dB	**65 dB**	**60 dB**
Interstate 80 Sierra College Blvd. to Horseshoe Bar Rd.	84,000	379	816	1,757
Interstate 80 Horseshoe Bar Rd. to Penryn exit	78,000	360	776	1,672
Sierra College Boulevard Interstate 80 to Taylor Road	12,300	84	181	390
Sierra College Boulevard Taylor Road to Bankhead Road	9,300	70	150	324
Sierra College Boulevard n/o King Road	6,100	53	113	244
Taylor Road e/o Sierra College Blvd.	10,500	58	126	271
Taylor Road s/o King Road	13,800	51	110	238
Horseshoe Bar Road Interstate 80 to Brace Road	5,300	-	40	86
King Road w/o Swetzer Road	5,300	-	40	86
Rocklin Road w/o Barton Road	4,500	-	36	77
Barton Road n/o Rocklin Road	1,700	-	-	40
Laird Road s/o High Cliff Road	1,900	-	-	44

Source:
Traffic

moving in both directions, and taken near roadway crossings (Boulder Ridge Road, west of Del Mar Avenue; and Webb Street, south of King Road) where train whistles were blown.

According to Union Pacific officials, the number of trains traveling through Loomis fluctuates, but typically includes 8 to 14 trains per day (Union Pacific, 2000). This number is consistent with a 1996 Surface Transportation Board ruling that limits the number of trains passing through Reno, Nevada, to 15 as a condition of the recent Union Pacific/Southern Pacific merger (Mike Furtney, Union Pacific, 1998). For the purpose of this analysis, the worst case (14 trains) is assumed, evenly distributed between east and westbound freight. The analysis also assumes that each train is pulled by an average of 3 to 4 engines, and carries an average of about 100 cars. About half the trains traverse the community at night, with whistles blown at all at-grade crossings. The average train speed is estimated to be about 50 miles per hour.

Amtrak operates two eastbound and two westbound passenger trains daily that pass through Loomis. All four passenger trains pass through the Town during the day or early evening.

To determine the distance to noise contours, it is necessary to calculate the Ldn for typical rail operations. This is accomplished by using the recorded SEL values and the known number of trains. The Ldn may be calculated as follows:

$$Ldn = SEL + 10\log N - 49.4 \text{ dB, where:}$$

SEL is the mean SEL of the event, N is the sum of the number of day and evening trains per day plus 10 times the number of nighttime (10pm to 7 am) trains per day, and 49.4 is ten times the logarithm of the number of seconds per day. Based on this information, the calculated noise contour distances from each rail line are shown in Table 8-7. These contours are depicted graphically in Figure 8-5. It should be noted that nearly all of the rail noise is a result of freight traffic. The amount of noise contributed by passenger trains is considered negligible.

Table 8-7 - Approximate Distance to Existing Rail Noise Contours

Train Source	**Recorded SEL**	**Ldn, at 100 feet**	**Distance to Ldn contour (feet)**		
			70	***65***	***60***
Union Pacific (freight)	108.7	75.2	-	-	-
Amtrak (passenger)	94.0	47.6	-	-	-
Combined Ldn	**n/a**	**75.2**	**223**	**480**	**1,035**

Assumes 7 freight and 2 passenger trains in each direction daily. 3.5 freight and no passenger trains at night. SEL recorded with noise meter at crossings at Boulder Ridge Road and Webb Street, with each train blowing its whistle during the crossing.

- **Stationary Noise Sources.** Industrial and commercial operations can be significant sources of noise, depending on the type and hours of operation. Stationary noise sources of concern typically include generators, pumps, air compressors, outdoor speakers, motors, heavy equipment and similar machinery. These are usually often associated with trucking companies, tire shops, auto mechanic shops, metal shops, shopping centers, drive-up windows, car washes, loading docks, gravel operations, athletic fields, and electric generating stations.

New traffic counts conducted in May 2009 for this study reveal that Taylor Road carried an *Average Daily Traffic (ADT)* volume of roughly 10,300 vehicles per day in the area between Sierra College Blvd and Horseshoe Bar Road, with the volume rising to 19,700 ADT between Horseshoe Bar Road and Webb Street and dropping to 16,330 ADT between Webb Street and King Road.

Traffic volumes reported on Taylor Road have been higher in the past. March 2007 traffic counts indicated that Taylor Road carried 21,710 ADT in the area from Horseshoe Bar Road to Webb Street and 17,580 ADT between Webb Street and King Road in the vicinity of the proposed project. These volumes indicate a drop of 7% to 10% over the last two years.

Horseshoe Bar Road. Horseshoe Bar Road is the primary gateway to Loomis from Interstate 80. This arterial street originates at an intersection on Taylor Road in downtown Loomis and continued east across the interchange on Interstate 80. Beyond Interstate 80 Horseshoe Bar Road continues for several miles into the rural area of Placer County near Folsom Lake. Horseshoe Bar Road is a two lane road with auxiliary left turn lanes at major intersections. On-street parking is permitted at a limited number of locations on Horseshoe Bar Road, and the speed limit is 25 mph. New traffic counts made for this study in May 2009 indicated that Horseshoe bar Road carried roughly 14,170 ADT in the area between Library Drive and Taylor Road, with 15,710 ADT counted between Doc Barnes Drive and the Interstate 80 ramps.

Sierra College Blvd. Sierra College Blvd is a major arterial street that links Loomis with the City of Lincoln to the north and with Interstate 80 and the City of Rocklin to the south. Today, Sierra College Blvd has one travel lane in each direction from Rocklin Road across Interstate 80 to its northern terminus at SR 193. Incremental widening has occurred to accommodate auxiliary turn lanes at the Taylor Road intersection and the two lane road was recently widened to a multi-lane facility in the area south of Granite Drive near the Interstate 80 interchange. Another improvement project to complete a 4 lane section on Sierra College Blvd south of Taylor Road is being pursued by the City of Rocklin and the South Placer Regional Transportation Agency (SPRTA). According to the City of Rocklin, this project will not alter the Taylor Road / Sierra College Blvd intersection. Year 2007 traffic counts revealed that Sierra College Blvd carries about, 15,724 ADT between Granite Drive and Brace Road and 10,585 ADT north of the Taylor Road intersection.

King Road. King Road is an east-west arterial road that provides regional access to Loomis and the rural areas of Placer County surrounding the Town. King Road originates at an intersection on Sierra College Blvd in western Loomis and continues easterly across Taylor Road, over Interstate 80 and ultimately to an intersection on Auburn Folsom Road near Folsom Lake. King Road is a two lane road with auxiliary turn lanes at major intersections. Traffic counts made in 2007 indicated that King Road carried 7,025 ADT between Taylor Road and Boyington Road.

Several local Town streets provide access to the properties in the Town Center area.

TABLE 3
CURRENT DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE

Roadway	Segment from	To	# of Lanes	General Plan Capacity (veh/day)	Average Daily Traffic	Daily Volume / Capacity Ratio	LOS
Taylor Road	Sierra College Blvd	Circle Drive	2+	15,000	10,204	0.68	B
	Circle Drive	Oak Street	2	15,000	10,303	0.69	B
	Oak Street	Horseshoe Bar Road	2	15,000	10,210	0.68	B
	Horseshoe Bar Road	Webb Street	2	15,000	19,697	1.31	**F**
	Webb Street	King Road	2	15,000	16,329	1.09	**F**
Horseshoe Bar Rd	Taylor Road	Library Drive	2	15,000	14,166	0.94	**E**
	Library Drive	Westbound I-80 ramps	2	15,000	15,706	1.05	**F**
Oak Street	Taylor Road	Magnolia Street	2	15,000	676	0.05	A
Walnut Street	Taylor Road	Magnolia Street	2	15,000	1,293	0.09	A
Webb Street	Taylor Road	Saunders Avenue	2	15,000	3,761	0.25	A

+ indicates presence of two way left turn lane

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	Loomis Quick Quack	JOB #:	0362-20-01
ROADWAY:	Sierra College Blvd from I80 to Taylor Rd	DATE:	31-Mar-20
LOCATION:	South Office	ENGINEER	Claire

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	22,429
SPEED =	40
PK HR % =	10
NEAR LANE/FAR LANE DIS	50
ROAD ELEVATION =	0.0
GRADE =	0.0 %
PK HR VOL =	2,243

RECEIVER INPUT DATA

RECEIVER DISTANCE =		125
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		125
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.105	0.8900
MEDIUM TRUCK	0.480	0.020	0.500	0.0500
HEAVY TRUCKS	0.480	0.020	0.500	0.0600

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	122.51	- -
MEDIUM TRUCKS	4.0	122.48	- -
HEAVY TRUCKS	8.0	122.51	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.9	59.9	58.6	52.6	61.0	61.6
MEDIUM TRUCKS	58.3	54.4	46.6	55.8	61.9	62.0
HEAVY TRUCKS	64.0	60.0	52.2	61.4	67.6	67.6
NOISE LEVELS (dBA)	66.7	63.5	59.7	62.9	69.3	69.4

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.9	59.9	58.6	52.6	61.0	61.6
MEDIUM TRUCKS	58.3	54.4	46.6	55.8	61.9	62.0
HEAVY TRUCKS	64.0	60.0	52.2	61.4	67.6	67.6
NOISE LEVELS (dBA)	66.7	63.5	59.7	62.9	69.3	69.4

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	115	247	533	1148
LDN	113	243	523	1126

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	Loomis Quick Quack	JOB #:	0362-20-01
ROADWAY:	Sierra College Blvd from I80 to Taylor Rd	DATE:	31-Mar-20
LOCATION:	East Residence	ENGINEER	Claire

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	22,429
SPEED =	40
PK HR % =	10
NEAR LANE/FAR LANE DIS	50
ROAD ELEVATION =	0.0
GRADE =	0.0 %
PK HR VOL =	2,243

RECEIVER INPUT DATA

RECEIVER DISTANCE =		340
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		340
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.105	0.8900
MEDIUM TRUCK	0.480	0.020	0.500	0.0500
HEAVY TRUCKS	0.480	0.020	0.500	0.0600

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	339.09	- -
MEDIUM TRUCKS	4.0	339.08	- -
HEAVY TRUCKS	8.0	339.09	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	55.3	53.2	52.0	45.9	54.3	55.0
MEDIUM TRUCKS	51.7	47.7	40.0	49.2	55.3	55.3
HEAVY TRUCKS	57.3	53.4	45.6	54.8	61.0	61.0
NOISE LEVELS (dBA)	60.1	56.9	53.1	56.3	62.7	62.8

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	55.3	53.2	52.0	45.9	54.3	55.0
MEDIUM TRUCKS	51.7	47.7	40.0	49.2	55.3	55.3
HEAVY TRUCKS	57.3	53.4	45.6	54.8	61.0	61.0
NOISE LEVELS (dBA)	60.1	56.9	53.1	56.3	62.7	62.8

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	113	243	524	1128
LDN	111	238	514	1107

Appendix D:

Construction Noise Modeling Output

Activity	L_{eq} at 250 feet dBA	L_{Max} at 250 feet dBA
Grading	62	66
Building Construction	63	65
Paving	62	64

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Pavers	80
Dozers	85
Scrappers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	85
Air Compressors	86
Trucks	86

Grading

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements									
1	Grader	85	1	40	400	0.5	0	62.4	58.4	698771.243
2	Dozer	85	1	40	400	0.5	0	62.4	58.4	698771.243
3	Tractor/Backhoe	80	1	40	400	0.5	0	57.4	53.4	220970.869
4										
							Lmax*	**66**	**Leq**	**62**
							Lw	**98**	**Lw**	**94**

Source: MD Acoustics, Mar 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**	**51**	**50**	**49**	**48**	**47**
60	18.3	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
70	21.3	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
80	24.4	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
90	27.4	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
100	30.5	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
110	33.5	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
120	36.6	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
130	39.6	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
140	42.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
150	45.7	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
160	48.8	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
170	51.8	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
180	54.9	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
190	57.9	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
200	61.0	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
210	64.0	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
220	67.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
230	70.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
240	73.1	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
250	76.2	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
260	79.2	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
270	82.3	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
280	85.3	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
290	88.4	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
300	91.4	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
310	94.5	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
320	97.5	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
330	100.6	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
340	103.6	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
350	106.7	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
360	109.7	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
370	112.8	0.5	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25

Building Construction

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Cranes	82	2	40	400	0.5	0	62.4	58.5	700430.452
2	Forklift/Tractor	80	2	40	400	0.5	0	60.4	56.5	441941.738
3	Generator	80	2	40	400	0.5	0	60.4	56.5	441941.738
4	Tractor/Backhoe	80	2	40	400	0.5	0	60.4	56.5	441941.738
							Lmax*	**65**	**Leq**	**63**
							Lw	**96**	**Lw**	**95**

Source: MD Acoustics, Mar 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**	**51**	**50**	**49**	**48**
60	18.3	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
70	21.3	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
80	24.4	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
90	27.4	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
100	30.5	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
110	33.5	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
120	36.6	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
130	39.6	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
140	42.7	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
150	45.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
160	48.8	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
170	51.8	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
180	54.9	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
190	57.9	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
200	61.0	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
210	64.0	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
220	67.1	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
230	70.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
240	73.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
250	76.2	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
260	79.2	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
270	82.3	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
280	85.3	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
290	88.4	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
300	91.4	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
310	94.5	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
320	97.5	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
330	100.6	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
340	103.6	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
350	106.7	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
360	109.7	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
370	112.8	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26

Paving

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements									
1	Pavers	86	1	40	400	0.5	0	63.4	59.4	879700.875
2	Rollers	80	1	40	400	0.5	0	57.4	53.4	220970.869
3	Paving Equipment	80	1	40	400	0.5	0	57.4	53.4	220970.869
4	Tractor/Backhoe	80	1	40	400	0.5	0	57.4	53.4	220970.869
							Lmax*	64	Leq	62
							Lw	96	Lw	94

Source: MD Acoustics, Mar 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**	**51**	**50**	**49**	**48**	**47**
60	18.3	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
70	21.3	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
80	24.4	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
90	27.4	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
100	30.5	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
110	33.5	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
120	36.6	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
130	39.6	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
140	42.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
150	45.7	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
160	48.8	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
170	51.8	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
180	54.9	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
190	57.9	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
200	61.0	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
210	64.0	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
220	67.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
230	70.1	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
240	73.1	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
250	76.2	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
260	79.2	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
270	82.3	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
280	85.3	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
290	88.4	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
300	91.4	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
310	94.5	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
320	97.5	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
330	100.6	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
340	103.6	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
350	106.7	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
360	109.7	0.5	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
370	112.8	0.5	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25

Activity	L_{eq} at 250 feet dBA	L_{Max} at 250 feet dBA
Grading	67	71
Building Construction	68	70
Paving	67	69

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Pavers	80
Dozers	85
Scrappers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	85
Air Compressors	86
Trucks	86

Grading

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements									
1	Grader	85	1	40	250	0.5	0	67.5	63.5	2262741.7
2	Dozer	85	1	40	250	0.5	0	67.5	63.5	2262741.7
3	Tractor/Backhoe	80	1	40	250	0.5	0	62.5	58.5	715541.753
4										
							Lmax*	**71**	**Leq**	**67**
							Lw	**103**	**Lw**	**99**

Source: MD Acoustics, Mar 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**
60	18.3	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
70	21.3	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
80	24.4	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
90	27.4	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
100	30.5	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
110	33.5	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
120	36.6	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
130	39.6	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
140	42.7	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
150	45.7	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
160	48.8	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
170	51.8	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
180	54.9	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
190	57.9	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
200	61.0	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
210	64.0	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
220	67.1	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
230	70.1	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
240	73.1	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
250	76.2	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
260	79.2	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
270	82.3	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
280	85.3	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
290	88.4	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
300	91.4	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
310	94.5	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
320	97.5	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
330	100.6	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
340	103.6	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
350	106.7	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
360	109.7	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
370	112.8	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30

Building Construction

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Cranes	82	2	40	250	0.5	0	67.5	63.6	2268114.51
2	Forklift/Tractor	80	2	40	250	0.5	0	65.5	61.6	1431083.51
3	Generator	80	2	40	250	0.5	0	65.5	61.6	1431083.51
4	Tractor/Backhoe	80	2	40	250	0.5	0	65.5	61.6	1431083.51
							Lmax*	**70**	**Leq**	**68**
							Lw	**101**	**Lw**	**100**

Source: MD Acoustics, Mar 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**68**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**
60	18.3	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
70	21.3	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
80	24.4	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
90	27.4	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
100	30.5	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
110	33.5	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
120	36.6	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
130	39.6	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
140	42.7	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
150	45.7	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
160	48.8	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
170	51.8	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
180	54.9	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
190	57.9	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
200	61.0	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
210	64.0	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
220	67.1	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
230	70.1	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
240	73.1	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
250	76.2	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
260	79.2	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
270	82.3	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
280	85.3	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
290	88.4	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
300	91.4	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
310	94.5	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
320	97.5	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
330	100.6	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
340	103.6	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
350	106.7	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
360	109.7	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
370	112.8	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31

Paving

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements									
1	Pavers	86	1	40	250	0.5	0	68.5	64.5	2848623.03
2	Rollers	80	1	40	250	0.5	0	62.5	58.5	715541.753
3	Paving Equipment	80	1	40	250	0.5	0	62.5	58.5	715541.753
4	Tractor/Backhoe	80	1	40	250	0.5	0	62.5	58.5	715541.753
							Lmax*	**69**	**Leq**	**67**
							Lw	**101**	**Lw**	**99**

Source: MD Acoustics, Mar 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**
60	18.3	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
70	21.3	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
80	24.4	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
90	27.4	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
100	30.5	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
110	33.5	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
120	36.6	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
130	39.6	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
140	42.7	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
150	45.7	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
160	48.8	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
170	51.8	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
180	54.9	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
190	57.9	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
200	61.0	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
210	64.0	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
220	67.1	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
230	70.1	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
240	73.1	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
250	76.2	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
260	79.2	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
270	82.3	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
280	85.3	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
290	88.4	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
300	91.4	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
310	94.5	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
320	97.5	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
330	100.6	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
340	103.6	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
350	106.7	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
360	109.7	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
370	112.8	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30

VIBRATION LEVEL IMPACT

Project:	Loomis Car Wash	Date: 3/31/20
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Auto-Tec	
Address:		

PPV = PPVref(25/D)^n (in/sec)

DATA INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	100.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

DATA OUT RESULTS

PPV =	**0.019**	IN/SEC	OUTPUT IN RED

R1 Construction Ldn Calculation

Time	Existing	Project	Project Plus Existing	Energy E		Energy E+P	CNEL Energy
0:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
1:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
2:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
3:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
4:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
5:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
6:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
7:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
8:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
9:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
10:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
11:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
12:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
13:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
14:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
15:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
16:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
17:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
18:00	56.9	63.0	64.0	489778.819	1995262.31	2485041.13	2485041.13
19:00	53.1	63.0	63.4	204173.794	1995262.31	2199436.11	2199436.11
20:00	53.1	63.0	63.4	204173.794	1995262.31	2199436.11	2199436.11
21:00	53.1	63.0	63.4	204173.794	1995262.31	2199436.11	2199436.11
22:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
23:00	56.3	0.0	56.3	4265795.19	1	426580.519	4265805.19
				44882023.9	29928943.7		74811048.6
Ldn	63	61	65				