APPENDIX K:
NOISE AND VIBRATION STUDY

MetroWalk Project

Noise and Vibration Study

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1 Project Description and Impact Summary

1.1 Introduction

This study analyzes the potential noise and vibration impacts of the proposed MetroWalk project (herein referred to as "proposed project" or "project") in Santa Clarita, California. Rincon Consultants, Inc. (Rincon) prepared this study for BluMax Santa Clarita, LLC for use in support of environmental documentation being prepared for the project pursuant to the California Environmental Quality Act (CEQA). The purpose of this study is to analyze the project's noise and vibration impacts related to both temporary construction activity and long-term operation of the project.

1.2 Project Summary

Project Location

The project site is an approximately 20.4-acre undeveloped parcel (Assessor's Parcel Number 2840-004-009) located east of Lost Canyon Road and south of the Vista Canyon Mixed-Use Project in Santa Clarita, California. State Route (SR) 14 is located approximately 0.3 mile west of the project site and provides regional access to the area. The project site has a General Plan Land Use designation of Business Park (BP) and is zoned Business Park (BP). The project would require a General Plan Amendment and Zone Change to accommodate the proposed residential development. Figure 1 shows the regional location of the project site, and Figure 2 shows an aerial view of the project site and surrounding area.

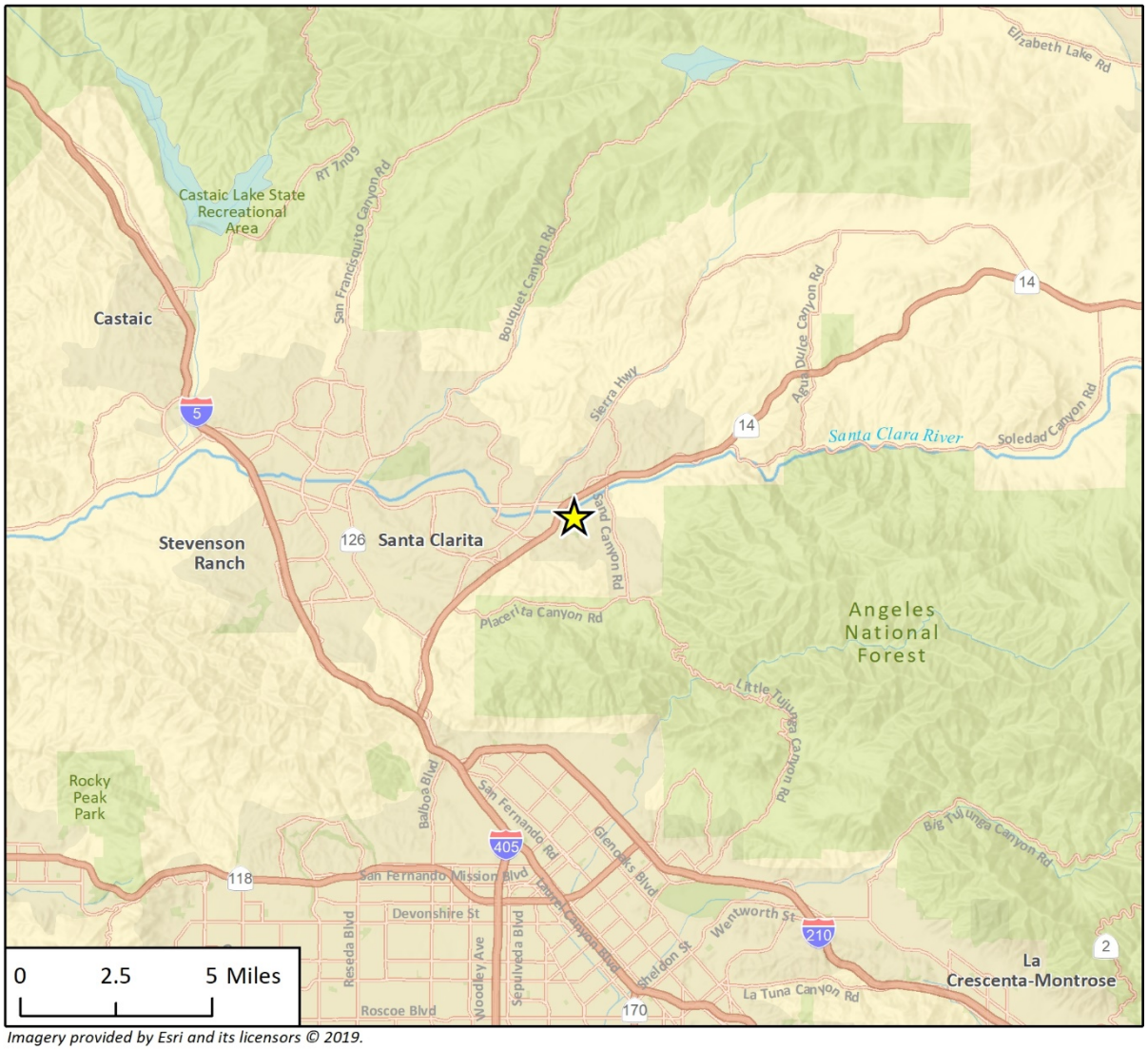
Surrounding land uses include the 185-acre Vista Canyon Mixed-Use Project currently under construction to the north and single-family residences to the south, west, and east. The Vista Canyon Mixed-Use Project will consist of residential, commercial, office, retail, and hotel uses in addition to open space, parks, and trails. A multi-modal transit hub for Metrolink, parking, and bus transfers is also planned to be sited adjacent to the project site and the Vista Canyon Mixed-Use Project.

Union Pacific Railroad tracks are located immediately south of the project site and provide service for the Metrolink Antelope Valley Line, which is a commuter rail line from Lancaster to Los Angeles Union Station. In addition, an approximately 14-acre ranch with a rural residential home is located approximately 0.1 mile to the east.

Project Description

The proposed project would involve construction of a mixed-income residential development with a total of 498 units. As shown in Table 1, the project would include 179 multi-family residential units, 169 age-qualified apartments (50 of which would be affordable senior housing units), and 150 three-story townhomes. The proposed project would also provide approximately 147,665 square feet (SF) of parks, clubrooms, pools, and landscaped walkways in addition to approximately 63,506 SF of rear yards and private patio decks. In addition, as shown in Table 2, the project would include

Figure 1 Regional Location



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Project Location

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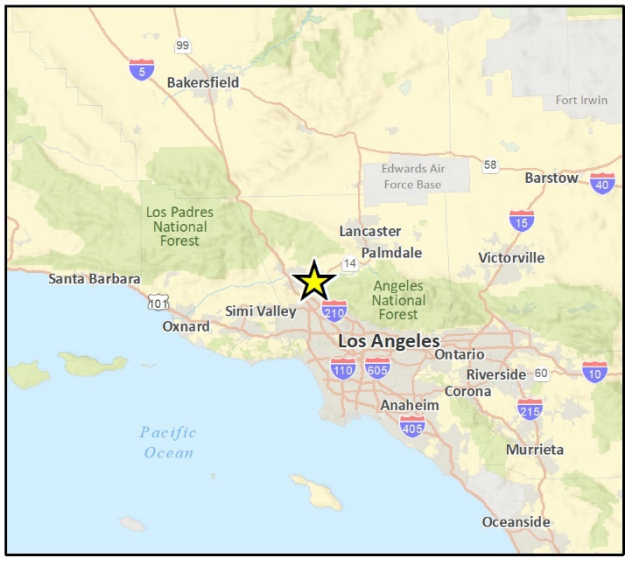


Fig 1 Regional Location

Figure 2 Project Site Location

approximately 902 parking spaces with 631 garage/covered spaces and 271 uncovered/surface parking spaces. Figure 3 presents the project site plan.

Table 1 Project Summary

Unit Type	Square Footage per Unit	Number of Units
Market Rate All-Ages Apartments		
Studio + 1 Bath	500	26
1 Bed + 1 Bath	678	116
2 Bed + 2 Bath	1,041	37
Total		**179**
Age-Qualified Apartments		
1 Bed +1 Bath	678	84
2 Bed + 2 Bath	1,041	35
Total		**119**
Deed Restricted Affordable Senior Apartments		
1 Bed +1 Bath	650	49
2 Bed + 2 Bath (Manager's)	950	1
Total		**50**
Townhomes		
2 Bed + 2.5 Bath	1,340 – 1,365	59
3 Bed + 2 Full Bath + 2 Half Bath	1,753 – 1,998	85
3 Bed + 2.5 Bath	2,292	6
Total		**150**
Total Multi-family Residential Units		**498**

Table 2 Parking Summary

Type of Parking	Number of Spaces
Apartments	331 Covered 196 Uncovered
Townhomes	300 Private Garage 75 Uncovered
Parking Spaces Subtotal	631 Covered/Garage 271 Uncovered
Total Parking	**902 Spaces**

Figure 3 Project Site Plan

Source: Withee Malcom, February 28, 2020

Construction

Project construction is expected to commence in March 2022 with full buildout of all phases completed by mid- to late 2027. Site preparation of the site would occur over the course of the first two months and grading and drainage/utilities installation would occur over the next nine months. Paving would occur over two weeks. Buildings would then be constructed in phases over the course of 36 months, starting with construction of the multi-family apartments and townhomes, followed by the age-qualified apartments and the senior affordable housing units. Architectural coating would occur over the course of 10 months for each phase. No demolition activities would be required.

Construction activities would occur between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 8:00 a.m. to 6:00 p.m. on Saturday. Santa Clarita Municipal Code (SCMC) Section 11.44.080 indicates construction work is prohibited on Sundays, New Year's Day, Independence Day, Thanksgiving Day, Christmas Day, Memorial Day, and Labor Day. The project would consist of approximately 400,000 cubic yards of cut, up to 400,000 cubic yards of fill, and approximately 400,000 cubic yards of remedial grading. No dirt would be hauled on or off the site. Construction waste from the project site would be hauled to Chiquita Canyon Landfill, approximately 15 to 20 miles west of the project site, depending on the route taken. The following three haul truck routes could be used:[1]

- Trucks could leave the project site by turning left onto Lost Canyon Road, taking State Route 14 south, to Interstate 5 north, and to State Route 126 west to the landfill site.
- Trucks could leave the project site by turning left onto Lost Canyon Road, left onto Soledad Canyon Road and Newhall Ranch Road, and to State Route 126 west to the landfill site.
- Trucks could leave the project site by turning left onto Lost Canyon Road, to Golden Valley Road, to Newhall Ranch Road, and to State Route 126 west to the landfill site.

Sustainability Features

The project would be built in accordance with the City of Santa Clarita Green Building Code (Santa Clarita Municipal Code Title 25, Chapter 25.01), which adopted by reference the 2019 California Green Building Standards Code [CALGreen] as well as the City of Santa Clarita Energy Conservation Code (Santa Clarita Municipal Code Title 24), which adopts by reference the 2019 Building Energy Efficiency Standards Code. In addition, as project design features, the project would install light-emitting diode (LED) streetlights, utilize reclaimed water for all landscape irrigation, and include approximately 54 electric vehicle (EV) charging spaces capable of supporting future EV supply equipment for multi-family residential units and approximately 150 EV spaces with the capability for EV charging for townhomes.

[1] To provide a conservative estimate of project emissions, this analysis assumes the longest 20-mile haul route would be used.

2 Background

2.1 Overview of Sound Measurement

Sound is a vibratory air disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs (e.g., the human ear). Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (California Department of Transportation [Caltrans] 2013).

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response, which is most sensitive to frequencies around 4,000 Hertz (Hz) and less sensitive to frequencies around and below 100 Hz (Kinsler, et al. 1999). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as a doubling of traffic volume, would increase the noise level by 3 dB; similarly, dividing the energy in half would result in a decrease of 3 dB (Crocker 2007).

Human perception of noise has no simple correlation with sound energy; the perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not "sound twice as loud" as one source. It is widely accepted that the average healthy ear can barely perceive an increase (or decrease) of up to 3 dBA in noise levels (i.e., twice [or half] the sound energy); that a change of 5 dBA is readily perceptible (8 times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (or half) as loud (10.5 times the sound energy) (Crocker 2007).

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in sound level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line), the path the sound will travel, site conditions, and obstructions. Noise levels from a point source (e.g., construction, industrial machinery, ventilation units) typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance. Noise from a line source (e.g., roadway, pipeline, railroad) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013). The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site, such as a parking lot or smooth body of water, receives no additional ground attenuation, and the changes in noise levels with distance (drop-off rate) result simply from the geometric spreading of the source. An additional ground attenuation value of 1.5 dBA per doubling of distance applies to a soft site (e.g., soft dirt, grass, or scattered bushes and trees) (Caltrans 2013).

Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features, such as hills and dense woods, and man-made features, such as buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2011). Structures can substantially reduce occupants' exposure to noise as well. The FHWA's guidelines indicate that modern building construction generally provides an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows.

The impact of noise is not a function of sound level alone. The time of day when noise occurs, and the duration of the noise are also important. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. One of the most frequently used noise metrics is the equivalent noise level (L_{eq}); it considers both duration and sound power level. The L_{eq} is defined as the single steady A-weighted level equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time. Typically, the L_{eq} is summed over a one-hour period. The L_{max} is the highest root mean squared (RMS) sound pressure level within the sampling period, and the L_{min} is the lowest RMS sound pressure level within the measuring period (Crocker 2007). Normal conversational levels are in the 60 to 65 dBA L_{eq} range; ambient noise levels greater than 65 dBA L_{eq} can interrupt conversations (Federal Transit Administration [FTA] 2018).

Noise that occurs at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (DNL), which is the 24-hour average noise level with a +10-dBA penalty for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.). Community noise can also be measured using Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a +5-dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10-dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans 2013). Noise levels described by DNL and CNEL usually differ by about 1 dBA. Quiet suburban areas typically have CNEL noise levels in the range of 40 to 50 CNEL, while areas near arterial streets are in the 50 to 60+ CNEL range.

2.2 Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most groundborne vibration that can be felt by the human body is from a low of less than 1 Hz up to a high of about 200 Hz (Crocker 2007).

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise (FTA 2018). Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations diminish much more rapidly than low frequencies, so low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances (Caltrans 2020). When a building is impacted by vibration, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under rare circumstances, the ground-to-foundation coupling may actually amplify the vibration level due to structural resonances of the floors and walls.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Caltrans 2020). Table 3 summarizes the vibration damage threshold criteria recommended by Caltrans for structural damage to buildings.

Table 3 Vibration Damage Potential Threshold Criteria

Structure and Condition	Vibration Level (in/sec PPV)	
	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

in/sec = inches per second; PPV = peak particle velocity

Source: Caltrans 2020

In addition to the potential for building damage, the human body responds to vibration signals. However, unlike buildings, which are rigid, it takes some time for the human body to respond to vibration. In a sense, a building responds to the instantaneous movement while the human body responds to average vibration amplitude, which is measured as RMS. The averaging of the particle generally results in the rms conservatively being equivalent to 71 percent of the PPV. Thus, human annoyance usually results in a more restrictive vibration limit than structural damage limits.

Numerous studies have been conducted to characterize the human response to vibration. The vibration annoyance potential criteria recommended for use by Caltrans, which are based on the general human response to different levels of groundborne vibration velocity levels, are described in Table 4.

Table 4 Vibration Annoyance Potential Criteria

Human Response	Vibration Level (in/sec PPV)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Severe	2.0	0.4
Strongly perceptible	0.9	0.10
Distinctly perceptible	0.25	0.04
Barely perceptible	0.04	0.01

Source: Caltrans 2020

2.3 Sensitive Receivers

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. The Santa Clarita General Plan Noise Element identifies noise-sensitive land uses as housing, schools, medical facilities, libraries, social care facilities, and similar facilities (City of Santa Clarita 2011). The nearest existing sensitive receivers are single-family homes located approximately 200 feet west of the project site and the nearest planned sensitive receivers are residences sited approximately 100 feet north of the project site as part of the Vista Canyon Mixed-Use Project, which is currently under construction. Additional sensitive receivers include residences approximately 250 feet south of the project site across the Union Pacific Railroad tracks.

2.4 Project Noise Setting

The most prevalent source of noise in the project site vicinity is vehicular traffic on Lost Canyon Road to the west, SR 14 to the west and north, and the Union Pacific Railroad to the south. In addition, Harriman Street, a newly constructed street for the Vista Canyon Mixed-Use Project located north of the project site, will be a source of vehicular traffic noise once the Vista Canyon Mixed-Use Project becomes operational. Ambient noise levels are generally highest during the daytime and rush hours unless congestion substantially slows speeds, which tends to reduce ambient noise levels.

To characterize ambient sound levels at and near the project site, four 15-minute sound level measurements were conducted on Tuesday, February 4, 2020 during the PM peak hour between 4:23 p.m. and 5:58 p.m. An Extech, Model 407780A, ANSI Type 2 integrating sound level meter was used to conduct the measurements. Figure 4 shows the noise measurement location, and Table 5 summarizes the results of the noise measurements. Detailed sound level measurement data are included in Appendix A.

Table 5 Project Site Sound Level Monitoring Results

#	Measurement Location	Sample Times	Approximate Distance to Primary Noise Source	L_{eq} (dBA)
1	Lost Canyon Road north of Medley Ridge Drive	4:23 – 4:38 p.m.	40 feet from centerline of Lost Canyon Road	53
2	Eastern terminus of Shauna Way	5:43 –5:58 p.m.	30 feet from centerline of Shauna Way	45
3	Western boundary of project site along on Lost Canyon Road	4:45 –5:00 p.m.	45 feet from centerline of Lost Canyon Road	50
4	Northern terminus of English Oak Court	5:15 –5:27 p.m.	10 feet from centerline of English Oak Court	40

See Appendix A for noise monitoring data. See Figure 4 for noise measurement locations.

Figure 4 Noise Measurement Locations

2.5 Regulatory Setting

City of Santa Clarita Noise Element

The City of Santa Clarita Noise Element contains goals and policies that are designed to include noise control in the planning process in order to maintain compatible land uses with acceptable environmental noise levels and protect Santa Clarita residents from excessive noise. The Noise Element provides Noise and Land Use Compatibility Guidelines as shown in Figure 5 (City of Santa Clarita 2011).

The Noise Element also establishes the following goals and policies that would apply to the proposed project:

Goal N 1: A healthy and safe noise environment for Santa Clarita Valley residents, employees, and visitors.

Objective N 1.1: Protect the health and safety of the residents of the Santa Clarita Valley by the elimination, mitigation, and prevention of significant existing and future noise levels.

Policy N 1.1.1: Use the Noise and Land Use Compatibility Guidelines contained on Exhibit N-8 (reproduced herein as Figure 5), which are consistent with State guidelines, as a policy basis for decisions on land use and development proposals related to noise.

Policy N 1.1.2: Continue to implement the adopted Noise Ordinance and other applicable code provisions, consistent with state and federal standards, which establish noise impact thresholds for noise abatement and attenuation, in order to reduce potential health hazards associated with high noise levels.

Policy N 1.1.3: Include consideration of potential noise impacts in land use planning and development review decisions.

Policy N 1.1.4: Control noise sources adjacent to residential, recreational, and community facilities, and those land uses classified as noise sensitive.

Goal N 2: Protect residents and sensitive receptors from traffic-generated noise.

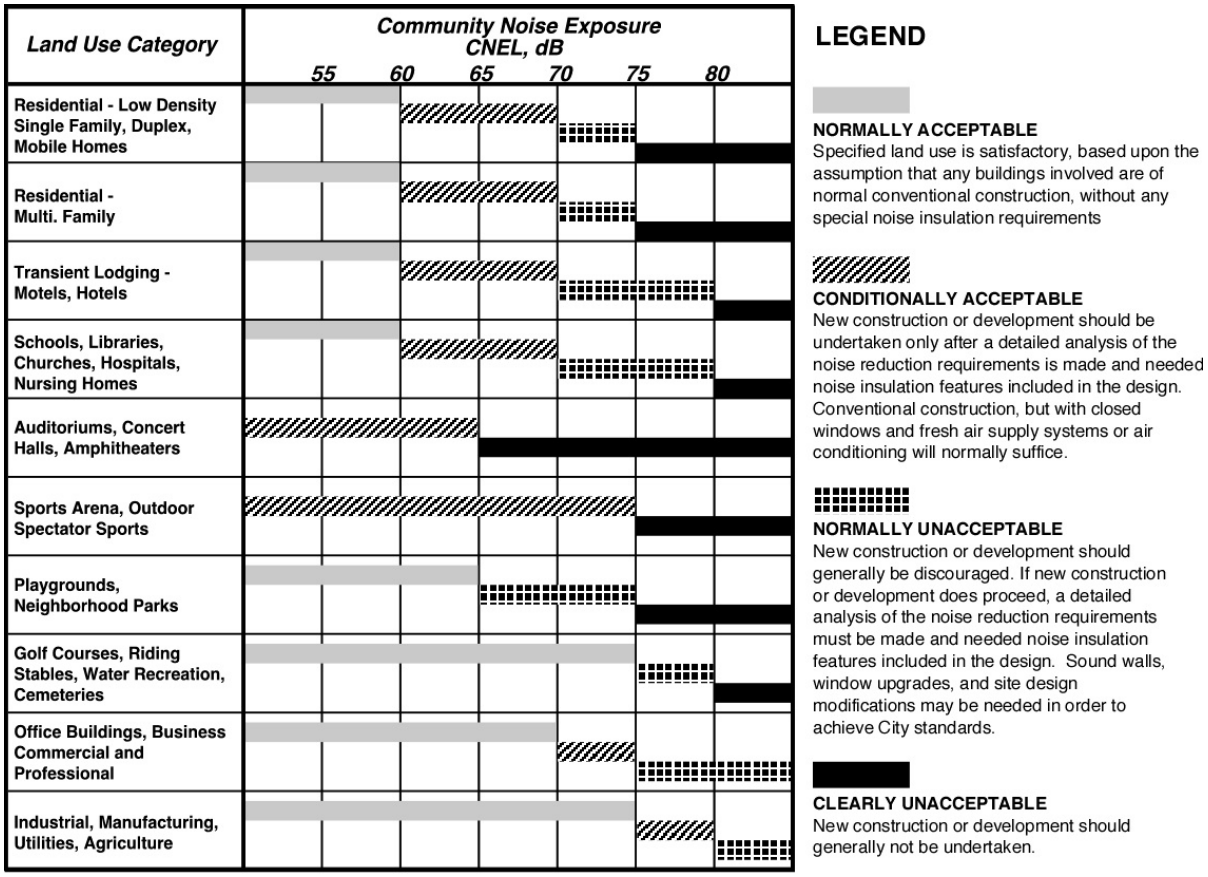
Objective N 2.1: Prevent and mitigate adverse effects of noise generated from traffic on arterial streets and highways through implementing noise reduction standards and programs.

Policy N 2.1.2: Encourage the use of noise absorbing barriers, where appropriate.

Policy N 2.1.4: Reduce significant noise levels related to through-traffic in residential areas by promoting subdivision circulation designs to contain a hierarchy of streets, which efficiently direct traffic to highways.

Policy N 2.1.7: Require vehicle owners to properly maintain their equipment to avoid generating excessive noise levels.

Figure 5 City of Santa Clarita Noise and Land Use Compatibility Guidelines



Goal N 3: Protect residential neighborhoods from excessive noise.

Objective N 3.1: Prevent and mitigate significant noise levels in residential neighborhoods.

Policy N 3.1.1: Require that developers of new single-family and multi-family residential neighborhoods in areas where the ambient noise levels exceed 60 CNEL provide mitigation measures for the new residences to reduce interior noise levels to 45 CNEL, based on future traffic and railroad noise levels.

Policy N 3.1.2: Require that developers of new single-family and multi-family residential neighborhoods in areas where the projected noise levels exceed 65 CNEL provide mitigation measures (which may include noise barriers, setbacks, and site design) for new residences to reduce outdoor noise levels to 65 CNEL, based on future traffic conditions. This requirement would apply to rear yard areas for single-family developments, and to private open space and common recreational and open space areas for multi-family developments.

Policy N 3.1.3: Through enforcement of the applicable Noise Ordinance, protect residential neighborhoods from noise generated by machinery or activities that produce significant discernable noise exceeding recommended levels for residential uses.

Policy N 3.1.4: Require that those responsible for construction activities develop techniques to mitigate or minimize the noise impacts on residences and adopt standards that regulate noise from construction activities that occur in or near residential neighborhoods.

Policy N 3.1.7: Ensure that design of parks, recreational facilities, and schools minimize noise impacts to residential neighborhoods.

Santa Clarita Municipal Code

SCMC Section 11.44.040(A-B). Santa Clarita Municipal Code (SCMC) Section 11.44.040(A) sets exterior noise level limits for residential, commercial, and manufacturing land uses, which are summarized in Table 6. SCMC Section 11.44.040(B) provides corrections to the noise level limits for certain noise conditions, which are summarized in Table 7. These corrections may be applied to the increase or decrease the numerical noise level limits shown in Table 6 where applicable noise conditions exist.

Table 6 Noise Level Limits

Region	Time	L_{eq} (dBA)
Residential	Day[1]	65
	Night[2]	55
Commercial/Manufacturing	Day[1]	80
	Night[2]	70

[1] SCMC Section 11.44.020 defines "Day" as 7:00 a.m. to 9:00 p.m.
[2] SCMC Section 11.44.020 defines "Night" as 9:00 p.m. to 7:00 a.m.
Source: SCMC Section 11.44.040(A)

Table 7 Corrections to Noise Limits

Noise Condition	Correction (in dB)
Repetitive Impulsive Noise	-5
Steady Whine, Screech or Hum	-5
Noise Occurring More Than 5 But Less Than 15 Minutes Per Hour[1]	+5
Noise Occurring More Than 1 But Less Than 5 Minutes Per Hour [1]	+10
Noise Occurring Less Than 1 Minute Per Hour [1]	+20

[1] These corrections apply to daytime noise level limits only.
Source: SCMC Section 11.44.040(B)

SCMC Section 11.44.060(A). It shall be unlawful for any person within the City to use or operate any radio receiving set, musical instrument, phonograph, television set, or other machine or device for the producing or reproducing of sound at any time in such a manner as to produce noise levels on residential land which would disturb the peace, quiet and comfort of neighboring residents or any reasonable person of normal sensitivity residing in the area.

SCMC Section 11.44.070. Any noise level from the use or operation of any machinery, equipment, pump, fan, air conditioning apparatus, refrigerating equipment, motor vehicle, or other mechanical or electrical device, or in repairing or rebuilding any motor vehicle, which exceeds the noise limits as set forth in Section 11.44.040 at any property line, or, if a condominium or rental units, within any condominium or rental unit within the complex, shall be a violation of this chapter.

SCMC Section 11.44.080. No person shall engage in any construction work which requires a building permit from the City on sites within 300 feet of a residentially zoned property except between the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 6:00 p.m. on Saturday. Further, no work shall be performed on the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas, Memorial Day, and Labor Day. Emergency work as defined in SCMC Section 11.44.020(D) is permitted at all times. The Department of Community Development may issue a permit for work to be done "after hours"; provided, that containment of construction noises is provided.

SCMC Section 11.44.090. The noise limits as described in SCMC Section 11.44.040(A) shall apply to any use of sound-amplifying equipment.

SCMC Section 17.57.020(E). For residential properties and structures, all air conditioners, antennas, heating, cool and ventilating equipment, and all other mechanical, lighting, or electrical devices shall be screening, shielded and/or sound buffered from surrounding properties and streets.

3 Impact Analysis

3.1 Methodology

Construction Noise

Construction noise was estimated using the FHWA Roadway Construction Noise Model (RCNM) (2006). RCNM predicts construction noise levels for a variety of construction operations based on empirical data and the application of acoustical propagation formulas. Using RCNM, construction noise levels were estimated at noise-sensitive receivers near the project site. RCNM provides reference noise levels for standard construction equipment, with an attenuation rate of 6 dBA per doubling of distance for stationary equipment.

For construction noise assessment, construction equipment can be considered to operate in two modes: stationary and mobile. As a rule, stationary equipment operates in a single location for one or more days at a time, with either fixed-power operation (e.g., pumps, generators, and compressors) or variable-power operation (e.g., pile drivers, rock drills, and pavement breakers). Mobile equipment moves around the construction site with power applied in cyclic fashion, such as bulldozers, graders, and loaders (FTA 2018). Noise impacts from stationary equipment are assessed from the center of the equipment, while noise impacts from mobile construction equipment are assessed from the center of the equipment activity area (e.g., construction site).

Variation in power imposes additional complexity in characterizing the noise source level from construction equipment. Power variation is accounted for by describing the noise at a reference distance from the equipment operating at full power and adjusting it based on the duty cycle, or percent of operational time, of the activity to determine the L_{eq} of the operation (FTA 2018).

Each phase of demolition and construction has a specific equipment mix, depending on the work to be accomplished during that phase. Each phase also has its own noise characteristics; some will have higher continuous noise levels than others, and some may have high instantaneous noise levels. The maximum hourly L_{eq} of each phase is determined by combining the L_{eq} contributions from each piece of equipment used in that phase (FTA 2018).

Construction of the proposed multi-family residential units is estimated to occur over 61 months. Construction phases would include site preparation, grading, drainage, and utilities installation and paving for the entire site followed by building construction and architectural coating, which would occur at different times throughout the project site as buildings are constructed in phases. Construction would not require any blasting or pile driving. The construction equipment list for each phase was provided by the project applicant. It is assumed that diesel engines would power all construction equipment. For assessment purposes, and to be conservative, the maximum hourly noise level that would occur during of all phases of construction activities has been used for assessment. Noise levels during the loudest hour are based on the use of two excavators, a forklift, four air compressors, and four generators operating simultaneously during the building construction phase. Using the FHWA RCNM to estimate noise associated with construction equipment, maximum hourly noise levels were calculated to be approximately 86 dBA L_{eq} at 50 feet. Due to the dynamic nature of construction, maximum hourly noise levels were calculated from the center of each construction activity area. Because buildings would be constructed in phases at different locations

on the project site depending on the type of housing, maximum hourly noise levels were calculated for each type of housing at the nearest sensitive receivers at the following distances:

- Townhomes – approximately 210 feet (planned residences to the north)[2]
- Market Rate All-Ages Apartments – approximately 430 feet (residences to the west)
- Deed Restricted Affordable Senior Apartments – approximately 480 feet (existing residences to the south)
- Age-Qualified Apartments – approximately 690 feet (existing residences to the west)

RCNM calculations are included in Appendix B.

Off-site Traffic Noise

The project would generate approximately 2,540 daily vehicle trips, thereby increasing traffic on area roadways (Zhou 2020a). To determine project impacts to roadway noise levels, roadway noise was modeled using the FHWA Traffic Noise Model (TNM) spreadsheet.[3] Roadway noise was modeled under existing, future, and future plus project conditions along Lost Canyon Road and Jakes Way based on traffic counts and modeling prepared by Fehr & Peers (Zhou 2020b). These locations were selected for modeling because they would be the most affected by project-generated traffic, capture potential roadway noise impacts to residential uses, and existing and future ADT volumes for these locations are provided in the traffic impact study prepared for the project. Based on the nature of the roadways, it was assumed that the vehicle mix of ADT on both roadways is 97 percent cars, 2 percent medium trucks, and 1 percent heavy trucks. Additional model assumptions include standard estimates of 5 percent of daily trips occurring in the evening and 15 percent of daily trips occurring at night and vehicle speeds consistent with posted speed limits on the modeled roadways.

Because residences along Jakes Way have direct line-of-sight to SR 14, this analysis includes traffic noise levels generated by SR 14 in the evaluation of existing and cumulative traffic noise levels along Jakes Way. According to Exhibit N-7 in the City's Noise Element, residences along Jakes Way between Lost Canyon Road and Eleanor Circle would be exposed to traffic noise levels of approximately 60 CNEL under existing and cumulative (i.e., future) conditions (City of Santa Clarita 2011).

Noise/Land Use Compatibility

In accordance with Policy N.3.1.1 of the City's General Plan Noise Element, the noise/land use compatibility of the project site was evaluated by comparing estimated ambient noise levels under cumulative plus project traffic and railroad conditions to the City's noise/land use compatibility standards for multi-family land uses (see Figure 5 in Section 2.5, *Regulatory Setting*). For cumulative plus project conditions, the FHWA TNM spreadsheet calculations discussed under *Off-site Traffic Noise* were utilized to estimate roadway noise levels and the U.S. Department of Housing and Urban Development Day/Night Noise Level Electronic Assessment Tool (HUD DNL Calculator) was used to approximate railway noise levels. The HUD DNL Calculator analyzes railway noise based on distance to the train tracks, average train speed, engines per train, railway cars per train, number of trains

[2] Townhomes would be constructed in 13 sub-phases; therefore, to provide a conservative estimate of project impacts, noise levels were estimated from the center of the townhouse block closest to sensitive receivers.

[3] The FHWA TNM spreadsheet relies on version 2.5. The differences between TNM version 2.5 and version 3.0 do not affect the calculations made in the TNM spreadsheet.

per day, the percentage of trains at night, the presence of whistles and horns, and if the tracks have bolted or welded tracks. This analysis includes the following assumptions:

- All trains are diesel-powered.
- Tracks are bolted.
- Horns and whistles are not used by trains because there are no public grade crossings within one mile of the project site.
- Passenger trains:
  - The average train speed adjacent to the project site is 15 miles per hour as trains accelerate or decelerate into the station.
  - Each passenger train has one engine and four railway cars, which was assumed to be typical of Metrolink trains.
  - The Metrolink Antelope Valley line will serve approximately 48 trains per day upon project buildout (Metrolink 2016).[4]
  - Based on current nighttime operations on the Antelope Valley line (Metrolink 2019b), approximately 19 percent of trains will pass by the project site during nighttime hours (10:00 p.m. to 7:00 a.m.).
- Freight trains:
  - The average train speed is 25 miles per hour (Union Pacific Corporation 2019).
  - Each freight train has two engines and 116 railway cars (Union Pacific Corporation 2019).[5]
  - Up to 25 trains will pass by the project site per day upon project buildout (Caltrans 2018).
  - This analysis assumes a model default night fraction of 15 percent for freight rail.

Groundborne Vibration

The proposed project does not include substantial vibration sources associated with operation. Thus, construction activities have the greatest potential to generate groundborne vibration affecting nearby receivers, especially during grading and paving of the project site. The greatest vibratory sources during construction would be rollers, bulldozers, and loaded trucks. Neither blasting nor pile driving would be required for construction of the proposed project. Construction vibration estimates are based on vibration levels reported by Caltrans and the FTA (Caltrans 2020; FTA 2018).

A quantitative assessment of potential vibration impacts from construction activities was conducted using the estimates and equations developed by Caltrans and the FTA (Caltrans 2020, FTA 2018). Table 8 shows typical vibration levels for various pieces of construction equipment used in the assessment of construction vibration (FTA 2018). These pieces of construction equipment are anticipated to be used during project construction and would generate the highest levels of vibration as compared to construction equipment not included in this analysis.

[4] This analysis assumes the moderate growth scenarios of the Metrolink 10-Year Strategic Plan in which the number of daily trains along the Antelope Valley line increases from 30 to 48 trains (Metrolink 2016).

[5] The average train length was estimated by averaging the train lengths of intermodal, grain, manifest, automotive, and coal trains (Union Pacific 2019).

Table 8 Vibration Levels Measured during Construction Activities

Equipment	PPV at 25 Feet (in/sec)
Vibratory Roller	0.21
Large Bulldozer	0.089
Loaded trucks	0.076

PPV = peak particle velocity

Source: FTA 2018

3.2 Significance Thresholds

To determine whether a project would have a significant noise impact, Appendix G to the *State CEQA Guidelines* requires consideration of whether a project would result in:

1. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
2. Generation of excessive groundborne vibration or groundborne noise levels; or
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels.

Construction Noise

Per SCMC Section 11.44.080, noise generated by construction activities is exempt from compliance with the noise level limits contained in SCMC Section 11.44.040 if they occur between the hours of 7:00 a.m. to 7:00 p.m., Monday through Friday and 8:00 a.m. to 6:00 p.m. on Saturday. However, for purposes of analyzing impacts from this project, the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) criteria will be used. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} for an 8-hour period (FTA 2018).

On-site Operational Noise

Operational noise generated by the proposed project would be significant if it would exceed the noise level limits specified in SCMC Section 11.44.040 (see Table 6 and Table 7).

Off-site Traffic Noise

Traffic noise impacts are evaluated in consideration of the City's Noise and Land Use Compatibility Guidelines (see Figure 5) and community response to changes in ambient noise levels. As discussed in Section 2.1, *Overview of Sound Measurement*, the average healthy ear can barely perceive an increase of up to 3 dBA in noise levels, and a change of 5 dBA is readily perceptible. Based on this information, off-site traffic noise impacts would be significant if project-related traffic would result if one of the following would occur:

- A noise level increase of 5 dBA or greater if noise levels remain within the same land use compatibility classification;

- A noise level increase of 3 dBA or greater if noise levels change land use compatibility classifications;
- Any increase in noise levels if existing noise levels fall within the "normally unacceptable" or "clearly unacceptable" ranges.

Vibration

The City of Santa Clarita has not adopted standards to assess vibration impacts during construction and operation. However, Caltrans has developed limits for the assessment of vibrations from transportation and construction sources. The Caltrans vibration limits are reflective of standard practice for analyzing vibration impacts on structures from continuous and intermittent sources. As shown in Section 2.2, *Vibration*, the Caltrans (2020) *Transportation and Construction Vibration Guidance Manual* identifies three sets of impact criteria for buildings and humans. Table 3 presents the impact criteria for buildings, and Table 4 presents impact criteria for humans from construction and operational vibration sources. The thresholds of significance used in this analysis to evaluate vibration impacts are based on these impact criteria, as summarized in Table 9.

Table 9 Vibration Thresholds

Type of Impact	Thresholds for Occasional Pass-bys of Construction Equipment (in/sec PPV)[1]	Thresholds for Extended Construction Activities and Operational Activities (in/sec PPV)[1]
Human Annoyance[1]	0.24	0.04
Damage to Older Residential Structures	0.5	0.3
Damage to Newer Residential Structures	1.0	0.5

[1] Thresholds are based on the points at which transient and steady state vibrations are distinctly perceptible from other vibrations.

3.3 CEQA Impact Analysis

Threshold 1:	Would the proposed project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Impact N-1 CONSTRUCTION OF THE PROPOSED PROJECT WOULD EXPOSE NEARBY SENSITIVE RECEIVERS TO A TEMPORARY INCREASE IN NOISE. HOWEVER, CONSTRUCTION NOISE LEVELS WOULD NOT EXCEED THE CITY OF SANTA CLARITA CONSTRUCTION NOISE THRESHOLDS. THEREFORE, THE PROPOSED PROJECT WOULD HAVE A LESS THAN SIGNIFICANT CONSTRUCTION NOISE IMPACT.

Construction Noise

Noise levels during the loudest hour of construction would occur during the building construction phase during which two excavators, a forklift, four air compressors, and four generators may operate simultaneously. As discussed in Section 3.1, *Methodology*, buildings would be constructed in phases; therefore, maximum hourly noise levels were calculated for each phase at the nearest

sensitive receivers using the FHWA RCNM and assuming a standard distance attenuation rate of 6 dBA per doubling of distance. Table 10 summarizes estimated construction noise levels. As shown therein, construction noise levels would not exceed the daytime construction noise threshold of 80 dBA L_{eq} at the nearest sensitive receivers. Construction noise levels at other nearby sensitive receivers would be less than the noise levels at the nearest sensitive receiver due to distance attenuation. Therefore, construction noise impacts would be less than significant.

Table 10 Estimated Construction Noise Levels

Building Construction Phase[1]	Distance to Nearest Sensitive Receiver (feet)[2]	Noise Level (dBA L_{eq})	Threshold (dBA L_{eq})	Threshold Exceeded?
Townhomes	210	74	80	No
Market Rate All-Ages Apartments	430	67	80	No
Deed Restricted Affordable Senior Apartments	480	66	80	No
Age-Qualified Apartments	690	63	80	No

[1] Although some types of housing units would be constructed within the same general timeframe, the same set of construction equipment would be used for the different housing types. There would not be two sets of construction equipment operating simultaneously at two different locations on the project site.
[2] Because buildings would be constructed in phases at different locations on the project site depending on the type of housing, maximum hourly noise levels were calculated for each type of housing at the distance from the proposed building locations on-site to the nearest sensitive receivers.
See Appendix B for RCNM results.

On-Site Operational Noise

The project would include ground-level HVAC equipment. One HVAC unit would be provided for each townhome, and several apartment units would share a larger HVAC unit. Assuming approximately one ton of HVAC systems would be required for every 600 square feet of apartment floor space, the proposed apartments would require approximately 431 tons of HVAC systems, or approximately 86 HVAC units.[6, 7] HVAC equipment would be located as close as 145 feet from the property line of the nearest sensitive receiver, which are planned residences part of the Vista Canyon Mixed-Use Project. HVAC equipment is a continuous noise source, and noise levels from a single HVAC unit can reach up to 70 dBA L_{eq} at a distance of 15 feet from the source (Illingworth & Rodkin 2009). At a distance of 145 feet, each HVAC unit would generate a noise level of approximately 50 dBA L_{eq}. However, SCMC Section 17.57.020(E) requires all HVAC equipment on residential properties to be screened, shielded and/or sound buffered. A noise barrier can achieve a minimum 5-dB reduction when it breaks the line-of-sight between the noise source and the receiver (FHWA 2011). Accordingly, HVAC screening would reduce noise levels by at least 5 dBA to approximately 45 dBA L_{eq} for each unit. Based on the proposed project's site design, any planned residence to the north would be exposed to noise from approximately 7 HVAC units. Assuming worst-case exposure of noise from up to 7 HVAC units each at a distance of 145 feet, combined

[6] The ratio of tons of HVAC systems to square feet is based on the average of the low-end estimates (one ton per 400 square feet for less efficient systems and one ton per 800 square feet for more efficient systems) for determining HVAC system size (United States Department of Energy 2010).

[7] 258,701 multi-family residential square feet divided by 600 square feet per ton of HVAC system

noise levels generated by HVAC equipment at the nearest sensitive receiver would be approximately 54 dBA L_{eq}, which would not exceed the daytime standard of 65 dBA L_{eq} for residential land uses or the nighttime standard of 55 dBA L_{eq} for residential land uses. Therefore, impacts related to HVAC noise would be less than significant.

The proposed project would require periodic trash hauling services. However, the project involves development of an infill site surrounded by residential land uses, which currently require trash hauling services. Therefore, these activities would not result in a substantial permanent increase in ambient noise levels, and impacts would be less than significant.

On-site vehicle circulation would generate intermittent noise as vehicles travel throughout the site. During peak hour traffic, approximately 190 vehicles would enter and exit the project site (Zhou 2020). The hourly noise level for on-site circulation of 190 vehicles traveling 25 miles per hour (the residential speed limit) is approximately 39 dBA L_{eq} at 50 feet from the source (Federal Highway Administration 2017).[8] Vehicle circulation areas on-site would be approximately 100 feet from the nearest sensitive receivers to the north of the project site. Therefore, the hourly noise level for on-site vehicle circulation during peak hour traffic would be approximately 36 dBA L_{eq} at the nearest sensitive receivers, which would not exceed the City's residential daytime or nighttime noise level limits of 65 dBA L_{eq} or 55 dBA L_{eq}, respectively. Therefore, impacts from vehicle circulation and parking noise would be less than significant.

The project would include common recreational spaces, including parks, pools, courtyards, and landscaped walkways. Noise at these areas would include social conversations and children playing. Per SCMC Section 14.06.130, it would be unlawful to use sound-amplifying devices in the on-site parks; therefore, this potential noise source is not included in this analysis. Average noise levels from social conversations and children playing are approximately 60 dBA at 50 feet for approximately 20 children playing and approximately 63 dBA L_{eq} at three feet for 20 people talking simultaneously (County of Sacramento 2011; American Journal of Audiology 1998). For the purposes of this analysis, it is assumed that peak operations of the main park on the eastern portion of the project site would consist of approximately 20 children utilizing the playground and approximately 100 people utilizing the picnic and seating areas (40 people in southern area, 20 people in northern area, and 40 people in eastern area based on proposed seating capacity indicated on the site plan shown in Figure 3). Sensitive receivers nearest to the project's main park would be the planned apartments to the north that are part of the Vista Canyon Mixed-Use Project, located approximately 40 feet from the playground, 180 feet from the northern picnic area, 230 feet from the northern part of the southern picnic area, 240 feet from the southern part of the southern picnic area, and 280 feet from the eastern picnic area. At these receivers, peak park operations would generate a noise level of approximately 54 dBA L_{eq}, which would not exceed the City's residential daytime noise level limit of 65 dBA L_{eq} (see Appendix C for recreational noise modeling). Although it is unlikely that peak park operations would occur during nighttime hours (9:00 p.m. to 7:00 a.m.), this noise level also would not exceed the City's residential nighttime noise level limit of 55 dBA L_{eq}. Noise levels at the sensitive receivers closest to other outdoor use areas dispersed throughout the project site would be less than noise levels generated by the project's main park due to the smaller size /capacity of these outdoor use areas, greater distance to the nearest sensitive receivers, and, in some instances, attenuation due to shielding by proposed buildings that would block the line of

[8] The FHWA TNM Low Volume Road Noise Calculation Tool relies on TNM version 2.5. A similar tool is not yet available for TNM version 3.0.

sight between outdoor use areas and sensitive receivers. Therefore, impacts from recreational activity noise would be less than significant.

Off-Site Traffic Noise

Table 11 summarizes traffic noise levels under existing and existing plus project conditions along Jakes Way and Lost Canyon Road. As shown therein, project-related traffic would not increase ambient noise levels by more than 5 dBA or result in a change in land use compatibility classifications for sensitive receivers along these roadways, all of which fall within the "normally acceptable" and "conditionally acceptable" noise level ranges. Therefore, project-related traffic would result in less-than-significant impacts to traffic noise levels.

Table 11 Existing Plus Project Roadway Noise Levels

Location	Estimated Roadway Noise (CNEL)		Change in Noise (dBA)	Noise Increase Threshold (dBA)	Threshold Exceeded?
	Existing	Existing + Project			
Jakes Way between Lost Canyon Road and Sierra Highway[1]	60	60	+ <1	+ 5	No
Lost Canyon Road between Jakes Way and Medley Ridge Drive	51	55	+ 4	+ 5	No
Lost Canyon Road between Medley Ridge Drive and Winter Pine Way	60	61	+ 1	+ 5	No
Lost Canyon Road between Winter Pine Way and Canyon Park Boulevard	62	63	+ 1	+ 5	No
Lost Canyon Road between Canyon Park Boulevard and Via Princessa	64	64	+ <1	+ 5	No
Lost Canyon Road between Jakes Way and Sand Canyon Road	64	64	+ <1	+ 5	No

Notes: CNEL = Community Noise Equivalent Level; dBA = A-weighted decibel

[1] Modeled noise levels for existing and existing plus project traffic volumes (35 CNEL and 44 CNEL, respectively) were added to estimated noise levels generated by traffic on SR 14 (60 CNEL) from the City's Noise Element (2011) to estimate overall roadway noise levels along Jakes Way.

See Appendix D for TNM output results.

Table 12 summarizes traffic noise levels under cumulative and cumulative plus project conditions along Jakes Way and Lost Canyon Road. As shown therein, a cumulative traffic noise impact would

occur along Lost Canyon Road between Jakes Way and Medley Ridge Drive because cumulative plus project traffic noise levels would result in greater than a 3-dBA increase in traffic noise levels as well as a change in the land use compatibility classification from “normally acceptable” to “conditionally acceptable.” The cumulative traffic noise impact would occur as a result of an increase in daily traffic volumes from approximately 450 daily trips under existing conditions to approximately 7,460 daily trips under cumulative plus project conditions, primarily due to buildout of the Vista Canyon Mixed-Use Project to the north of the project site as well as the proposed project.[9] However, project-related traffic would only contribute approximately 1 dBA to the overall 12-dBA noise level increase. As discussed in Section 2.1, *overview of Sound Measurement*, an increase of up to 3 dBA in noise levels is barely perceptible to the human ear; therefore, a 1-dBA increase in roadway noise levels would not be perceptible. Furthermore, the project’s 1-dBA contribution to cumulative roadway noise would be well below the roadway noise impact threshold of 3 dBA. Therefore, project-related traffic would not result in a cumulatively considerable increase in traffic noise levels along Lost Canyon Road. Significant cumulative traffic noise impacts would not occur along any of the remaining roadways in the study area.

[9] Estimates of daily traffic volumes are based on an industry standard assumption that peak hour traffic volumes are approximately 10 percent of average daily traffic volumes.

Table 12 Cumulative Plus Project Roadway Noise Levels

Location	Estimated Roadway Noise Levels (CNEL)			Cumulative Change in Noise Levels (dBA)	Noise Level Increase Threshold (dBA)	Threshold Exceeded?	Project Contribution to Cumulative Change (dBA)
	Existing	Cumulative	Cumulative + Project				
Jakes Way between Lost Canyon Road and Sierra Highway[1]	60	62	62	+ 2	+ 5	No	+ <1
Lost Canyon Road between Jakes Way and Medley Ridge Drive	51	63	63	+ 12	+ 3	Yes	+ 1
Lost Canyon Road between Medley Ridge Drive and Winter Pine Way	60	64	64	+ 4	+ 5	No	+ <1
Lost Canyon Road between Winter Pine Way and Canyon Park Boulevard	62	65	65	+ 3	+ 5	No	+ <1
Lost Canyon Road between Canyon Park Boulevard and Via Princessa	64	66	66	+ 2	+ 5	No	+ <1
Lost Canyon Road between Jakes Way and Sand Canyon Road	64	65	65	+ 1	+ 5	No	+ <1

Notes: CNEL = Community Noise Equivalent Level; dBA = A-weighted decibel

[1] Modeled noise levels for existing, cumulative, and cumulative plus project traffic volumes (35 CNEL, 58 CNEL, and 58 CNEL, respectively) were added to estimated noise levels generated by traffic on SR 14 (60 CNEL) from the City's Noise Element (2011) to estimate overall roadway noise levels along Jakes Way.

See Appendix D for TNM output results.

Threshold 2: Would the proposed project generate excessive groundborne vibration or groundborne noise levels?

Impact N-2 CONSTRUCTION OF THE PROPOSED PROJECT WOULD EXPOSE NEARBY SENSITIVE RECEIVERS TO A TEMPORARY INCREASE IN VIBRATION. HOWEVER, VIBRATION LEVELS WOULD NOT EXCEED THE HUMAN ANNOYANCE OR STRUCTURAL DAMAGE THRESHOLDS FOR OCCASIONAL PASS-BYS OF CONSTRUCTION EQUIPMENT OR FOR EXTENDED PERIODS OF CONSTRUCTION ACTIVITIES. IN ADDITION, THE PROJECT WOULD NOT

Construction Vibration

Certain types of construction equipment can generate high levels of groundborne vibration. The equipment utilized during project construction that would generate the highest levels of vibration would include rollers, loaded trucks, and bulldozers. Construction vibration impacts are assessed for individual pieces of construction equipment in accordance with FTA guidance (FTA 2018). Due to site constraints and worker safety limitations, individual pieces of vibratory construction equipment typically do not operate in close proximity to each other such that any single off-site structure would experience substantial levels of vibration from multiple pieces of construction equipment. Therefore, the additive impacts of multiple pieces of vibratory construction equipment operating simultaneously are not evaluated.

Vibration-generating construction equipment that would occasionally pass-by off-site structures would include bulldozers and vibratory rollers used for grading and paving the project site, respectively. These equipment would operate as close as 100 feet from the nearest structure located in the planned residential development immediately north of the project site. Vibration-generating construction equipment that would operate for longer periods of time at the proposed locations of on-site structures would include bulldozers and loaded trucks. These equipment would operate as close as 115 feet from the nearest structure located in the planned residential development immediately north of the project site.

As shown in Table 13, vibration levels from individal pieces of construction equipment would not exceed the human annoyance or structural damage thresholds for occasional pass-bys of construction equipment or for extended periods of construction activities. As a result, impacts would be less than significant.

Table 13 Vibration Levels at Sensitive Receivers

Equipment	Estimated Transient Vibration Levels at Nearest Building (in/sec PPV)[1]	Estimated Steady-State Vibration Levels at Nearest Building (in/sec PPV)[2]
Vibratory Roller	0.05	n/a
Large Bulldozer	0.02	0.02
Loaded Truck	n/a	0.01
Threshold for Human Annoyance	**0.24**	**0.04**
Threshold Exceeded?	No	No
Threshold for Structural Damage to Older Residential Structures	**0.5**	**0.3**
Threshold Exceeded?	No	No
Threshold for Structural Damage to New Residential Structures	**1.0**	**0.5**
Threshold Exceeded?	No	No

Note: Transient vibration levels are estimated for construction activities that would result in infrequent, occasional pass-bys of construction equipment (less than 70 events per day) while steady-state vibration levels are estimated for construction activities that would occur for longer periods of time at a single location on the project site (Caltrans 2020).

[1] Measured at a distance of 100 feet (the distance from the edge of the proposed parking area to the nearest off-site structure).

[2] Measured at a distance of 115 feet (the distance from the edge of proposed on-site buildings to the nearest off-site structure).

See Appendix E for vibration analysis worksheets.

Operational Vibration

As a residential land use, the proposed project would not include significant stationary sources of vibration, such as manufacturing or heavy equipment operations. No operation-related vibration impact would occur.

Threshold 3:	For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed project expose people residing or working in the project area to excessive noise levels?

Impact N-3 THE PROJECT WOULD BE LOCATED OUTSIDE THE AIRPORT INFLUENCE AREA FOR THE WHITEMAN AIRPORT. THEREFORE, THE PROJECT WOULD NOT EXPOSE PEOPLE WORKING IN THE PROJECT AREA TO EXCESSIVE NOISE LEVELS. NO IMPACT WOULD OCCUR.

The nearest airport to the project site is the Whiteman Airport, located approximately 10 miles south of the project site. Therefore, the project would not be within the airport's land use plan, area of influence, within two miles of a public use airport or near a private airstrip or airport (Los Angeles County Airport Land Use Commission 2003). No impacts would occur.

3.4 Noise/Land Use Compatibility Analysis

The ruling for *California Building Industry Association v. Bay Area Air Quality Management District* (*CBIA v. BAAQMD*) determined that under CEQA, except for a few specified and limited instances, environmental impacts on residents of a proposed project are not required to be analyzed (i.e., CEQA requires the analysis of the impacts of a project on the environment and not analysis of the environment's impacts on a project). Therefore, the following noise/land use compatibility discussion is provided for informational purposes only.

The City of Santa Clarita's General Plan Noise Element considers ambient noise levels up to 60 CNEL to be normally acceptable and ambient noise levels up to 70 CNEL to be conditionally acceptable for multi-family land uses (see Figure 5 in Section 2.5, *Regulatory Setting*). Table 14 summarizes estimated railroad and roadway noise levels at the project site under cumulative plus project conditions. As shown therein, noise levels at residences along the outer edges of the project would experience ambient noise levels ranging from approximately 70 to 75 CNEL, primarily due to noise generated by passenger and freight rail operations. These noise levels would fall within the "conditionally acceptable" and "normally unacceptable" ranges for multi-family residential land uses per the City's noise/land use compatibility criteria (see Figure 5 in Section 2.5, *Regulatory Setting*), and the project would be required to reduce exterior noise levels to 65 CNEL per Policy N 3.1.2 of the City's Noise Element. Furthermore, interior noise levels at residences in the southern portion of the project site would be approximately 50 CNEL, which would exceed the City's standard of 45 CNEL (Policy N.3.1.1 of the City's Noise Element). Therefore, in order to comply with the City's noise/land use compatibility criteria and interior noise standard, the project shall incorporate Recommended Measure N-1, which includes design features to reduce exterior and interior noise exposure.

Table 14 Noise/Land Use Compatibility Analysis

Source	Noise Level (CNEL)[1]			
	Southern Portion of Site	Western Portion of Site	Northern Portion of Site	Eastern Portion of Site
Railroad	75	69	69	69
Lost Canyon Road	58	60	59	n/a
Harriman Street	n/a	n/a	61	61
Total Exterior Noise	**75**	**70**	**70**	**70**
Interior-to-Exterior Reduction[2]	(25)	(25)	(25)	(25)
Total Interior Noise	**50**	**45**	**45**	**45**

See Appendix D for TNM results and Appendix F for HUD DNL Calculator results.
[1] The HUD DNL Calculator calculates noise in L_{dn}; however, L_{dn} and CNEL are interchangeable.
[2] The exterior-to-interior reduction of new construction with closed windows is typically 25 to 30 dBA (Caltrans 2013). This analysis conservatively utilizes the low end of this range.

Recommended Measure

N-1 Project Design Features for Noise Exposure Reduction

The project shall incorporate the following design features to reduce exterior and interior noise levels on the project site so as to achieve 65 CNEL for exterior noise levels and 45 CNEL for interior noise levels in all habitable rooms:

- A 10-foot-high barrier, berm, or combination thereof should be constructed along the entire length of the southern edge of the project site parallel to the railroad tracks.
- All residences within 270 feet of the railroad should be constructed with upper-level exterior building facades composed of wall and window materials with an elevated composite STC rating that achieves an interior noise level of 45 CNEL.
- All habitable rooms in residential units throughout the project site should be designed and constructed such that any exterior door or window can be kept closed when the room is in use and still receive circulated air. A forced air circulation system (e.g., air conditioning) or active ventilation system (e.g., fresh air supply) should be provided.
- Upper-level balconies for residential units throughout the project site should not be provided on exterior facades with direct line-of-sight to the railroad tracks. Instead, balconies should be provided on northern facades and on facades facing away from the railroad tracks with no direct line-of-sight to the railroad tracks.

Noise Levels with Implementation of Recommendations

Implementation of Recommended Measure N-1 would require implementation of project design features to reduce exterior and interior noise levels. Construction of an approximately 10-foot-high wall would reduce exterior noise levels by approximately 10 dBA to 65 CNEL (see barrier calculations in Appendix F), which would fall within the City's "conditionally acceptable" range and would be consistent with the exterior noise level standard of 65 CNEL outlined in Policy N 3.1.2 of the City's Noise Element. The wall would also reduce interior noise levels at the ground floor of residences to

approximately 40 CNEL (65 CNEL – 25 CNEL). In addition, exterior building facades on the upper floors of residences within 270 feet of the railroad would be required to be constructed of window and wall materials with elevated STC ratings to meet the performance criterion of 45 CNEL for interior noise levels . Therefore, these measures would achieve interior noise levels of approximately 45 CNEL or less, which would comply with the City's standard of 45 CNEL. Therefore, with incorporation of Recommendation Measure N-1, the project would be consistent with the City's noise/land use compatibility criteria and interior noise standard.

4 Conclusions and Recommendations

The proposed project would have less than significant impacts related to construction noise, operational noise, vibration, off-site traffic noise, and airport-related noise. Exterior noise levels at residences along the outer edges of the project site would fall within the “conditionally acceptable” and “normally unacceptable” ranges for multi-family residential land uses per the City’s noise/land use compatibility criteria. However, implementation of Recommended Measure N-1 would reduce exterior and interior noise exposure to acceptable levels.

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Appendix A

Noise Measurement Data

Noise Measurement 1

Data Logger 2		
Duration (seconds)	3	
Weighting	A	
Response	SLOW	
Range	40-100	
L05	56.2	
L10	54.2	
L50	48.5	
L90	45.1	
L95	44.7	
Lmax	71.4	
Time	2/4/2020	16:34:48 PM
SEL	82.2	
Leq	52.7	

Leq (Manual) **52.6**

No.s	Date Time	dB	Sound Energy
1	2/4/2020 16:23	45.2	99339.33644
2	2/4/2020 16:23	44.9	92708.86298
3	2/4/2020 16:23	45.5	106444.0168
4	2/4/2020 16:23	49.5	267375.2814
5	2/4/2020 16:23	48.7	222393.0724
6	2/4/2020 16:23	50.6	344446.0864
7	2/4/2020 16:23	50.9	369080.6312
8	2/4/2020 16:23	48	189287.2033
9	2/4/2020 16:23	48.3	202824.8926
10	2/4/2020 16:23	49.1	243849.1548
11	2/4/2020 16:23	46.4	130954.7497
12	2/4/2020 16:23	45.4	104021.0551
13	2/4/2020 16:23	45.9	116713.5435
14	2/4/2020 16:23	46.7	140320.5424
15	2/4/2020 16:23	46.7	140320.5424
16	2/4/2020 16:23	49.6	273603.2518
17	2/4/2020 16:23	52.7	558626.141
18	2/4/2020 16:24	51.6	433631.9312
19	2/4/2020 16:24	51.6	433631.9312
20	2/4/2020 16:24	52.7	558626.141
21	2/4/2020 16:24	51.8	454068.3745
22	2/4/2020 16:24	56.3	1279738.556
23	2/4/2020 16:24	55.7	1114605.687
24	2/4/2020 16:24	53.7	703268.6446
25	2/4/2020 16:24	56.2	1250608.15
26	2/4/2020 16:24	51.6	433631.9312
27	2/4/2020 16:24	50	300000

28	2/4/2020 16:24	49.1	243849.1548
29	2/4/2020 16:24	49.7	279976.2902
30	2/4/2020 16:24	47.7	176653.0966
31	2/4/2020 16:24	47.9	184978.5006
32	2/4/2020 16:24	48.8	227573.2725
33	2/4/2020 16:24	45.4	104021.0551
34	2/4/2020 16:24	45.6	108923.4164
35	2/4/2020 16:24	46.2	125060.815
36	2/4/2020 16:24	46.2	125060.815
37	2/4/2020 16:24	46.9	146933.6458
38	2/4/2020 16:25	45.6	108923.4164
39	2/4/2020 16:25	46.6	137126.4569
40	2/4/2020 16:25	45.4	104021.0551
41	2/4/2020 16:25	45.3	101653.2468
42	2/4/2020 16:25	46.3	127973.8556
43	2/4/2020 16:25	47.4	164862.2622
44	2/4/2020 16:25	50.1	306987.8977
45	2/4/2020 16:25	51.3	404688.8648
46	2/4/2020 16:25	45.5	106444.0168
47	2/4/2020 16:25	45.6	108923.4164
48	2/4/2020 16:25	49.7	279976.2902
49	2/4/2020 16:25	50.8	360679.3304
50	2/4/2020 16:25	47.5	168702.3976
51	2/4/2020 16:25	44.4	82626.8611
52	2/4/2020 16:25	47.5	168702.3976
53	2/4/2020 16:25	47.4	164862.2622
54	2/4/2020 16:25	47.1	153858.4152
55	2/4/2020 16:25	46.7	140320.5424
56	2/4/2020 16:25	47.7	176653.0966
57	2/4/2020 16:25	50.5	336605.5363
58	2/4/2020 16:26	54.3	807460.4412
59	2/4/2020 16:26	49.8	286497.7758
60	2/4/2020 16:26	44.8	90598.55161
61	2/4/2020 16:26	46.6	137126.4569
62	2/4/2020 16:26	48.6	217330.788
63	2/4/2020 16:26	48.2	198208.0344
64	2/4/2020 16:26	46.3	127973.8556
65	2/4/2020 16:26	44.7	88536.2768
66	2/4/2020 16:26	44.9	92708.86298
67	2/4/2020 16:26	45.7	111460.5687
68	2/4/2020 16:26	45.7	111460.5687
69	2/4/2020 16:26	43.9	73641.26747
70	2/4/2020 16:26	45.5	106444.0168
71	2/4/2020 16:26	44	75356.59295
72	2/4/2020 16:26	47.2	157442.2381
73	2/4/2020 16:26	46.3	127973.8556
74	2/4/2020 16:26	45.2	99339.33644

75	2/4/2020 16:26	45.8	114056.8189
76	2/4/2020 16:26	46	119432.1512
77	2/4/2020 16:26	47.8	180767.8758
78	2/4/2020 16:27	47.6	172631.9812
79	2/4/2020 16:27	48.6	217330.788
80	2/4/2020 16:27	57.3	1611095.389
81	2/4/2020 16:27	50.4	328943.4588
82	2/4/2020 16:27	48.4	207549.2913
83	2/4/2020 16:27	48.2	198208.0344
84	2/4/2020 16:27	47.4	164862.2622
85	2/4/2020 16:27	47	150356.1701
86	2/4/2020 16:27	47.7	176653.0966
87	2/4/2020 16:27	48.1	193696.2687
88	2/4/2020 16:27	47.2	157442.2381
89	2/4/2020 16:27	45.5	106444.0168
90	2/4/2020 16:27	45.2	99339.33644
91	2/4/2020 16:27	45	94868.32981
92	2/4/2020 16:27	44.5	84551.48794
93	2/4/2020 16:27	45.8	114056.8189
94	2/4/2020 16:27	46.2	125060.815
95	2/4/2020 16:27	57.2	1574422.381
96	2/4/2020 16:27	61.6	4336319.312
97	2/4/2020 16:27	60.8	3606793.304
98	2/4/2020 16:28	53.9	736412.6747
99	2/4/2020 16:28	49	238298.4704
100	2/4/2020 16:28	51.7	443732.5165
101	2/4/2020 16:28	54.7	885362.768
102	2/4/2020 16:28	55.1	970780.9708
103	2/4/2020 16:28	54.3	807460.4412
104	2/4/2020 16:28	56.1	1222140.833
105	2/4/2020 16:28	53.3	641388.6269
106	2/4/2020 16:28	49.9	293171.1663
107	2/4/2020 16:28	48.6	217330.788
108	2/4/2020 16:28	49.3	255341.4115
109	2/4/2020 16:28	47.9	184978.5006
110	2/4/2020 16:28	49.1	243849.1548
111	2/4/2020 16:28	48.5	212383.7353
112	2/4/2020 16:28	46.1	122214.0833
113	2/4/2020 16:28	44.7	88536.2768
114	2/4/2020 16:28	46.8	143589.0277
115	2/4/2020 16:28	49.2	249529.1313
116	2/4/2020 16:28	50.5	336605.5363
117	2/4/2020 16:28	50.2	314138.5644
118	2/4/2020 16:29	50	300000
119	2/4/2020 16:29	49.7	279976.2902
120	2/4/2020 16:29	52.1	486543.0292
121	2/4/2020 16:29	50.3	321455.7916

122	2/4/2020 16:29	47.2	157442.2381
123	2/4/2020 16:29	47.3	161109.5389
124	2/4/2020 16:29	45.8	114056.8189
125	2/4/2020 16:29	47.7	176653.0966
126	2/4/2020 16:29	50.4	328943.4588
127	2/4/2020 16:29	53.6	687260.2958
128	2/4/2020 16:29	48.7	222393.0724
129	2/4/2020 16:29	50	300000
130	2/4/2020 16:29	46.1	122214.0833
131	2/4/2020 16:29	48	189287.2033
132	2/4/2020 16:29	49.5	267375.2814
133	2/4/2020 16:29	44.1	77111.87348
134	2/4/2020 16:29	44.8	90598.55161
135	2/4/2020 16:29	46.6	137126.4569
136	2/4/2020 16:29	45.9	116713.5435
137	2/4/2020 16:29	45.9	116713.5435
138	2/4/2020 16:30	44.7	88536.2768
139	2/4/2020 16:30	44.1	77111.87348
140	2/4/2020 16:30	45.3	101653.2468
141	2/4/2020 16:30	46.7	140320.5424
142	2/4/2020 16:30	43.5	67161.63416
143	2/4/2020 16:30	42.4	52134.02486
144	2/4/2020 16:30	43.2	62678.88393
145	2/4/2020 16:30	44.3	80746.04412
146	2/4/2020 16:30	45.5	106444.0168
147	2/4/2020 16:30	47.8	180767.8758
148	2/4/2020 16:30	47.4	164862.2622
149	2/4/2020 16:30	48	189287.2033
150	2/4/2020 16:30	46.7	140320.5424
151	2/4/2020 16:30	46.9	146933.6458
152	2/4/2020 16:30	47.9	184978.5006
153	2/4/2020 16:30	50.3	321455.7916
154	2/4/2020 16:30	51	377677.6235
155	2/4/2020 16:30	46.2	125060.815
156	2/4/2020 16:30	45	94868.32981
157	2/4/2020 16:30	45.2	99339.33644
158	2/4/2020 16:31	48.3	202824.8926
159	2/4/2020 16:31	48.4	207549.2913
160	2/4/2020 16:31	50.9	369080.6312
161	2/4/2020 16:31	49	238298.4704
162	2/4/2020 16:31	47	150356.1701
163	2/4/2020 16:31	48.9	232874.135
164	2/4/2020 16:31	49.2	249529.1313
165	2/4/2020 16:31	55.5	1064440.168
166	2/4/2020 16:31	66.9	14693364.58
167	2/4/2020 16:31	61.6	4336319.312
168	2/4/2020 16:31	59.3	2553414.115

169	2/4/2020 16:31	55.2	993393.3644
170	2/4/2020 16:31	50.2	314138.5644
171	2/4/2020 16:31	48.6	217330.788
172	2/4/2020 16:31	49.3	255341.4115
173	2/4/2020 16:31	50.7	352469.2665
174	2/4/2020 16:31	51.4	414115.2794
175	2/4/2020 16:31	50.9	369080.6312
176	2/4/2020 16:31	51.3	404688.8648
177	2/4/2020 16:31	51.5	423761.2634
178	2/4/2020 16:32	50.6	344446.0864
179	2/4/2020 16:32	49.8	286497.7758
180	2/4/2020 16:32	49	238298.4704
181	2/4/2020 16:32	50.4	328943.4588
182	2/4/2020 16:32	48.1	193696.2687
183	2/4/2020 16:32	51	377677.6235
184	2/4/2020 16:32	60.8	3606793.304
185	2/4/2020 16:32	56.4	1309547.497
186	2/4/2020 16:32	54.9	927088.6298
187	2/4/2020 16:32	51.5	423761.2634
188	2/4/2020 16:32	50.3	321455.7916
189	2/4/2020 16:32	48.1	193696.2687
190	2/4/2020 16:32	48.2	198208.0344
191	2/4/2020 16:32	51.3	404688.8648
192	2/4/2020 16:32	50	300000
193	2/4/2020 16:32	47.7	176653.0966
194	2/4/2020 16:32	49.6	273603.2518
195	2/4/2020 16:32	48.8	227573.2725
196	2/4/2020 16:32	48.9	232874.135
197	2/4/2020 16:32	51.4	414115.2794
198	2/4/2020 16:33	49.7	279976.2902
199	2/4/2020 16:33	48.4	207549.2913
200	2/4/2020 16:33	47.4	164862.2622
201	2/4/2020 16:33	51.8	454068.3745
202	2/4/2020 16:33	54.1	771118.7348
203	2/4/2020 16:33	49.9	293171.1663
204	2/4/2020 16:33	45.7	111460.5687
205	2/4/2020 16:33	46.4	130954.7497
206	2/4/2020 16:33	47.6	172631.9812
207	2/4/2020 16:33	47.8	180767.8758
208	2/4/2020 16:33	51.5	423761.2634
209	2/4/2020 16:33	50.9	369080.6312
210	2/4/2020 16:33	48.3	202824.8926
211	2/4/2020 16:33	47.4	164862.2622
212	2/4/2020 16:33	49.4	261289.077
213	2/4/2020 16:33	48.3	202824.8926
214	2/4/2020 16:33	45.9	116713.5435
215	2/4/2020 16:33	49.4	261289.077

216	2/4/2020 16:33	46.7	140320.5424
217	2/4/2020 16:33	47.6	172631.9812
218	2/4/2020 16:34	49	238298.4704
219	2/4/2020 16:34	50.8	360679.3304
220	2/4/2020 16:34	49.5	267375.2814
221	2/4/2020 16:34	51.8	454068.3745
222	2/4/2020 16:34	46.2	125060.815
223	2/4/2020 16:34	46.5	134005.0776
224	2/4/2020 16:34	51.9	464644.9857
225	2/4/2020 16:34	53.6	687260.2958
226	2/4/2020 16:34	55.2	993393.3644
227	2/4/2020 16:34	53.3	641388.6269
228	2/4/2020 16:34	57.3	1611095.389
229	2/4/2020 16:34	55.5	1064440.168
230	2/4/2020 16:34	54.7	885362.768
231	2/4/2020 16:34	52.4	521340.2486
232	2/4/2020 16:34	62.3	5094730.957
233	2/4/2020 16:34	69.3	25534141.15
234	2/4/2020 16:34	63.7	7032686.446
235	2/4/2020 16:34	60.6	3444460.864
236	2/4/2020 16:34	56	1194321.512
237	2/4/2020 16:34	51.6	433631.9312
238	2/4/2020 16:35	47.5	168702.3976
239	2/4/2020 16:35	46.4	130954.7497
240	2/4/2020 16:35	46.1	122214.0833
241	2/4/2020 16:35	45.7	111460.5687
242	2/4/2020 16:35	47.5	168702.3976
243	2/4/2020 16:35	45.5	106444.0168
244	2/4/2020 16:35	46.2	125060.815
245	2/4/2020 16:35	45.7	111460.5687
246	2/4/2020 16:35	45.1	97078.09708
247	2/4/2020 16:35	45.1	97078.09708
248	2/4/2020 16:35	47.9	184978.5006
249	2/4/2020 16:35	49	238298.4704
250	2/4/2020 16:35	49.4	261289.077
251	2/4/2020 16:35	53.5	671616.3416
252	2/4/2020 16:35	51.7	443732.5165
253	2/4/2020 16:35	52.8	571638.2154
254	2/4/2020 16:35	50.2	314138.5644
255	2/4/2020 16:35	48	189287.2033
256	2/4/2020 16:35	48.2	198208.0344
257	2/4/2020 16:35	49.4	261289.077
258	2/4/2020 16:36	47.4	164862.2622
259	2/4/2020 16:36	46	119432.1512
260	2/4/2020 16:36	47.9	184978.5006
261	2/4/2020 16:36	44.7	88536.2768
262	2/4/2020 16:36	46.8	143589.0277

263	2/4/2020 16:36	45.3	101653.2468
264	2/4/2020 16:36	45.9	116713.5435
265	2/4/2020 16:36	50.5	336605.5363
266	2/4/2020 16:36	56.2	1250608.15
267	2/4/2020 16:36	57.3	1611095.389
268	2/4/2020 16:36	56.9	1469336.458
269	2/4/2020 16:36	51.8	454068.3745
270	2/4/2020 16:36	46.1	122214.0833
271	2/4/2020 16:36	45.8	114056.8189
272	2/4/2020 16:36	44.9	92708.86298
273	2/4/2020 16:36	45.1	97078.09708
274	2/4/2020 16:36	45.3	101653.2468
275	2/4/2020 16:36	46.7	140320.5424
276	2/4/2020 16:36	44.8	90598.55161
277	2/4/2020 16:36	45	94868.32981
278	2/4/2020 16:37	45.1	97078.09708
279	2/4/2020 16:37	44.9	92708.86298
280	2/4/2020 16:37	45.9	116713.5435
281	2/4/2020 16:37	48.6	217330.788
282	2/4/2020 16:37	49.9	293171.1663
283	2/4/2020 16:37	52	475467.9577
284	2/4/2020 16:37	53.2	626788.8393
285	2/4/2020 16:37	53.9	736412.6747
286	2/4/2020 16:37	54	753565.9295
287	2/4/2020 16:37	53.3	641388.6269
288	2/4/2020 16:37	51.9	464644.9857
289	2/4/2020 16:37	51.9	464644.9857
290	2/4/2020 16:37	49.1	243849.1548
291	2/4/2020 16:37	53.2	626788.8393
292	2/4/2020 16:37	54.5	845514.8794
293	2/4/2020 16:37	55.7	1114605.687
294	2/4/2020 16:37	52.4	521340.2486
295	2/4/2020 16:37	50	300000
296	2/4/2020 16:37	48.9	232874.135
297	2/4/2020 16:37	46.3	127973.8556
298	2/4/2020 16:38	46.6	137126.4569
299	2/4/2020 16:38	48.9	232874.135
300	2/4/2020 16:38	49	238298.4704

Noise Measurement 2

Data Logger 2		
Duration (seconds)	3	
Weighting	A	
Response	SLOW	
Range	40-100	
L05	46.9	
L10	46.2	
L50	43.6	
L90	42	
L95	41.2	
Lmax	60.5	
Time	2/4/2020	17:44:12 PM
SEL	74.4	
Leq	44.9	

Leq (Manual) **44.6**

No.s	Date Time	dB	Sound Energy
1	2/4/2020 17:43	50.1	306987.8977
2	2/4/2020 17:43	44.4	82626.8611
3	2/4/2020 17:43	43.4	65632.84872
4	2/4/2020 17:43	43.5	67161.63416
5	2/4/2020 17:43	48.7	222393.0724
6	2/4/2020 17:43	45.4	104021.0551
7	2/4/2020 17:43	45	94868.32981
8	2/4/2020 17:43	43.8	71964.98757
9	2/4/2020 17:43	42.6	54591.02576
10	2/4/2020 17:43	44.9	92708.86298
11	2/4/2020 17:43	43.9	73641.26747
12	2/4/2020 17:44	44.8	90598.55161
13	2/4/2020 17:44	45.3	101653.2468
14	2/4/2020 17:44	43	59857.86945
15	2/4/2020 17:44	54.3	807460.4412
16	2/4/2020 17:44	45.3	101653.2468
17	2/4/2020 17:44	42.8	57163.82154
18	2/4/2020 17:44	43.1	61252.13834
19	2/4/2020 17:44	42.5	53348.3823
20	2/4/2020 17:44	42.1	48654.30292
21	2/4/2020 17:44	41.7	44373.25165
22	2/4/2020 17:44	41.9	46464.49857
23	2/4/2020 17:44	42.5	53348.3823
24	2/4/2020 17:44	42.6	54591.02576
25	2/4/2020 17:44	42.5	53348.3823
26	2/4/2020 17:44	42.4	52134.02486
27	2/4/2020 17:44	42.9	58495.33799

28	2/4/2020 17:44	42.7	55862.6141
29	2/4/2020 17:44	45.6	108923.4164
30	2/4/2020 17:44	42.9	58495.33799
31	2/4/2020 17:44	43.1	61252.13834
32	2/4/2020 17:45	41.5	42376.12634
33	2/4/2020 17:45	41.9	46464.49857
34	2/4/2020 17:45	42.9	58495.33799
35	2/4/2020 17:45	42.8	57163.82154
36	2/4/2020 17:45	42.9	58495.33799
37	2/4/2020 17:45	42.1	48654.30292
38	2/4/2020 17:45	42.2	49787.60722
39	2/4/2020 17:45	41.1	38647.48655
40	2/4/2020 17:45	41.6	43363.19312
41	2/4/2020 17:45	42.5	53348.3823
42	2/4/2020 17:45	42	47546.79577
43	2/4/2020 17:45	43.2	62678.88393
44	2/4/2020 17:45	43.6	68726.02958
45	2/4/2020 17:45	44.7	88536.2768
46	2/4/2020 17:45	43.9	73641.26747
47	2/4/2020 17:45	44	75356.59295
48	2/4/2020 17:45	44.1	77111.87348
49	2/4/2020 17:45	44.4	82626.8611
50	2/4/2020 17:45	45.4	104021.0551
51	2/4/2020 17:45	44.7	88536.2768
52	2/4/2020 17:46	44.1	77111.87348
53	2/4/2020 17:46	43.7	70326.86446
54	2/4/2020 17:46	42.8	57163.82154
55	2/4/2020 17:46	42.3	50947.30957
56	2/4/2020 17:46	42.4	52134.02486
57	2/4/2020 17:46	43.2	62678.88393
58	2/4/2020 17:46	43.4	65632.84872
59	2/4/2020 17:46	43.2	62678.88393
60	2/4/2020 17:46	42.9	58495.33799
61	2/4/2020 17:46	43.6	68726.02958
62	2/4/2020 17:46	44.1	77111.87348
63	2/4/2020 17:46	44.2	78908.03976
64	2/4/2020 17:46	43.7	70326.86446
65	2/4/2020 17:46	43.2	62678.88393
66	2/4/2020 17:46	42.6	54591.02576
67	2/4/2020 17:46	42.8	57163.82154
68	2/4/2020 17:46	43.3	64138.86269
69	2/4/2020 17:46	42.4	52134.02486
70	2/4/2020 17:46	42.9	58495.33799
71	2/4/2020 17:46	42.1	48654.30292
72	2/4/2020 17:47	41.6	43363.19312
73	2/4/2020 17:47	42.9	58495.33799
74	2/4/2020 17:47	43.4	65632.84872

75	2/4/2020 17:47	44	75356.59295
76	2/4/2020 17:47	45	94868.32981
77	2/4/2020 17:47	45.1	97078.09708
78	2/4/2020 17:47	43.4	65632.84872
79	2/4/2020 17:47	42.9	58495.33799
80	2/4/2020 17:47	42.7	55862.6141
81	2/4/2020 17:47	45.8	114056.8189
82	2/4/2020 17:47	43.9	73641.26747
83	2/4/2020 17:47	43.1	61252.13834
84	2/4/2020 17:47	41.9	46464.49857
85	2/4/2020 17:47	42.5	53348.3823
86	2/4/2020 17:47	42	47546.79577
87	2/4/2020 17:47	43.2	62678.88393
88	2/4/2020 17:47	43.5	67161.63416
89	2/4/2020 17:47	44.7	88536.2768
90	2/4/2020 17:47	45.2	99339.33644
91	2/4/2020 17:47	43.8	71964.98757
92	2/4/2020 17:48	42.1	48654.30292
93	2/4/2020 17:48	42.9	58495.33799
94	2/4/2020 17:48	42	47546.79577
95	2/4/2020 17:48	41.3	40468.88648
96	2/4/2020 17:48	42.1	48654.30292
97	2/4/2020 17:48	43.6	68726.02958
98	2/4/2020 17:48	43.3	64138.86269
99	2/4/2020 17:48	42.3	50947.30957
100	2/4/2020 17:48	42.6	54591.02576
101	2/4/2020 17:48	42.7	55862.6141
102	2/4/2020 17:48	42.9	58495.33799
103	2/4/2020 17:48	42.6	54591.02576
104	2/4/2020 17:48	43.6	68726.02958
105	2/4/2020 17:48	43	59857.86945
106	2/4/2020 17:48	42.1	48654.30292
107	2/4/2020 17:48	43.2	62678.88393
108	2/4/2020 17:48	42.2	49787.60722
109	2/4/2020 17:48	42.8	57163.82154
110	2/4/2020 17:48	43.1	61252.13834
111	2/4/2020 17:48	43.2	62678.88393
112	2/4/2020 17:49	43.5	67161.63416
113	2/4/2020 17:49	43.9	73641.26747
114	2/4/2020 17:49	43.5	67161.63416
115	2/4/2020 17:49	43.7	70326.86446
116	2/4/2020 17:49	44.4	82626.8611
117	2/4/2020 17:49	42.9	58495.33799
118	2/4/2020 17:49	43.4	65632.84872
119	2/4/2020 17:49	44	75356.59295
120	2/4/2020 17:49	45.2	99339.33644
121	2/4/2020 17:49	44	75356.59295

122	2/4/2020 17:49	43.8	71964.98757
123	2/4/2020 17:49	44.6	86520.94509
124	2/4/2020 17:49	44.2	78908.03976
125	2/4/2020 17:49	46.3	127973.8556
126	2/4/2020 17:49	46.3	127973.8556
127	2/4/2020 17:49	46	119432.1512
128	2/4/2020 17:49	43.7	70326.86446
129	2/4/2020 17:49	45	94868.32981
130	2/4/2020 17:49	43.9	73641.26747
131	2/4/2020 17:49	42.6	54591.02576
132	2/4/2020 17:50	41.6	43363.19312
133	2/4/2020 17:50	40.7	35246.92665
134	2/4/2020 17:50	40.8	36067.93304
135	2/4/2020 17:50	41.5	42376.12634
136	2/4/2020 17:50	41.7	44373.25165
137	2/4/2020 17:50	41.7	44373.25165
138	2/4/2020 17:50	42.3	50947.30957
139	2/4/2020 17:50	42.4	52134.02486
140	2/4/2020 17:50	42.1	48654.30292
141	2/4/2020 17:50	43.5	67161.63416
142	2/4/2020 17:50	44.6	86520.94509
143	2/4/2020 17:50	43	59857.86945
144	2/4/2020 17:50	44.7	88536.2768
145	2/4/2020 17:50	43	59857.86945
146	2/4/2020 17:50	42.2	49787.60722
147	2/4/2020 17:50	42	47546.79577
148	2/4/2020 17:50	39.9	29317.11663
149	2/4/2020 17:50	40.1	30698.78977
150	2/4/2020 17:50	39.8	28649.77758
151	2/4/2020 17:50	39.6	27360.32518
152	2/4/2020 17:51	40.7	35246.92665
153	2/4/2020 17:51	40.1	30698.78977
154	2/4/2020 17:51	41.8	45406.83745
155	2/4/2020 17:51	43.6	68726.02958
156	2/4/2020 17:51	43.8	71964.98757
157	2/4/2020 17:51	43.1	61252.13834
158	2/4/2020 17:51	41.2	39547.70216
159	2/4/2020 17:51	40.7	35246.92665
160	2/4/2020 17:51	41.3	40468.88648
161	2/4/2020 17:51	41.5	42376.12634
162	2/4/2020 17:51	41.1	38647.48655
163	2/4/2020 17:51	42.6	54591.02576
164	2/4/2020 17:51	44.6	86520.94509
165	2/4/2020 17:51	42.7	55862.6141
166	2/4/2020 17:51	43.1	61252.13834
167	2/4/2020 17:51	44.7	88536.2768
168	2/4/2020 17:51	45.2	99339.33644

169	2/4/2020 17:51	43.9	73641.26747
170	2/4/2020 17:51	42.6	54591.02576
171	2/4/2020 17:51	42.8	57163.82154
172	2/4/2020 17:52	42.4	52134.02486
173	2/4/2020 17:52	41.8	45406.83745
174	2/4/2020 17:52	42.1	48654.30292
175	2/4/2020 17:52	43	59857.86945
176	2/4/2020 17:52	45.6	108923.4164
177	2/4/2020 17:52	52.4	521340.2486
178	2/4/2020 17:52	49.3	255341.4115
179	2/4/2020 17:52	45.7	111460.5687
180	2/4/2020 17:52	49.5	267375.2814
181	2/4/2020 17:52	53.1	612521.3834
182	2/4/2020 17:52	51.4	414115.2794
183	2/4/2020 17:52	47.3	161109.5389
184	2/4/2020 17:52	44.2	78908.03976
185	2/4/2020 17:52	42.9	58495.33799
186	2/4/2020 17:52	42.6	54591.02576
187	2/4/2020 17:52	41.9	46464.49857
188	2/4/2020 17:52	42.6	54591.02576
189	2/4/2020 17:52	42.9	58495.33799
190	2/4/2020 17:52	43.2	62678.88393
191	2/4/2020 17:52	43.6	68726.02958
192	2/4/2020 17:53	42.5	53348.3823
193	2/4/2020 17:53	43.9	73641.26747
194	2/4/2020 17:53	43.2	62678.88393
195	2/4/2020 17:53	43.2	62678.88393
196	2/4/2020 17:53	43	59857.86945
197	2/4/2020 17:53	42.1	48654.30292
198	2/4/2020 17:53	42.7	55862.6141
199	2/4/2020 17:53	42.2	49787.60722
200	2/4/2020 17:53	42.5	53348.3823
201	2/4/2020 17:53	42.1	48654.30292
202	2/4/2020 17:53	42.7	55862.6141
203	2/4/2020 17:53	43.2	62678.88393
204	2/4/2020 17:53	44.8	90598.55161
205	2/4/2020 17:53	44.5	84551.48794
206	2/4/2020 17:53	44.9	92708.86298
207	2/4/2020 17:53	44.1	77111.87348
208	2/4/2020 17:53	44.8	90598.55161
209	2/4/2020 17:53	44	75356.59295
210	2/4/2020 17:53	44.2	78908.03976
211	2/4/2020 17:53	44.6	86520.94509
212	2/4/2020 17:54	44.5	84551.48794
213	2/4/2020 17:54	44.8	90598.55161
214	2/4/2020 17:54	45	94868.32981
215	2/4/2020 17:54	46.3	127973.8556

216	2/4/2020 17:54	46.5	134005.0776
217	2/4/2020 17:54	47.5	168702.3976
218	2/4/2020 17:54	47	150356.1701
219	2/4/2020 17:54	46.5	134005.0776
220	2/4/2020 17:54	44.8	90598.55161
221	2/4/2020 17:54	44.4	82626.8611
222	2/4/2020 17:54	46.1	122214.0833
223	2/4/2020 17:54	44.5	84551.48794
224	2/4/2020 17:54	43.6	68726.02958
225	2/4/2020 17:54	43	59857.86945
226	2/4/2020 17:54	43.3	64138.86269
227	2/4/2020 17:54	42.5	53348.3823
228	2/4/2020 17:54	43.1	61252.13834
229	2/4/2020 17:54	43.9	73641.26747
230	2/4/2020 17:54	44.4	82626.8611
231	2/4/2020 17:54	44	75356.59295
232	2/4/2020 17:55	44.1	77111.87348
233	2/4/2020 17:55	44.3	80746.04412
234	2/4/2020 17:55	43.8	71964.98757
235	2/4/2020 17:55	45.9	116713.5435
236	2/4/2020 17:55	44.4	82626.8611
237	2/4/2020 17:55	45	94868.32981
238	2/4/2020 17:55	44.3	80746.04412
239	2/4/2020 17:55	43.3	64138.86269
240	2/4/2020 17:55	44.6	86520.94509
241	2/4/2020 17:55	44.2	78908.03976
242	2/4/2020 17:55	46.6	137126.4569
243	2/4/2020 17:55	44.1	77111.87348
244	2/4/2020 17:55	44	75356.59295
245	2/4/2020 17:55	45.9	116713.5435
246	2/4/2020 17:55	45.2	99339.33644
247	2/4/2020 17:55	44.9	92708.86298
248	2/4/2020 17:55	45	94868.32981
249	2/4/2020 17:55	45.5	106444.0168
250	2/4/2020 17:55	45.4	104021.0551
251	2/4/2020 17:55	45.6	108923.4164
252	2/4/2020 17:56	46	119432.1512
253	2/4/2020 17:56	46.2	125060.815
254	2/4/2020 17:56	46	119432.1512
255	2/4/2020 17:56	44.5	84551.48794
256	2/4/2020 17:56	43.5	67161.63416
257	2/4/2020 17:56	44.2	78908.03976
258	2/4/2020 17:56	43.5	67161.63416
259	2/4/2020 17:56	43.3	64138.86269
260	2/4/2020 17:56	43.4	65632.84872
261	2/4/2020 17:56	43.9	73641.26747
262	2/4/2020 17:56	45.5	106444.0168

263	2/4/2020 17:56	45	94868.32981
264	2/4/2020 17:56	46.5	134005.0776
265	2/4/2020 17:56	46.3	127973.8556
266	2/4/2020 17:56	47.3	161109.5389
267	2/4/2020 17:56	46.4	130954.7497
268	2/4/2020 17:56	46.8	143589.0277
269	2/4/2020 17:56	46	119432.1512
270	2/4/2020 17:56	46.9	146933.6458
271	2/4/2020 17:56	45	94868.32981
272	2/4/2020 17:57	46.3	127973.8556
273	2/4/2020 17:57	45.9	116713.5435
274	2/4/2020 17:57	51.6	433631.9312
275	2/4/2020 17:57	46.2	125060.815
276	2/4/2020 17:57	45.9	116713.5435
277	2/4/2020 17:57	44.8	90598.55161
278	2/4/2020 17:57	45.3	101653.2468
279	2/4/2020 17:57	46.2	125060.815
280	2/4/2020 17:57	46.9	146933.6458
281	2/4/2020 17:57	46.7	140320.5424
282	2/4/2020 17:57	44.3	80746.04412
283	2/4/2020 17:57	44.5	84551.48794
284	2/4/2020 17:57	44.4	82626.8611
285	2/4/2020 17:57	44.2	78908.03976
286	2/4/2020 17:57	44.8	90598.55161
287	2/4/2020 17:57	45.5	106444.0168
288	2/4/2020 17:57	45.6	108923.4164
289	2/4/2020 17:57	45.8	114056.8189
290	2/4/2020 17:57	46.6	137126.4569
291	2/4/2020 17:57	47.1	153858.4152
292	2/4/2020 17:58	45.8	114056.8189
293	2/4/2020 17:58	45.5	106444.0168
294	2/4/2020 17:58	45.9	116713.5435
295	2/4/2020 17:58	45.8	114056.8189
296	2/4/2020 17:58	46.2	125060.815
297	2/4/2020 17:58	45.4	104021.0551
298	2/4/2020 17:58	44.4	82626.8611
299	2/4/2020 17:58	44.5	84551.48794
300	2/4/2020 17:58	45.6	108923.4164

Noise Measurement 3

Data Logger 2		
Duration (seconds)	3	
Weighting	A	
Response	SLOW	
Range	40-100	
L05	54.7	
L10	53	
L50	45.9	
L90	43.3	
L95	42.6	
Lmax	67.9	
Time	2/4/2020	16:45:14 PM
SEL	79.7	
Leq	50.2	

Leq (Manual) **50.4**

No.s	Date Time	dB	Sound Energy
1	2/4/2020 16:45	45	94868.32981
2	2/4/2020 16:45	44	75356.59295
3	2/4/2020 16:45	44.2	78908.03976
4	2/4/2020 16:45	45.4	104021.0551
5	2/4/2020 16:45	66.2	12506081.5
6	2/4/2020 16:45	54.1	771118.7348
7	2/4/2020 16:45	45.1	97078.09708
8	2/4/2020 16:45	44	75356.59295
9	2/4/2020 16:45	42.6	54591.02576
10	2/4/2020 16:45	42.4	52134.02486
11	2/4/2020 16:45	45.8	114056.8189
12	2/4/2020 16:45	42.1	48654.30292
13	2/4/2020 16:45	43.2	62678.88393
14	2/4/2020 16:45	47.5	168702.3976
15	2/4/2020 16:45	42.6	54591.02576
16	2/4/2020 16:45	43	59857.86945
17	2/4/2020 16:45	43.1	61252.13834
18	2/4/2020 16:45	44.1	77111.87348
19	2/4/2020 16:45	45.7	111460.5687
20	2/4/2020 16:45	54.5	845514.8794
21	2/4/2020 16:46	50.1	306987.8977
22	2/4/2020 16:46	49.7	279976.2902
23	2/4/2020 16:46	49	238298.4704
24	2/4/2020 16:46	53.5	671616.3416
25	2/4/2020 16:46	49.9	293171.1663
26	2/4/2020 16:46	45.5	106444.0168
27	2/4/2020 16:46	45.3	101653.2468

28	2/4/2020 16:46	45.8	114056.8189
29	2/4/2020 16:46	46.9	146933.6458
30	2/4/2020 16:46	47.7	176653.0966
31	2/4/2020 16:46	47.3	161109.5389
32	2/4/2020 16:46	56.7	1403205.424
33	2/4/2020 16:46	55.8	1140568.189
34	2/4/2020 16:46	52.5	533483.823
35	2/4/2020 16:46	54.5	845514.8794
36	2/4/2020 16:46	52.7	558626.141
37	2/4/2020 16:46	59.4	2612890.77
38	2/4/2020 16:46	53.7	703268.6446
39	2/4/2020 16:46	52.9	584953.3799
40	2/4/2020 16:46	53.2	626788.8393
41	2/4/2020 16:47	50	300000
42	2/4/2020 16:47	50.1	306987.8977
43	2/4/2020 16:47	51.6	433631.9312
44	2/4/2020 16:47	57.8	1807678.758
45	2/4/2020 16:47	57.8	1807678.758
46	2/4/2020 16:47	54.2	789080.3976
47	2/4/2020 16:47	54.3	807460.4412
48	2/4/2020 16:47	50.8	360679.3304
49	2/4/2020 16:47	50.4	328943.4588
50	2/4/2020 16:47	48.8	227573.2725
51	2/4/2020 16:47	52.2	497876.0722
52	2/4/2020 16:47	53.1	612521.3834
53	2/4/2020 16:47	53.6	687260.2958
54	2/4/2020 16:47	52.9	584953.3799
55	2/4/2020 16:47	54.4	826268.611
56	2/4/2020 16:47	49.7	279976.2902
57	2/4/2020 16:47	45.9	116713.5435
58	2/4/2020 16:47	45.9	116713.5435
59	2/4/2020 16:47	45.2	99339.33644
60	2/4/2020 16:47	45.1	97078.09708
61	2/4/2020 16:48	45.7	111460.5687
62	2/4/2020 16:48	45.4	104021.0551
63	2/4/2020 16:48	45	94868.32981
64	2/4/2020 16:48	49.5	267375.2814
65	2/4/2020 16:48	52.5	533483.823
66	2/4/2020 16:48	59.9	2931711.663
67	2/4/2020 16:48	56.4	1309547.497
68	2/4/2020 16:48	50.5	336605.5363
69	2/4/2020 16:48	49.5	267375.2814
70	2/4/2020 16:48	46.5	134005.0776
71	2/4/2020 16:48	47.8	180767.8758
72	2/4/2020 16:48	48.7	222393.0724
73	2/4/2020 16:48	46.9	146933.6458
74	2/4/2020 16:48	44.9	92708.86298

75	2/4/2020 16:48	45	94868.32981
76	2/4/2020 16:48	45.3	101653.2468
77	2/4/2020 16:48	44.9	92708.86298
78	2/4/2020 16:48	44.8	90598.55161
79	2/4/2020 16:48	47.5	168702.3976
80	2/4/2020 16:48	47.3	161109.5389
81	2/4/2020 16:49	48	189287.2033
82	2/4/2020 16:49	46.9	146933.6458
83	2/4/2020 16:49	49.9	293171.1663
84	2/4/2020 16:49	54.8	905985.5161
85	2/4/2020 16:49	51.1	386474.8655
86	2/4/2020 16:49	48.4	207549.2913
87	2/4/2020 16:49	46.2	125060.815
88	2/4/2020 16:49	43.7	70326.86446
89	2/4/2020 16:49	43.8	71964.98757
90	2/4/2020 16:49	43.2	62678.88393
91	2/4/2020 16:49	44	75356.59295
92	2/4/2020 16:49	42.6	54591.02576
93	2/4/2020 16:49	42.9	58495.33799
94	2/4/2020 16:49	43	59857.86945
95	2/4/2020 16:49	45.3	101653.2468
96	2/4/2020 16:49	43.8	71964.98757
97	2/4/2020 16:49	45.4	104021.0551
98	2/4/2020 16:49	43.6	68726.02958
99	2/4/2020 16:49	42.5	53348.3823
100	2/4/2020 16:49	42.4	52134.02486
101	2/4/2020 16:50	44	75356.59295
102	2/4/2020 16:50	45.3	101653.2468
103	2/4/2020 16:50	43.8	71964.98757
104	2/4/2020 16:50	43.6	68726.02958
105	2/4/2020 16:50	46.3	127973.8556
106	2/4/2020 16:50	43.7	70326.86446
107	2/4/2020 16:50	44	75356.59295
108	2/4/2020 16:50	44.2	78908.03976
109	2/4/2020 16:50	43.3	64138.86269
110	2/4/2020 16:50	44.8	90598.55161
111	2/4/2020 16:50	43.5	67161.63416
112	2/4/2020 16:50	44.6	86520.94509
113	2/4/2020 16:50	59.8	2864977.758
114	2/4/2020 16:50	61.9	4646449.857
115	2/4/2020 16:50	52.5	533483.823
116	2/4/2020 16:50	49	238298.4704
117	2/4/2020 16:50	47.5	168702.3976
118	2/4/2020 16:50	47.1	153858.4152
119	2/4/2020 16:50	46.4	130954.7497
120	2/4/2020 16:50	53.2	626788.8393
121	2/4/2020 16:51	47.1	153858.4152

122	2/4/2020 16:51	47.3	161109.5389
123	2/4/2020 16:51	47.5	168702.3976
124	2/4/2020 16:51	51	377677.6235
125	2/4/2020 16:51	54.3	807460.4412
126	2/4/2020 16:51	49.7	279976.2902
127	2/4/2020 16:51	44.8	90598.55161
128	2/4/2020 16:51	44	75356.59295
129	2/4/2020 16:51	44.4	82626.8611
130	2/4/2020 16:51	45.9	116713.5435
131	2/4/2020 16:51	47.8	180767.8758
132	2/4/2020 16:51	45.4	104021.0551
133	2/4/2020 16:51	43.9	73641.26747
134	2/4/2020 16:51	44	75356.59295
135	2/4/2020 16:51	44.5	84551.48794
136	2/4/2020 16:51	44.9	92708.86298
137	2/4/2020 16:51	45.6	108923.4164
138	2/4/2020 16:51	44.4	82626.8611
139	2/4/2020 16:51	44.2	78908.03976
140	2/4/2020 16:51	44.2	78908.03976
141	2/4/2020 16:52	43.9	73641.26747
142	2/4/2020 16:52	42.9	58495.33799
143	2/4/2020 16:52	42.1	48654.30292
144	2/4/2020 16:52	42.4	52134.02486
145	2/4/2020 16:52	43.3	64138.86269
146	2/4/2020 16:52	44.1	77111.87348
147	2/4/2020 16:52	43.5	67161.63416
148	2/4/2020 16:52	44.6	86520.94509
149	2/4/2020 16:52	45.2	99339.33644
150	2/4/2020 16:52	44.4	82626.8611
151	2/4/2020 16:52	43.3	64138.86269
152	2/4/2020 16:52	43.6	68726.02958
153	2/4/2020 16:52	43.9	73641.26747
154	2/4/2020 16:52	45.5	106444.0168
155	2/4/2020 16:52	47.7	176653.0966
156	2/4/2020 16:52	45.9	116713.5435
157	2/4/2020 16:52	46.1	122214.0833
158	2/4/2020 16:52	46.8	143589.0277
159	2/4/2020 16:52	48	189287.2033
160	2/4/2020 16:52	45.7	111460.5687
161	2/4/2020 16:53	45.3	101653.2468
162	2/4/2020 16:53	43.7	70326.86446
163	2/4/2020 16:53	44	75356.59295
164	2/4/2020 16:53	43.8	71964.98757
165	2/4/2020 16:53	47.2	157442.2381
166	2/4/2020 16:53	45.5	106444.0168
167	2/4/2020 16:53	44.2	78908.03976
168	2/4/2020 16:53	44.9	92708.86298

169	2/4/2020 16:53	45.5	106444.0168
170	2/4/2020 16:53	46.2	125060.815
171	2/4/2020 16:53	46.1	122214.0833
172	2/4/2020 16:53	45.4	104021.0551
173	2/4/2020 16:53	46.1	122214.0833
174	2/4/2020 16:53	45	94868.32981
175	2/4/2020 16:53	45.9	116713.5435
176	2/4/2020 16:53	45	94868.32981
177	2/4/2020 16:53	46.1	122214.0833
178	2/4/2020 16:53	45.4	104021.0551
179	2/4/2020 16:53	46.9	146933.6458
180	2/4/2020 16:53	46.2	125060.815
181	2/4/2020 16:54	46	119432.1512
182	2/4/2020 16:54	45	94868.32981
183	2/4/2020 16:54	44.4	82626.8611
184	2/4/2020 16:54	44.8	90598.55161
185	2/4/2020 16:54	44.5	84551.48794
186	2/4/2020 16:54	44.5	84551.48794
187	2/4/2020 16:54	44.2	78908.03976
188	2/4/2020 16:54	44.1	77111.87348
189	2/4/2020 16:54	45.5	106444.0168
190	2/4/2020 16:54	45.4	104021.0551
191	2/4/2020 16:54	46.2	125060.815
192	2/4/2020 16:54	48.7	222393.0724
193	2/4/2020 16:54	53.6	687260.2958
194	2/4/2020 16:54	54.4	826268.611
195	2/4/2020 16:54	49.6	273603.2518
196	2/4/2020 16:54	46.5	134005.0776
197	2/4/2020 16:54	44.9	92708.86298
198	2/4/2020 16:54	43.5	67161.63416
199	2/4/2020 16:54	44.4	82626.8611
200	2/4/2020 16:54	44.2	78908.03976
201	2/4/2020 16:55	44	75356.59295
202	2/4/2020 16:55	44.8	90598.55161
203	2/4/2020 16:55	44	75356.59295
204	2/4/2020 16:55	45.3	101653.2468
205	2/4/2020 16:55	46.5	134005.0776
206	2/4/2020 16:55	45.9	116713.5435
207	2/4/2020 16:55	45.1	97078.09708
208	2/4/2020 16:55	44	75356.59295
209	2/4/2020 16:55	43.2	62678.88393
210	2/4/2020 16:55	43.8	71964.98757
211	2/4/2020 16:55	42.6	54591.02576
212	2/4/2020 16:55	43.5	67161.63416
213	2/4/2020 16:55	45.4	104021.0551
214	2/4/2020 16:55	46.8	143589.0277
215	2/4/2020 16:55	50.8	360679.3304

216	2/4/2020 16:55	54.7	885362.768
217	2/4/2020 16:55	51.7	443732.5165
218	2/4/2020 16:55	48.2	198208.0344
219	2/4/2020 16:55	45.8	114056.8189
220	2/4/2020 16:55	46.1	122214.0833
221	2/4/2020 16:56	46.5	134005.0776
222	2/4/2020 16:56	46.4	130954.7497
223	2/4/2020 16:56	46.6	137126.4569
224	2/4/2020 16:56	55.6	1089234.164
225	2/4/2020 16:56	50.7	352469.2665
226	2/4/2020 16:56	48.8	227573.2725
227	2/4/2020 16:56	45.5	106444.0168
228	2/4/2020 16:56	45.2	99339.33644
229	2/4/2020 16:56	45.2	99339.33644
230	2/4/2020 16:56	45.2	99339.33644
231	2/4/2020 16:56	46.7	140320.5424
232	2/4/2020 16:56	50.1	306987.8977
233	2/4/2020 16:56	54.7	885362.768
234	2/4/2020 16:56	55.8	1140568.189
235	2/4/2020 16:56	50.9	369080.6312
236	2/4/2020 16:56	56.4	1309547.497
237	2/4/2020 16:56	63.7	7032686.446
238	2/4/2020 16:56	54.3	807460.4412
239	2/4/2020 16:56	48.2	198208.0344
240	2/4/2020 16:56	46.1	122214.0833
241	2/4/2020 16:57	46.9	146933.6458
242	2/4/2020 16:57	49.2	249529.1313
243	2/4/2020 16:57	49.5	267375.2814
244	2/4/2020 16:57	51.2	395477.0216
245	2/4/2020 16:57	51	377677.6235
246	2/4/2020 16:57	49.3	255341.4115
247	2/4/2020 16:57	47	150356.1701
248	2/4/2020 16:57	46.8	143589.0277
249	2/4/2020 16:57	46.3	127973.8556
250	2/4/2020 16:57	46.3	127973.8556
251	2/4/2020 16:57	45.8	114056.8189
252	2/4/2020 16:57	47.1	153858.4152
253	2/4/2020 16:57	47.6	172631.9812
254	2/4/2020 16:57	49.7	279976.2902
255	2/4/2020 16:57	54.2	789080.3976
256	2/4/2020 16:57	50.6	344446.0864
257	2/4/2020 16:57	48.5	212383.7353
258	2/4/2020 16:57	47.7	176653.0966
259	2/4/2020 16:57	47.6	172631.9812
260	2/4/2020 16:57	46.5	134005.0776
261	2/4/2020 16:58	45.1	97078.09708
262	2/4/2020 16:58	45.2	99339.33644

263	2/4/2020 16:58	44.9	92708.86298
264	2/4/2020 16:58	46.8	143589.0277
265	2/4/2020 16:58	46.4	130954.7497
266	2/4/2020 16:58	44.6	86520.94509
267	2/4/2020 16:58	44	75356.59295
268	2/4/2020 16:58	44.8	90598.55161
269	2/4/2020 16:58	44.8	90598.55161
270	2/4/2020 16:58	44.6	86520.94509
271	2/4/2020 16:58	43.7	70326.86446
272	2/4/2020 16:58	44.1	77111.87348
273	2/4/2020 16:58	44.4	82626.8611
274	2/4/2020 16:58	45.6	108923.4164
275	2/4/2020 16:58	43.8	71964.98757
276	2/4/2020 16:58	42.7	55862.6141
277	2/4/2020 16:58	42.5	53348.3823
278	2/4/2020 16:58	43.3	64138.86269
279	2/4/2020 16:58	42.4	52134.02486
280	2/4/2020 16:58	42.6	54591.02576
281	2/4/2020 16:59	47.6	172631.9812
282	2/4/2020 16:59	44.1	77111.87348
283	2/4/2020 16:59	42.9	58495.33799
284	2/4/2020 16:59	43.7	70326.86446
285	2/4/2020 16:59	43	59857.86945
286	2/4/2020 16:59	44.7	88536.2768
287	2/4/2020 16:59	46.5	134005.0776
288	2/4/2020 16:59	45.8	114056.8189
289	2/4/2020 16:59	44.1	77111.87348
290	2/4/2020 16:59	43.3	64138.86269
291	2/4/2020 16:59	48.6	217330.788
292	2/4/2020 16:59	49	238298.4704
293	2/4/2020 16:59	47.9	184978.5006
294	2/4/2020 16:59	50.7	352469.2665
295	2/4/2020 16:59	45.1	97078.09708
296	2/4/2020 16:59	45.4	104021.0551
297	2/4/2020 16:59	50.5	336605.5363
298	2/4/2020 16:59	57.7	1766530.966
299	2/4/2020 16:59	51.1	386474.8655
300	2/4/2020 16:59	46.6	137126.4569

Noise Measurement 1

Data Logger 2		
Duration (seconds)		3
Weighting	A	
Response	SLOW	
Range	40-100	
L05		42.2
L10		41.5
L50		39
L90		36.8
L95		36
Lmax		52.3
Time		
SEL		69
Leq		39.5

Leq (Manual) **39.7**

No.s	Date Time	dB	Sound Energy
272	2/4/2020 17:25	39.4	26128.9077
273	2/4/2020 17:25	39.1	24384.91548
274	2/4/2020 17:25	38.7	22239.30724
275	2/4/2020 17:25	40.5	33660.55363
276	2/4/2020 17:25	39.3	25534.14115
277	2/4/2020 17:26	37.8	18076.78758
278	2/4/2020 17:26	37.2	15744.22381
279	2/4/2020 17:26	37.1	15385.84152
280	2/4/2020 17:26	38.4	20754.92913
281	2/4/2020 17:26	37.3	16110.95389
282	2/4/2020 17:26	37.6	17263.19812
283	2/4/2020 17:26	38.2	19820.80344
284	2/4/2020 17:26	38.6	21733.0788
285	2/4/2020 17:26	38.7	22239.30724
286	2/4/2020 17:26	40.9	36908.06312
287	2/4/2020 17:26	40.2	31413.85644
288	2/4/2020 17:26	38.2	19820.80344
289	2/4/2020 17:26	38.2	19820.80344
290	2/4/2020 17:26	38.1	19369.62687
291	2/4/2020 17:26	37.3	16110.95389
292	2/4/2020 17:26	37.6	17263.19812
293	2/4/2020 17:26	37.1	15385.84152
294	2/4/2020 17:26	37.9	18497.85006
295	2/4/2020 17:26	40	30000
296	2/4/2020 17:26	38.6	21733.0788
297	2/4/2020 17:27	41.6	43363.19312
298	2/4/2020 17:27	39.5	26737.52814

299	2/4/2020 17:27	39	23829.84704
300	2/4/2020 17:27	40	30000
1	2/4/2020 17:12	48.3	202824.8926
2	2/4/2020 17:12	41.9	46464.49857
3	2/4/2020 17:12	39.8	28649.77758
4	2/4/2020 17:12	39	23829.84704
5	2/4/2020 17:12	39.8	28649.77758
6	2/4/2020 17:12	40.5	33660.55363
7	2/4/2020 17:12	40.2	31413.85644
8	2/4/2020 17:12	41.7	44373.25165
9	2/4/2020 17:12	44.8	90598.55161
10	2/4/2020 17:12	41.1	38647.48655
11	2/4/2020 17:12	39.6	27360.32518
12	2/4/2020 17:12	40.7	35246.92665
13	2/4/2020 17:12	41.4	41411.52794
14	2/4/2020 17:12	40.8	36067.93304
15	2/4/2020 17:12	41.2	39547.70216
16	2/4/2020 17:12	41.1	38647.48655
17	2/4/2020 17:13	41.9	46464.49857
18	2/4/2020 17:13	41.4	41411.52794
19	2/4/2020 17:13	42.3	50947.30957
20	2/4/2020 17:13	41	37767.76235
21	2/4/2020 17:13	41.5	42376.12634
22	2/4/2020 17:13	41.3	40468.88648
23	2/4/2020 17:13	39.6	27360.32518
24	2/4/2020 17:13	41.5	42376.12634
25	2/4/2020 17:13	39.4	26128.9077
26	2/4/2020 17:13	39.7	27997.62902
27	2/4/2020 17:13	38	18928.72033
28	2/4/2020 17:13	38.2	19820.80344
29	2/4/2020 17:13	39.4	26128.9077
30	2/4/2020 17:13	39.1	24384.91548
31	2/4/2020 17:13	39.2	24952.91313
32	2/4/2020 17:13	44.9	92708.86298
33	2/4/2020 17:13	41.4	41411.52794
34	2/4/2020 17:13	41.2	39547.70216
35	2/4/2020 17:13	42.1	48654.30292
36	2/4/2020 17:13	40.9	36908.06312
37	2/4/2020 17:14	40.7	35246.92665
38	2/4/2020 17:14	41	37767.76235
39	2/4/2020 17:14	40	30000
40	2/4/2020 17:14	40.9	36908.06312
41	2/4/2020 17:14	40.4	32894.34588
42	2/4/2020 17:14	40.1	30698.78977
43	2/4/2020 17:14	40.6	34444.60864
44	2/4/2020 17:14	40.7	35246.92665
45	2/4/2020 17:14	41.7	44373.25165

46	2/4/2020 17:14	41.8	45406.83745
47	2/4/2020 17:14	40.7	35246.92665
48	2/4/2020 17:14	40.5	33660.55363
49	2/4/2020 17:14	41.1	38647.48655
50	2/4/2020 17:14	43	59857.86945
51	2/4/2020 17:14	39.4	26128.9077
52	2/4/2020 17:14	39.5	26737.52814
53	2/4/2020 17:14	40.1	30698.78977
54	2/4/2020 17:14	39.8	28649.77758
55	2/4/2020 17:14	39.9	29317.11663
56	2/4/2020 17:14	38.8	22757.32725
57	2/4/2020 17:15	40.3	32145.57916
58	2/4/2020 17:15	40.1	30698.78977
59	2/4/2020 17:15	40	30000
60	2/4/2020 17:15	39.6	27360.32518
61	2/4/2020 17:15	38.6	21733.0788
62	2/4/2020 17:15	39.3	25534.14115
63	2/4/2020 17:15	38.1	19369.62687
64	2/4/2020 17:15	37.9	18497.85006
65	2/4/2020 17:15	38.4	20754.92913
66	2/4/2020 17:15	37.1	15385.84152
67	2/4/2020 17:15	37.2	15744.22381
68	2/4/2020 17:15	39.6	27360.32518
69	2/4/2020 17:15	38.8	22757.32725
70	2/4/2020 17:15	38.5	21238.37353
71	2/4/2020 17:15	39.5	26737.52814
72	2/4/2020 17:15	39.8	28649.77758
73	2/4/2020 17:15	38.8	22757.32725
74	2/4/2020 17:15	37.5	16870.23976
75	2/4/2020 17:15	38.7	22239.30724
76	2/4/2020 17:15	38.2	19820.80344
77	2/4/2020 17:16	37.5	16870.23976
78	2/4/2020 17:16	38	18928.72033
79	2/4/2020 17:16	38.3	20282.48926
80	2/4/2020 17:16	38.5	21238.37353
81	2/4/2020 17:16	38.6	21733.0788
82	2/4/2020 17:16	39.5	26737.52814
83	2/4/2020 17:16	38.2	19820.80344
84	2/4/2020 17:16	38	18928.72033
85	2/4/2020 17:16	37.8	18076.78758
86	2/4/2020 17:16	38.5	21238.37353
87	2/4/2020 17:16	39.2	24952.91313
88	2/4/2020 17:16	39.4	26128.9077
89	2/4/2020 17:16	40.2	31413.85644
90	2/4/2020 17:16	39.2	24952.91313
91	2/4/2020 17:16	39.1	24384.91548
92	2/4/2020 17:16	39.5	26737.52814

93	2/4/2020 17:16	38.9	23287.4135
94	2/4/2020 17:16	40.7	35246.92665
95	2/4/2020 17:16	40.4	32894.34588
96	2/4/2020 17:16	44.3	80746.04412
97	2/4/2020 17:17	42	47546.79577
98	2/4/2020 17:17	39.3	25534.14115
99	2/4/2020 17:17	40.1	30698.78977
100	2/4/2020 17:17	38.8	22757.32725
101	2/4/2020 17:17	38.1	19369.62687
102	2/4/2020 17:17	38.1	19369.62687
103	2/4/2020 17:17	39.8	28649.77758
104	2/4/2020 17:17	39.2	24952.91313
105	2/4/2020 17:17	40.2	31413.85644
106	2/4/2020 17:17	41.3	40468.88648
107	2/4/2020 17:17	40.8	36067.93304
108	2/4/2020 17:17	39.7	27997.62902
109	2/4/2020 17:17	38.5	21238.37353
110	2/4/2020 17:17	38.2	19820.80344
111	2/4/2020 17:17	39.3	25534.14115
112	2/4/2020 17:17	39.1	24384.91548
113	2/4/2020 17:17	39.3	25534.14115
114	2/4/2020 17:17	38.7	22239.30724
115	2/4/2020 17:17	37.7	17665.30966
116	2/4/2020 17:17	38.7	22239.30724
117	2/4/2020 17:18	39.6	27360.32518
118	2/4/2020 17:18	39.1	24384.91548
119	2/4/2020 17:18	40.3	32145.57916
120	2/4/2020 17:18	38.7	22239.30724
121	2/4/2020 17:18	38.3	20282.48926
122	2/4/2020 17:18	37.7	17665.30966
123	2/4/2020 17:18	38.3	20282.48926
124	2/4/2020 17:18	37.9	18497.85006
125	2/4/2020 17:18	38.3	20282.48926
126	2/4/2020 17:18	37.4	16486.22622
127	2/4/2020 17:18	37.4	16486.22622
128	2/4/2020 17:18	36.6	13712.64569
129	2/4/2020 17:18	36	11943.21512
130	2/4/2020 17:18	35.9	11671.35435
131	2/4/2020 17:18	39.6	27360.32518
132	2/4/2020 17:18	37	15035.61701
133	2/4/2020 17:18	36.9	14693.36458
134	2/4/2020 17:18	36.4	13095.47497
135	2/4/2020 17:18	38.5	21238.37353
136	2/4/2020 17:18	36.1	12221.40833
137	2/4/2020 17:19	38.7	22239.30724
138	2/4/2020 17:19	36.3	12797.38556
139	2/4/2020 17:19	36.4	13095.47497

140	2/4/2020 17:19	36.5	13400.50776
141	2/4/2020 17:19	36	11943.21512
142	2/4/2020 17:19	36.8	14358.90277
143	2/4/2020 17:19	36.1	12221.40833
144	2/4/2020 17:19	36.4	13095.47497
145	2/4/2020 17:19	35.6	10892.34164
146	2/4/2020 17:19	35.9	11671.35435
147	2/4/2020 17:19	36.2	12506.0815
148	2/4/2020 17:19	36.2	12506.0815
149	2/4/2020 17:19	36.7	14032.05424
150	2/4/2020 17:19	35.9	11671.35435
151	2/4/2020 17:19	35.1	9707.809708
152	2/4/2020 17:19	35.3	10165.32468
153	2/4/2020 17:19	35.4	10402.10551
154	2/4/2020 17:19	35.4	10402.10551
155	2/4/2020 17:19	35.3	10165.32468
156	2/4/2020 17:19	36	11943.21512
157	2/4/2020 17:20	35	9486.832981
158	2/4/2020 17:20	35.7	11146.05687
159	2/4/2020 17:20	36.7	14032.05424
160	2/4/2020 17:20	36.4	13095.47497
161	2/4/2020 17:20	36.5	13400.50776
162	2/4/2020 17:20	37.9	18497.85006
163	2/4/2020 17:20	38.3	20282.48926
164	2/4/2020 17:20	37.5	16870.23976
165	2/4/2020 17:20	38	18928.72033
166	2/4/2020 17:20	37.4	16486.22622
167	2/4/2020 17:20	37.3	16110.95389
168	2/4/2020 17:20	37.1	15385.84152
169	2/4/2020 17:20	39.7	27997.62902
170	2/4/2020 17:20	40	30000
171	2/4/2020 17:20	41.1	38647.48655
172	2/4/2020 17:20	38.7	22239.30724
173	2/4/2020 17:20	38.5	21238.37353
174	2/4/2020 17:20	38.9	23287.4135
175	2/4/2020 17:20	46.2	125060.815
176	2/4/2020 17:20	41.4	41411.52794
177	2/4/2020 17:21	39.2	24952.91313
178	2/4/2020 17:21	43.6	68726.02958
179	2/4/2020 17:21	41.9	46464.49857
180	2/4/2020 17:21	38.4	20754.92913
181	2/4/2020 17:21	38.6	21733.0788
182	2/4/2020 17:21	39	23829.84704
183	2/4/2020 17:21	38.3	20282.48926
184	2/4/2020 17:21	37.7	17665.30966
185	2/4/2020 17:21	37.5	16870.23976
186	2/4/2020 17:21	38.2	19820.80344

187	2/4/2020	17:21	38	18928.72033
188	2/4/2020	17:21	37.3	16110.95389
189	2/4/2020	17:21	37.1	15385.84152
190	2/4/2020	17:21	37.1	15385.84152
191	2/4/2020	17:21	37.3	16110.95389
192	2/4/2020	17:21	37.2	15744.22381
193	2/4/2020	17:21	37.6	17263.19812
194	2/4/2020	17:21	39.5	26737.52814
195	2/4/2020	17:21	40.6	34444.60864
196	2/4/2020	17:21	41.8	45406.83745
197	2/4/2020	17:22	41.4	41411.52794
198	2/4/2020	17:22	42.7	55862.6141
199	2/4/2020	17:22	43.6	68726.02958
200	2/4/2020	17:22	42.2	49787.60722
201	2/4/2020	17:22	41	37767.76235
202	2/4/2020	17:22	41.9	46464.49857
203	2/4/2020	17:22	40.8	36067.93304
204	2/4/2020	17:22	40.8	36067.93304
205	2/4/2020	17:22	39.6	27360.32518
206	2/4/2020	17:22	39.4	26128.9077
207	2/4/2020	17:22	40.5	33660.55363
208	2/4/2020	17:22	43.6	68726.02958
209	2/4/2020	17:22	41.8	45406.83745
210	2/4/2020	17:22	40.6	34444.60864
211	2/4/2020	17:22	40.4	32894.34588
212	2/4/2020	17:22	39.3	25534.14115
213	2/4/2020	17:22	38.3	20282.48926
214	2/4/2020	17:22	37.7	17665.30966
215	2/4/2020	17:22	39.3	25534.14115
216	2/4/2020	17:22	38.1	19369.62687
217	2/4/2020	17:23	39.3	25534.14115
218	2/4/2020	17:23	46.2	125060.815
219	2/4/2020	17:23	38.4	20754.92913
220	2/4/2020	17:23	39.2	24952.91313
221	2/4/2020	17:23	39	23829.84704
222	2/4/2020	17:23	45	94868.32981
223	2/4/2020	17:23	43.7	70326.86446
224	2/4/2020	17:23	39.4	26128.9077
225	2/4/2020	17:23	38	18928.72033
226	2/4/2020	17:23	38.7	22239.30724
227	2/4/2020	17:23	40.9	36908.06312
228	2/4/2020	17:23	38.7	22239.30724
229	2/4/2020	17:23	38.7	22239.30724
230	2/4/2020	17:23	38.5	21238.37353
231	2/4/2020	17:23	37.5	16870.23976
232	2/4/2020	17:23	38	18928.72033
233	2/4/2020	17:23	37.5	16870.23976

234	2/4/2020 17:23	37.6	17263.19812
235	2/4/2020 17:23	37.1	15385.84152
236	2/4/2020 17:23	37.4	16486.22622
237	2/4/2020 17:24	38	18928.72033
238	2/4/2020 17:24	38.7	22239.30724
239	2/4/2020 17:24	39.4	26128.9077
240	2/4/2020 17:24	38.4	20754.92913
241	2/4/2020 17:24	37.9	18497.85006
242	2/4/2020 17:24	37.9	18497.85006
243	2/4/2020 17:24	38.9	23287.4135
244	2/4/2020 17:24	39.2	24952.91313
245	2/4/2020 17:24	38.7	22239.30724
246	2/4/2020 17:24	38.7	22239.30724
247	2/4/2020 17:24	39.8	28649.77758
248	2/4/2020 17:24	39.9	29317.11663
249	2/4/2020 17:24	40.2	31413.85644
250	2/4/2020 17:24	41.7	44373.25165
251	2/4/2020 17:24	42.5	53348.3823
252	2/4/2020 17:24	40.2	31413.85644
253	2/4/2020 17:24	39.2	24952.91313
254	2/4/2020 17:24	39.2	24952.91313
255	2/4/2020 17:24	39.7	27997.62902
256	2/4/2020 17:24	40	30000
257	2/4/2020 17:25	40.3	32145.57916
258	2/4/2020 17:25	39.2	24952.91313
259	2/4/2020 17:25	39.8	28649.77758
260	2/4/2020 17:25	39.6	27360.32518
261	2/4/2020 17:25	38.7	22239.30724
262	2/4/2020 17:25	37.8	18076.78758
263	2/4/2020 17:25	37.9	18497.85006
264	2/4/2020 17:25	38.6	21733.0788
265	2/4/2020 17:25	38.6	21733.0788
266	2/4/2020 17:25	38.6	21733.0788
267	2/4/2020 17:25	39.6	27360.32518
268	2/4/2020 17:25	39.6	27360.32518
269	2/4/2020 17:25	38.8	22757.32725
270	2/4/2020 17:25	38.7	22239.30724
271	2/4/2020 17:25	38.9	23287.4135

Appendix B

Roadway Construction Noise Model (RCNM) Results

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 06/11/2020
Case Description: Metrowalk Noise Modelling-Building Construction

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
50 Feet	Residential	44.9	45.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50.0	0.0
Excavator	No	40		80.7	50.0	0.0
Man Lift	No	20		74.7	50.0	0.0
Compressor (air)	No	40		77.7	50.0	0.0
Compressor (air)	No	40		77.7	50.0	0.0
Compressor (air)	No	40		77.7	50.0	0.0
Compressor (air)	No	40		77.7	50.0	0.0
Generator	No	50		80.6	50.0	0.0
Generator	No	50		80.6	50.0	0.0
Generator	No	50		80.6	50.0	0.0
Generator	No	50		80.6	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	74.7	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Generator	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.7	86.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix C

Recreational Noise Modeling

Recreational Noise Modeling

Addition						
	Children Playing	Southern Picnic Area 1	Southern Picnic Area 2	Northern Picnic Area	Eastern Picnic Area	Total Summed Noise Level (dBA)
1	54.0	25.3	24.2	27.4	23.6	54.0

Appendix D

Traffic Noise Model (TNM) Results

Appendix C
Rincon FHWA Traffic Noise Model

rincon

Project Name :	MetroWalk Santa Clarita
Project Number :	19-07837
Modeling Condition :	Existing
Ground Type :	Hard
Metric (L_{eq}, L_{dn}, CNEL) :	CNEL

Model Input

Peak ratio to ADT:	10
Traffic Desc. (Peak or ADT) :	Peak

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Jakes Way	Sierra Highway	Lost Canyon Road	1	30	40	97			2	1	80	5	15	
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	45	35	50	97			2	1	80	5	15	
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	389	35	60	97			2	1	80	5	15	
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	627	35	50	97			2	1	80	5	15	
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	916	35	50	97			2	1	80	5	15	
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	832	35	40	97			2	1	80	5	15	

rincon

Project Number :	MetroWalk Santa Clarita
Modeling Condition :	19-07837
Ground Type :	Existing
Metric (Leq, Ldn, CNEL) :	CNEL

Model Results

Segment Number	Roadway	Segment		Noise Levels (dB) CNEL					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Jakes Way	Sierra Highway	Lost Canyon Road	33.2	0.0	0.0	25.8	28.1	34.9
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	49.5	0.0	0.0	41.5	43.6	51.0
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	58.5	0.0	0.0	50.1	52.1	59.9
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	60.9	0.0	0.0	53.0	55.0	62.4
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	62.6	0.0	0.0	54.6	56.7	64.1
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	62.7	0.0	0.0	55.2	57.2	64.3

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
0	0	0	0	1
1	2	6	20	63
6	18	58	185	585
9	28	88	278	878
13	41	128	406	1,283
11	34	108	342	1,081

Appendix C
Rincon FHWA Traffic Noise Model

rincon

Project Name :	MetroWalk Santa Clarita
Project Number :	19-07837
Modeling Condition :	Existing plus Project
Ground Type :	Hard
Metric (L_{eq}, L_{dn}, CNEL) :	CNEL

Model Input

Peak ratio to ADT:	10
Traffic Desc. (Peak or ADT) :	Peak

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Jakes Way	Sierra Highway	Lost Canyon Road	9	30	40	97			2	1	80	5	15	
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	106	35	50	97			2	1	80	5	15	
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	450	35	60	97			2	1	80	5	15	
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	688	35	50	97			2	1	80	5	15	
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	977	35	50	97			2	1	80	5	15	
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	855	35	40	97			2	1	80	5	15	

rincon

Project Number :	MetroWalk Santa Clarita
Modeling Condition :	19-07837
Ground Type :	Existing plus Project
Metric (Leq, Ldn, CNEL) :	CNEL

Model Results

Segment Number	Roadway	Segment		Noise Levels (dB) CNEL					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Jakes Way	Sierra Highway	Lost Canyon Road	42.7	0.0	0.0	35.3	37.6	44.4
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	53.2	0.0	0.0	45.2	47.3	54.7
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	59.1	0.0	0.0	50.7	52.8	60.5
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	61.3	0.0	0.0	53.4	55.4	62.9
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	62.9	0.0	0.0	54.9	56.9	64.4
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	62.8	0.0	0.0	55.3	57.3	64.4

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
0	0	1	4	11
1	5	15	47	149
7	21	68	214	676
10	30	96	305	964
14	43	137	433	1,369
11	35	111	351	1,111

Appendix C
Rincon FHWA Traffic Noise Model

rincon

Project Name :	MetroWalk Santa Clarita
Project Number :	19-07837
Modeling Condition :	Cumulative
Ground Type :	Hard
Metric (L_{eq}, L_{dn}, CNEL) :	CNEL

Model Input

Peak ratio to ADT:	10
Traffic Desc. (Peak or ADT) :	Peak

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Jakes Way	Sierra Highway	Lost Canyon Road	250	30	40	97			2	1	85	5	10	
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	800	35	50	97			2	1	85	5	10	
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	1,140	35	60	97			2	1	85	5	10	
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	1,380	35	50	97			2	1	85	5	10	
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	1,660	35	50	97			2	1	85	5	10	
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	1,020	35	40	97			2	1	85	5	10	

rincon

Project Number :	MetroWalk Santa Clarita
Modeling Condition :	19-07837
Ground Type :	Cumulative
Metric (Leq, Ldn, CNEL) :	CNEL

Model Results

Segment Number	Roadway	Segment		Noise Levels (dB) CNEL					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Jakes Way	Sierra Highway	Lost Canyon Road	56.7	0.0	0.0	48.9	51.2	58.3
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	61.4	0.0	0.0	53.1	55.2	62.8
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	62.5	0.0	0.0	53.9	55.9	63.8
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	63.8	0.0	0.0	55.5	57.5	65.2
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	64.6	0.0	0.0	56.3	58.4	66.0
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	63.1	0.0	0.0	55.2	57.2	64.6

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
3	9	27	85	269
10	30	96	304	961
15	46	145	459	1,450
17	52	166	524	1,657
20	63	199	630	1,994
12	36	115	364	1,152

Appendix C
Rincon FHWA Traffic Noise Model

rincon

Project Name :	MetroWalk Santa Clarita
Project Number :	19-07837
Modeling Condition :	Cumulative plus Project
Ground Type :	Hard
Metric (L_{eq}, L_{dn}, CNEL) :	CNEL

Model Input

Peak ratio to ADT:	10
Traffic Desc. (Peak or ADT) :	Peak

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Jakes Way	Sierra Highway	Lost Canyon Road	258	30	40	97			2	1	85	5	10	
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	861	35	50	97			2	1	85	5	10	
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	1,201	35	60	97			2	1	85	5	10	
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	1,441	35	50	97			2	1	85	5	10	
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	1,715	35	50	97			2	1	85	5	10	
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	1,043	35	40	97			2	1	85	5	10	

rincon

Project Number :	MetroWalk Santa Clarita
Modeling Condition :	19-07837
Ground Type :	Cumulative plus Project
Metric (Leq, Ldn, CNEL) :	CNEL

Model Results

Segment Number	Roadway	Segment		Noise Levels (dB) CNEL					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Jakes Way	Sierra Highway	Lost Canyon Road	56.8	0.0	0.0	49.0	51.3	58.4
2	Lost Canyon Road	Jakes Way	Medley Ridge Drive	61.7	0.0	0.0	53.5	55.5	63.2
3	Lost Canyon Road	Medley Ridge Drive	Winter Pine Way	62.7	0.0	0.0	54.1	56.2	64.1
4	Lost Canyon Road	Winter Pine Way	Canyon Park Blvd.	64.0	0.0	0.0	55.7	57.7	65.4
5	Lost Canyon Road	Canyon Park Blvd.	Via Princessa	64.7	0.0	0.0	56.4	58.5	66.1
6	Lost Canyon Road	Jakes Way	Sand Canyon Blvd.	63.2	0.0	0.0	55.3	57.3	64.7

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
3	9	28	88	277
10	33	103	327	1,034
15	48	153	483	1,528
17	55	173	547	1,731
21	65	206	651	2,060
12	37	118	373	1,178

Appendix E

Vibration Analysis

Groundborne Noise and Vibration Modeling at 100 Feet

Notes
The reference distance is measured from the nearest anticipated point of construction equipment to the nearest structure.

	Reference Level Inputs			
Equipment	**PPV_{ref} (in/sec)**	**Lv_{ref} (VdB)**	**RMS_{ref} (in/sec)**	**Reference Distance**
Vibratory Roller	0.21	94	0.050	25
Large bulldozer	0.089	87	0.022	25
Loaded trucks	0.076	83	0.014	25

	Vibration Level at Receiver			
Equipment	**Distance (feet)**	**PPV_x (in/sec)**	**Lv_x (VdB)**	**RMS_x (in/sec)**
Vibratory Roller	100	0.0457	81	0.011
Large bulldozer	100	0.0194	74	0.005
Loaded trucks	100	0.0165	70	0.003

Source
California Department of Transportation (Caltrans). 2013. Transportation and Construction Last Updated: 4/11/2019

Groundborne Noise and Vibration Modeling at 115 Feet

Notes
The reference distance is measured from the nearest anticipated point of construction equipment to the nearest structure.

	Reference Level Inputs			
Equipment	**PPV_{ref} (in/sec)**	**Lv_{ref} (VdB)**	**RMS_{ref} (in/sec)**	**Reference Distance**
Vibratory Roller	0.21	94	0.050	25
Large bulldozer	0.089	87	0.022	25
Loaded trucks	0.076	83	0.014	25

	Vibration Level at Receiver			
Equipment	**Distance (feet)**	**PPV_x (in/sec)**	**Lv_x (VdB)**	**RMS_x (in/sec)**
Vibratory Roller	115	0.0392	79	0.009
Large bulldozer	115	0.0166	72	0.004
Loaded trucks	115	0.0142	68	0.003

Source
California Department of Transportation (Caltrans). 2013. Transportation and Construction Last Updated: 4/11/2019

Appendix F

Noise/Land Use Compatibility Analysis

DNL Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the **Day/Night Noise Level Calculator Electronic Assessment Tool Overview (/programs/environmental-review/daynight-noise-level-electronic-assessment-tool/)**.

Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- **Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	MetroWalk Santa Clarita - Southern Boundary
Record Date	5/6/2020
User's Name	Rincon Consultants

Railroad #1 Track Identifier:	**Metrolink**

Rail # 1

Train Type	**Electric** ☐	**Diesel** ☑
Effective Distance		85
Average Train Speed		15
Engines per Train		1
Railway cars per Train		4
Average Train Operations (ATO)		48
Night Fraction of ATO		19
Railway whistles or horns?	Yes: ☐ No: ☐	Yes: ☐ No: ☑
Bolted Tracks?	Yes: ☐ No: ☐	Yes: ☑ No: ☐
Train DNL	0	72
Calculate Rail #1 DNL	72	Reset

Railroad #2 Track Identifier:	**Freight Trains**

Train Type	**Electric** ☐	**Diesel** ☑
Effective Distance		85
Average Train Speed		25
Engines per Train		2
Railway cars per Train		116
Average Train Operations (ATO)		25
Night Fraction of ATO		15
Railway whistles or horns?	Yes: ☐ No: ☐	Yes: ☐ No: ☑
Bolted Tracks?	Yes: ☐ No: ☐	Yes: ☑ No: ☐
Train DNL	0	71
Calculate Rail #2 DNL	71	Reset

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	○**Yes** ○**No**
Combined DNL for all Road and Rail sources	**75**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate Reset

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
  - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
  - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

Day/Night Noise Level Assessment Tool User Guide (/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

Day/Night Noise Level Assessment Tool Flowcharts (/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

DNL Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the **Day/Night Noise Level Calculator Electronic Assessment Tool Overview (/programs/environmental-review/daynight-noise-level-electronic-assessment-tool/)**.

Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- **Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	MetroWalk Santa Clarita - Western/Eastern/Northern Boundaries
Record Date	5/6/2020
User's Name	Rincon Consultants

Railroad #1 Track Identifier:	**Metrolink**

Rail # 1

Train Type	**Electric** ☐	**Diesel** ☑
Effective Distance		215
Average Train Speed		15
Engines per Train		1
Railway cars per Train		4
Average Train Operations (ATO)		48
Night Fraction of ATO		19
Railway whistles or horns?	Yes: ☐ No: ☐	Yes: ☐ No: ☑
Bolted Tracks?	Yes: ☐ No: ☐	Yes: ☑ No: ☐
Train DNL	0	66
Calculate Rail #1 DNL	66	Reset

Railroad #2 Track Identifier:	**Freight Trains**

Train Type	**Electric** ☐	**Diesel** ☑
Effective Distance		215
Average Train Speed		25
Engines per Train		2
Railway cars per Train		116
Average Train Operations (ATO)		25
Night Fraction of ATO		15
Railway whistles or horns?	Yes: ☐ No: ☐	Yes: ☐ No: ☑
Bolted Tracks?	Yes: ☐ No: ☐	Yes: ☑ No: ☐
Train DNL	0	65
Calculate Rail #2 DNL	65	Reset

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	○**Yes** ○**No**
Combined DNL for all Road and Rail sources	**69**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate Reset

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
  - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
  - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

Day/Night Noise Level Assessment Tool User Guide (/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

Day/Night Noise Level Assessment Tool Flowcharts (/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

Appendix E
Rincon FHWA Traffic Noise Model

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Model Input

Project Name :	MetroWalk Santa Clarita		
Project Number :	19-07837		
Modeling Condition :	Noise/Land Use Compatibility		
Ground Type :	Hard	**Peak ratio to ADT:**	10
Metric (L_{eq}, L_{dn}, CNEL) :	CNEL	**Traffic Desc. (Peak or ADT) :**	Peak

Segment Number	Roadway	Segment		Traffic Volume	Speed (mph)	Distance to Centerline	Vehicle Cassification Mix (%)					24-Hour Traffic Distribution (%)			K-Factor
		From	To				Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Day	Evening	Night	
1	Lost Canyon Road (Southern Boundary)	Jakes Way	Medley Ridge Drive	861	30	940	97			2	1	85	5	10	
2	Lost Canyon Road (Western Boundary)	Jakes Way	Medley Ridge Drive	861	35	190	97			2	1	85	5	10	
3	Harriman Street (Northern Boundary)	Lost Canyon	Terminus	555	35	50	97			2	1	85	5	10	
4	Lost Canyon Road (Northern Boundary)	Jakes Way	Medley Ridge Drive	861	35	440	97			2	1	85	5	10	
5															

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Model Results

Project Number :	MetroWalk Santa Clarita
Modeling Condition :	19-07837
Ground Type :	Noise/Land Use Compatibility
Metric (Leq, Ldn, CNEL) :	CNEL

Segment Number	Roadway	Segment		Noise Levels (dB) CNEL					
		From	To	Automobiles	Motorcycles	Bus	Medium Trucks	Heavy Trucks	Total
1	Lost Canyon Road (Southern Boundary)	Jakes Way	Medley Ridge Drive	57.9	0.0	0.0	40.5	42.8	58.1
2	Lost Canyon Road (Western Boundary)	Jakes Way	Medley Ridge Drive	59.3	0.0	0.0	47.7	49.7	60.0
3	Harriman Street (Northern Boundary)	Lost Canyon	Terminus	59.8	0.0	0.0	51.5	53.6	61.2
4	Lost Canyon Road (Northern Boundary)	Jakes Way	Medley Ridge Drive	58.5	0.0	0.0	44.0	46.1	58.9
5									

Distance to Traffic Noise Contours (feet)				
70 dB	65 dB	60 dB	55 dB	50 dB
61	192	608	1,922	6,079
19	60	189	598	1,892
7	21	67	211	667
34	108	342	1,083	3,424

Addition

Addition				
	Railroad	Lost Canyon Road	Harriman Street	Total Summed Noise Level (dBA)
1	75.0	58.0	0.0	75.1
2	69.0	60.0	0.0	69.5
3	69.0	59.0	61.0	70.0
4	69.0	0.0	61.0	69.6

Barrier Calculations

Input Variables	
Reference Noise Level (dBA)	75
Reference Distance (ft)	85
Site Conditions *(Choice: Hard or Soft)*	Hard

Output Calculations

Distance from Barrier to Source (ft)	Distance from Barrier to Receiver (ft)	Distance from Source to Receiver (ft)	Height of Source (ft)	Height of Wall (ft)	Height of Receiver (ft)	Noise Level Reduction (dBA)	Unabated Noise Level (dBA)	Resultant Noise Level (dBA)
35	50	85	6	10	5	9.99	75	65.01