APPENDIX D

NOISE ASSESSMENT

Simmerhorn Ranch

City of Galt, California

January 9, 2020

Project # 190408

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Table of Contents

Appendices

List of Figures

List of Tables

INTRODUCTION

The Simmerhorn Ranch project consists of the development of a 10-parcel 119.5 acre site. The project includes zoning for a 6.6 acre park, 10.1 acre school site, and various densities of residential uses. The project is located south of Simmerhorn Road, north of Boessow Road, east of Crystal Way, and west of Marengo Road in the City of Galt, California.

Figure 1 shows the project site plan. **Figure 2** shows an aerial photo of the project site.

ENVIRONMENTAL SETTING

BACKGROUND INFORMATION ON NOISE

Fundamentals of Acoustics

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

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

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

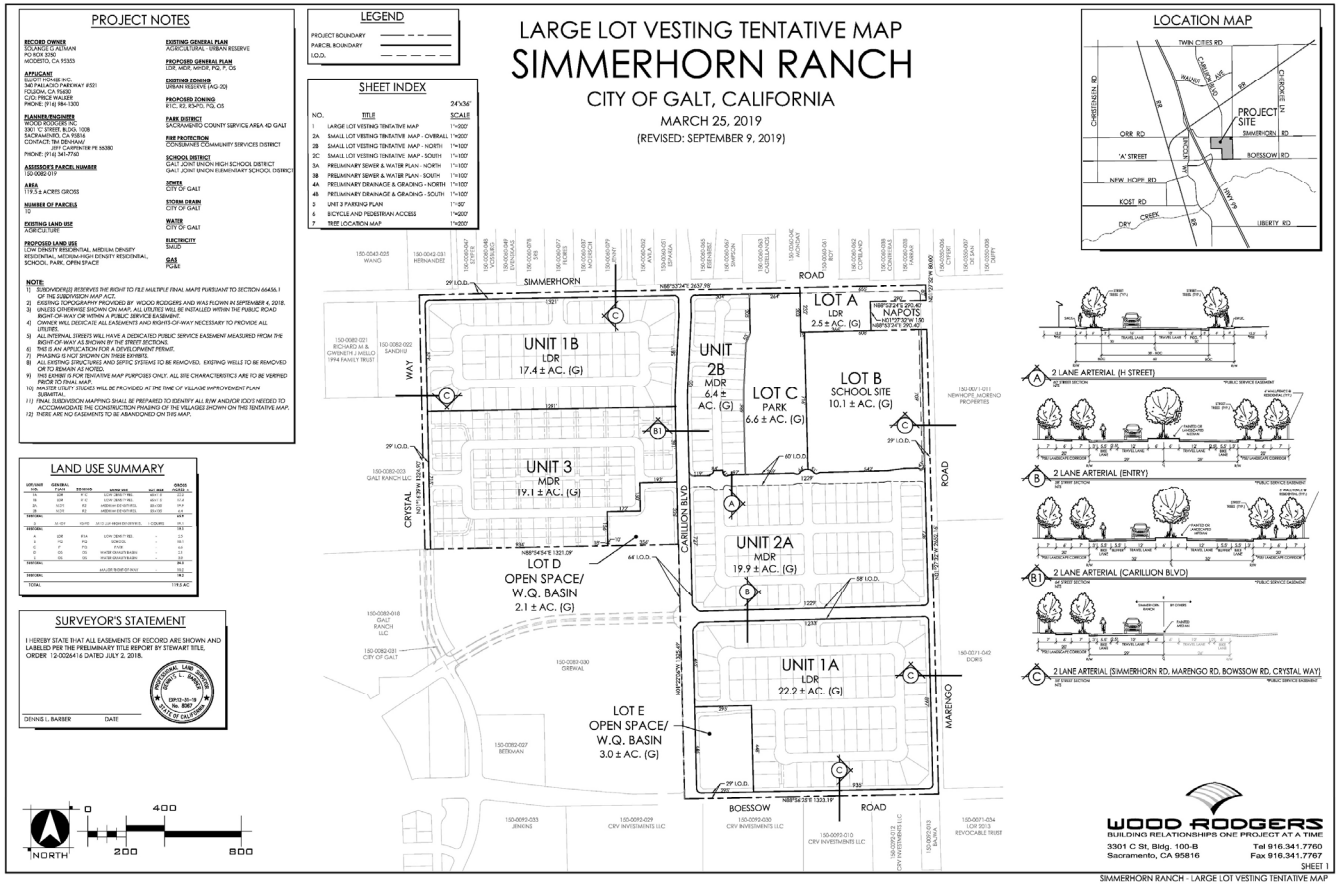
The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong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

Simmerhorn Ranch

City of Galt, California

Figure 1

Project Site Plan



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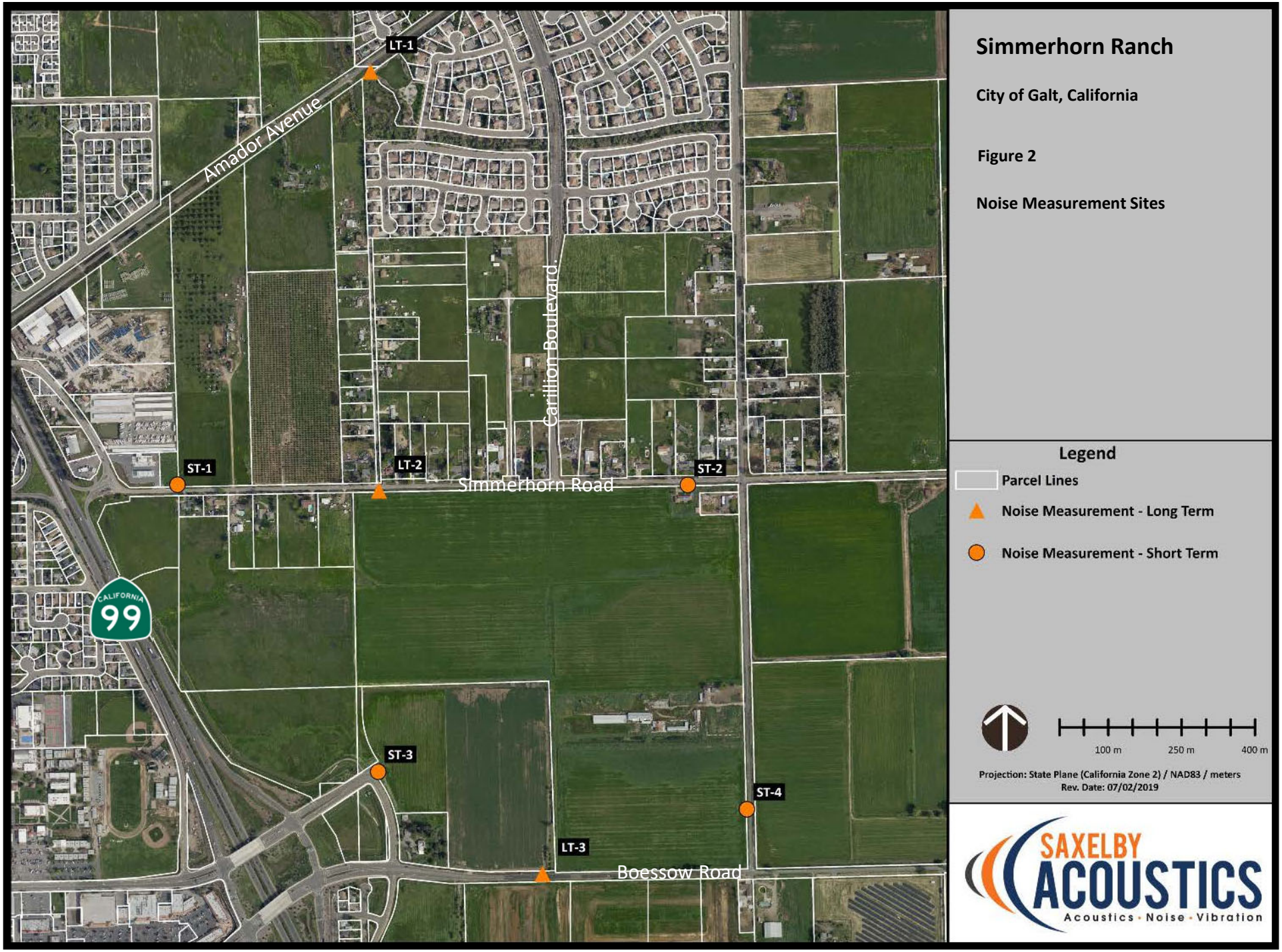

Simmerhorn Ranch

City of Galt, California

Figure 2

Noise Measurement Sites

Legend

- Parcel Lines
- Noise Measurement - Long Term
- Noise Measurement - Short Term

100 m 250 m 400 m

Projection: State Plane (California Zone 2) / NAD83 / meters
Rev. Date: 07/02/2019

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

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

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

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

TABLE 1: TYPICAL NOISE LEVELS

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

Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. September, 2013.

Effects of Noise on People

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

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

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

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

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

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

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

EXISTING NOISE AND VIBRATION ENVIRONMENTS

EXISTING NOISE RECEPTORS

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, sensitive land uses include existing single-family residential uses located north and south of the project site.

EXISTING GENERAL AMBIENT NOISE LEVELS

The existing noise environment in the project area is primarily defined traffic on Simmerhorn Road, Marengo Road, and Boessow Road.

To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted three continuous (24-hr.) noise level measurements and four short-tern noise level measurements in the vicinity of the project.

Noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey results is provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted L_{max}, represents the highest noise level measured. The average value, denoted L_{eq}, represents the energy average of all of the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L_{50}, represents the sound level exceeded 50 percent of the time during the monitoring period.

Larson Davis Laboratories (LDL) model 812 and 820 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with a B&K Model 4230 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

Site	Date	Average Measured Hourly Noise Levels, dBA						
			Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm – 7:00 am)		
		CNEL/L_{dn}	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
LT-1	04/24/19	62	58	45	73	55	53	65
LT-2	04/24/19	70	67	57	85	62	52	81
LT-3	04/24/19	68	66	56	86	60	53	80
ST-1	04/25/19	N/A	63	56	77	N/A	N/A	N/A
ST-2	04/25/19	N/A	63	47	81	N/A	N/A	N/A
ST-3	04/25/19	N/A	54	54	70	N/A	N/A	N/A
ST-4	04/25/19	N/A	63	48	79	N/A	N/A	N/A
Source: Saxelby Acoustics – 2019								

FUTURE TRAFFIC NOISE ENVIRONMENT AT OFF-SITE RECEPTORS

Off-Site Traffic Noise Impact Assessment Methodology

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels are predicted at sensitive receptors for existing and future, project and no-project conditions.

Existing, Short-Term, and Cumulative noise levels due to traffic are calculated using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108). The model is based upon the Calveno reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site.

The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. To predict traffic noise levels in terms of L_{dn}, it is necessary to adjust the input volume to account for the day/night distribution of traffic.

Project trip generation volumes were provided by the project traffic engineer (GHD December 2019), truck usage and vehicle speeds on the local area roadways were estimated from field observations. The predicted increases in traffic noise levels on the local roadway network for Existing, Short-Term, and Cumulative conditions which would result from the project are provided in terms of L_{dn}.

Traffic noise levels are predicted at the sensitive receptors located at the closest typical setback distance along each project-area roadway segment. In some locations sensitive receptors may not receive full shielding from noise barriers, or may be located at distances which vary from the assumed calculation distance.

Predicted Exterior Traffic Noise Levels

Operation of the proposed project would result in an increase in ADT volumes on the local roadway network and consequently, an increase in noise levels from traffic sources along affected segments.

To examine the effect of project-generated traffic increases, traffic noise levels associated with the proposed project were calculated for roadway segments in the project study area using the FHWA model. Traffic noise levels were modeled under Existing and Background conditions with and without the proposed project.

Table 3 summarizes the modeled traffic noise levels at the nearest sensitive receptors along each roadway segment in the Project area. **Appendix C** provides the complete inputs and results of the FHWA traffic modeling.

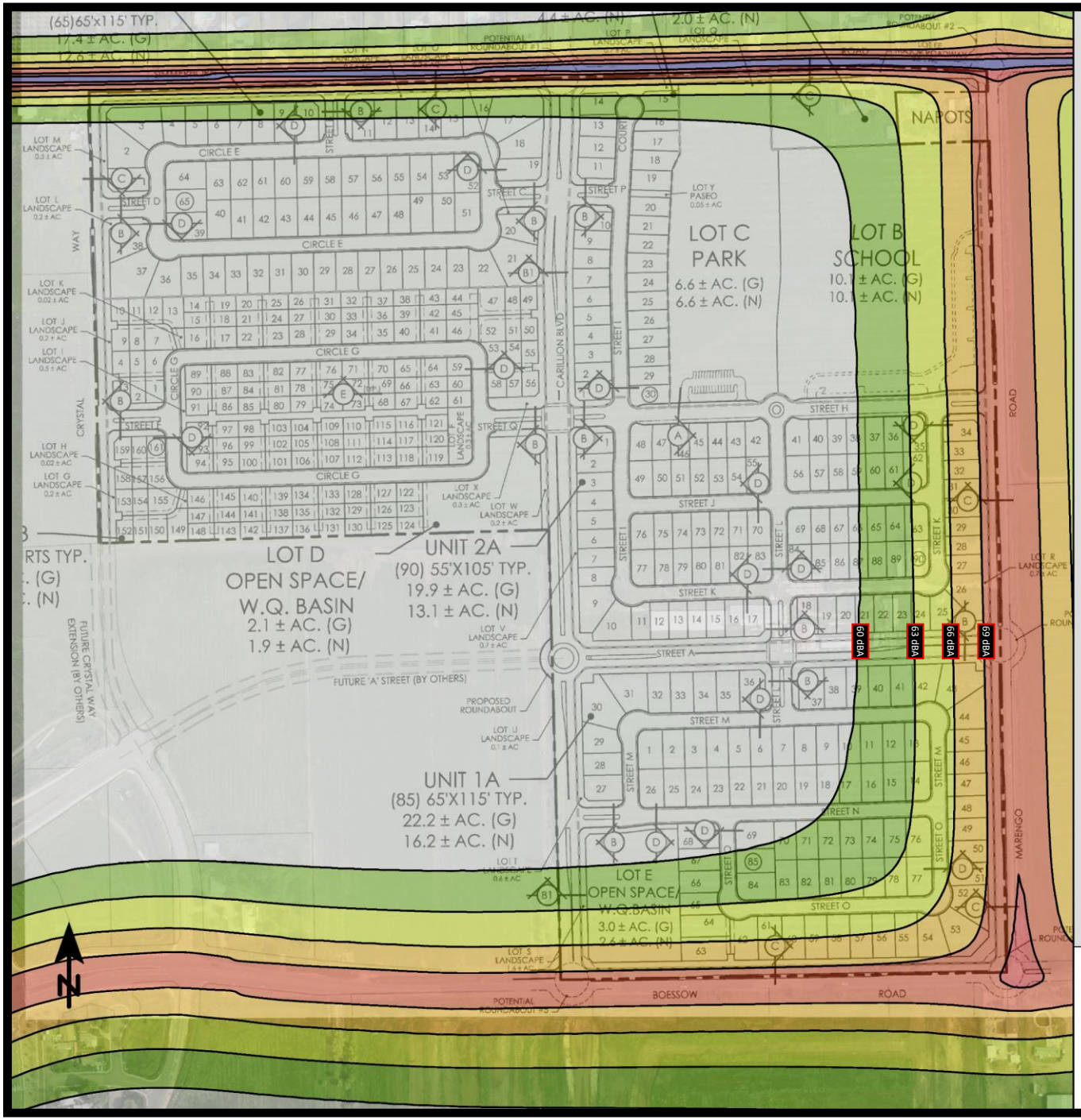
TABLE 3: PREDICTED TRAFFIC NOISE LEVEL AND PROJECT-RELATED TRAFFIC NOISE LEVEL INCREASES

Roadway	Segment	Predicted Exterior Noise Level (dBA L_{dn}) at Closest Sensitive Receptors					
		Existing No Project	Existing + Project	Change	2040 No Project	2040 + Project	Change
Simmerhorn Rd.	East of Hwy. 99	56.7	57.2	0.4	61.8	62.0	0.1
Simmerhorn Rd.	Carillion Blvd. to Marengo Rd.	55.9	56.5	0.6	62.7	62.9	0.1
Simmerhorn Rd.	West of Carillion Blvd.	54.9	55.1	0.2	61.4	61.4	0.0
Simmerhorn Rd.	East of Marengo Rd.	55.7	55.8	0.1	62.8	62.8	0.0
Marengo Rd.	North of Simmerhorn Rd.	64.2	65.7	1.5	65.9	66.7	0.8
Marengo Rd.	South of Simmerhorn Rd.	61.1	61.6	0.4	66.4	66.6	0.1
Marengo Rd.	Boessow Rd. to Simmerhorn Rd.	61.5	62.7	1.3	63.0	63.3	0.3
Boessow Rd.	East of Crystal Way	64.2	64.9	0.7	72.0	72.1	0.2
Boessow Rd.	East of Marengo Rd.	60.8	61.2	0.4	67.9	68.0	0.2
Boessow Rd.	West of Marengo Rd.	58.7	58.8	0.1	64.8	64.8	0.1
Carillion Blvd.	North of Walnut Ave.	57.8	58.0	0.2	60.7	60.7	0.1
Carillion Blvd.	South of Walnut Ave.	63.9	64.0	0.1	65.8	65.9	0.1
Walnut Ave.	East of Carillion Blvd.	63.6	64.5	1.0	66.9	67.1	0.2
Walnut Ave.	West of Carillion Blvd.	64.5	64.5	0.0	65.7	65.7	0.0
A Street	West of Hwy. 99	58.1	58.1	0.0	60.3	60.4	0.1
C Street	West of Fairway Dr.	66.0	66.0	0.0	66.2	66.2	0.0

Based upon the **Table 3** data, the proposed project is predicted to result in an increase in a maximum traffic noise level increase of 1.5 dBA.

Evaluation of Transportation Noise on Project site

Saxelby Acoustics used the SoundPLAN noise model to calculate traffic noise levels at the proposed single-family uses due to traffic on Simmerhorn Road, Marengo Road, and Boessow Road. Traffic noise levels were predicted for future 2040 plus project conditions. The results of this analysis are shown graphically on **Figure 3**.



Simmerhorn Ranch

City of Galt, California

Figure 3

Future (2040) Traffic Noise Contours (dBA L_{dn})

Signs and symbols

Levels in dB(A)

<= 60
60 - 63
63 - 66
66 - 69
69 - 72
72 - 75
> 75

1 : 4942

0 25 50 100 150 200 m

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Construction Noise Environment

During the construction of the proposed project, including roads, water and sewer lines, and related infrastructure, noise from construction activities would temporarily add to the noise environment in the project vicinity. As shown in **Table 4**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dB at a distance of 50 feet.

TABLE 4: CONSTRUCTION EQUIPMENT NOISE

Type of Equipment	Maximum Level, dBA at 50 feet
Auger Drill Rig	84
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

Source: *Roadway Construction Noise Model User's Guide*. Federal Highway Administration. FHWA-HEP-05-054. January 2006.

Construction Vibration Environment

The primary vibration-generating activities associated with the proposed project would occur during construction when activities such as grading, utilities placement, and parking lot construction occur. **Table 5** shows the typical vibration levels produced by construction equipment.

TABLE 5: VIBRATION LEVELS FOR VARIOUS CONSTRUCTION EQUIPMENT

Type of Equipment	Peak Particle Velocity at 25 feet (inches/second)	Peak Particle Velocity at 50 feet (inches/second)	Peak Particle Velocity at 100 feet (inches/second)
Large Bulldozer	0.089	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Small Bulldozer	0.003	0.001	0.000
Auger/drill Rigs	0.089	0.031	0.011
Jackhammer	0.035	0.012	0.004
Vibratory Hammer	0.070	0.025	0.009
Vibratory Compactor/roller	0.210 (Less than 0.20 at 26 feet)	0.074	0.026

Source: *Transit Noise and Vibration Impact Assessment Guidelines.* Federal Transit Administration. May 2006.

REGULATORY CONTEXT

FEDERAL

There are no federal regulations related to noise that apply to the Proposed Project.

STATE

There are no state regulations related to noise that apply to the Proposed Project.

LOCAL

City of Galt General Plan

The 2030 Galt General Plan Noise Element outlines criteria to "non-transportation" or "locally regulated" noise sources. The noise level performance standards for non-transportation noise in Galt are shown in **Table 6**.

TABLE 6: NOISE LEVEL PERFORMANCE STANDARDS FOR RESIDENTIAL AREAS AFFECTED BY NON-TRANSPORTATION NOISE

Noise Level Descriptor	Exterior Noise Level Standards, dBA	
	Daytime (7 AM-10 PM)	Nighttime (10 PM-7 AM)
Hourly Leq, dB	50	45
Maximum Level, dB	70	65

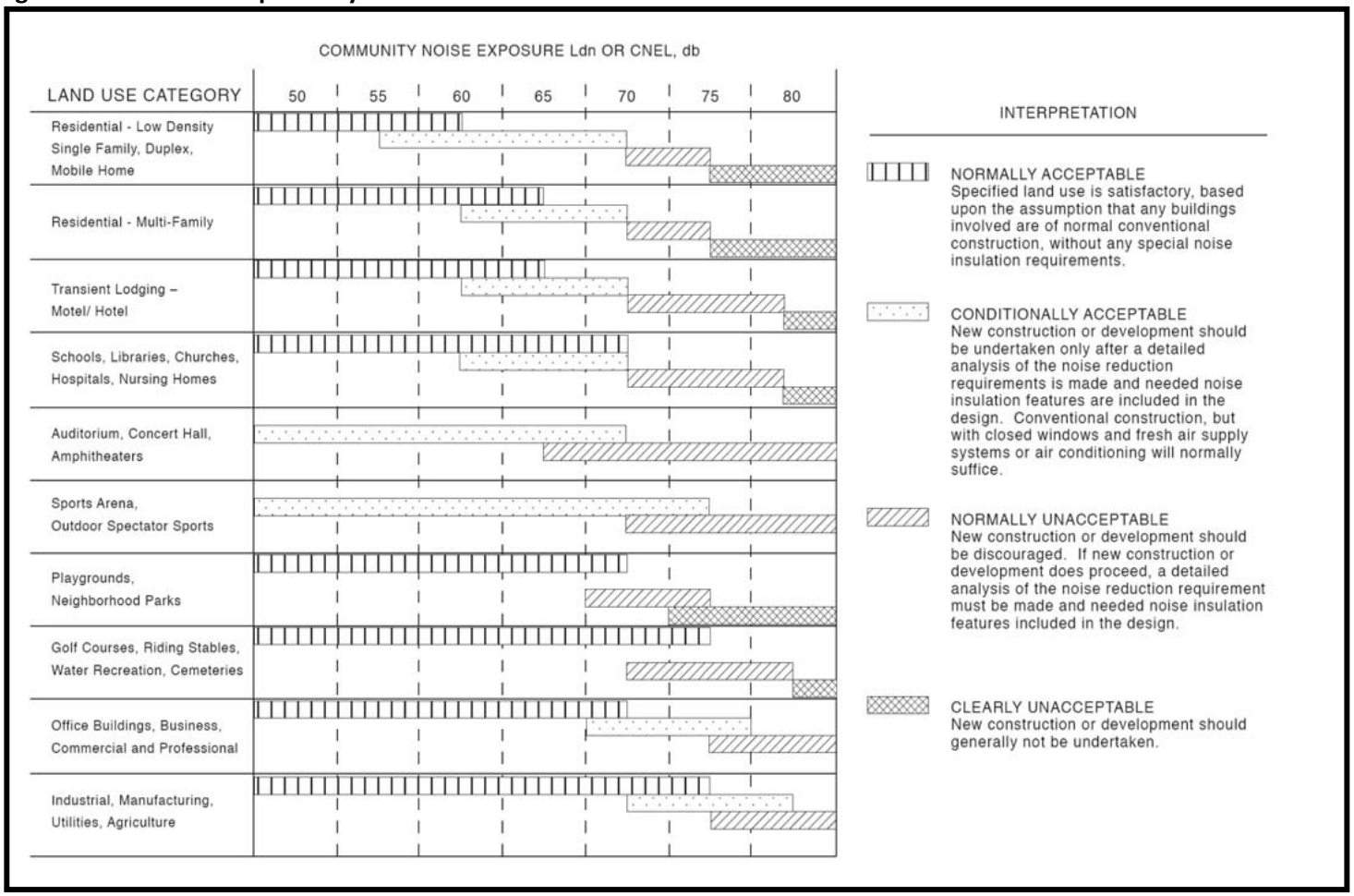
Note: These standards apply to new or existing residential areas affected by new or existing non-transportation sources.

Each of the noise level standards specified above shall be reduced by five dBA for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

Source: 2030 Galt General Plan EIR, March 2009.

The 2030 Galt General Plan Noise Element utilizes the State Office of Noise Control (ONC) *Guidelines for the Preparation and Content of Noise Elements of the General Plan*. The ONC guidelines include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The ONC guidelines contain a land use compatibility table that describes the compatibility of different land uses with a range of environmental noise levels in terms of L_{dn}. These guidelines are shown in **Figure 4**.

Figure 4: Land Use Compatibility Chart



Sources: State of California General Plan Guidelines, Office of Planning and Research, 1998; and ESA, 2008.

Based upon **Figure 4**, residential uses are considered normally acceptable in ambient noise environments up to 60 dBA L_{dn}, and conditionally acceptable in noise environments up to 70 dBA L_{dn}. The City of Galt maintains an interior noise level criterion of 45 dBA L_{dn} for residential uses. The intent of this standard is to provide a suitable environment for indoor communication and sleep.

Criteria for Acceptable Vibration

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. **Table 7**, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second.

Table 7 indicates that the threshold for architectural damage to structures is 0.20 in/sec p.p.v. A threshold of 0.2 in/sec p.p.v. is considered to be a reasonable threshold for short-term construction projects.

TABLE 7: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

Peak Particle Velocity		Human Reaction	Effect on Buildings
mm/second	in/second		
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: *Transportation Related Earthborne Vibrations.* Caltrans. TAV-02-01-R9601. February 20, 2002.

IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Appendix G of the CEQA Guidelines states that a project would normally be considered to result in significant noise impacts if noise levels conflict with adopted environmental standards or plans or if noise generated by the project would substantially increase existing noise levels at sensitive receivers on a permanent or temporary basis. Significance criteria for noise impacts are drawn from CEQA Guidelines Appendix G (Items XI [a-f]).

Would the project:

a. 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

b. Generate excessive groundborne vibration or groundborne noise levels?

c. 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 project expose people residing or working in the project area to excessive noise levels?

The 2030 Galt General Plan considers the following significance criteria for noise impacts:

- If the noise level resulting from project operations would exceed the "normally acceptable" range (as shown in **Figure 4**) for a given land use where the existing noise level exceeds the normally acceptable range, a 3 dBA or greater increase due to a project is considered significant;

- If the noise level resulting from project operations would exceed the "normally acceptable" range (as shown in **Figure 4**) for a given land use where the existing noise level is within the normally acceptable range, a 5 dBA or greater increase due to a project is considered significant; or

- If the noise level resulting from project operations would be within the "normally acceptable" range (as shown in **Figure 4**) for a given land use, a 10 dBA or greater increase due to the project is considered significant.

PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

IMPACT 1: WOULD THE 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?

Traffic Noise Increases

As shown in **Table 3**, traffic from the proposed project is not predicted to cause a significant change in exterior noise levels, as the greatest change is only +1.5 dBA. This is a **less-than-significant** impact and no mitigation is required.

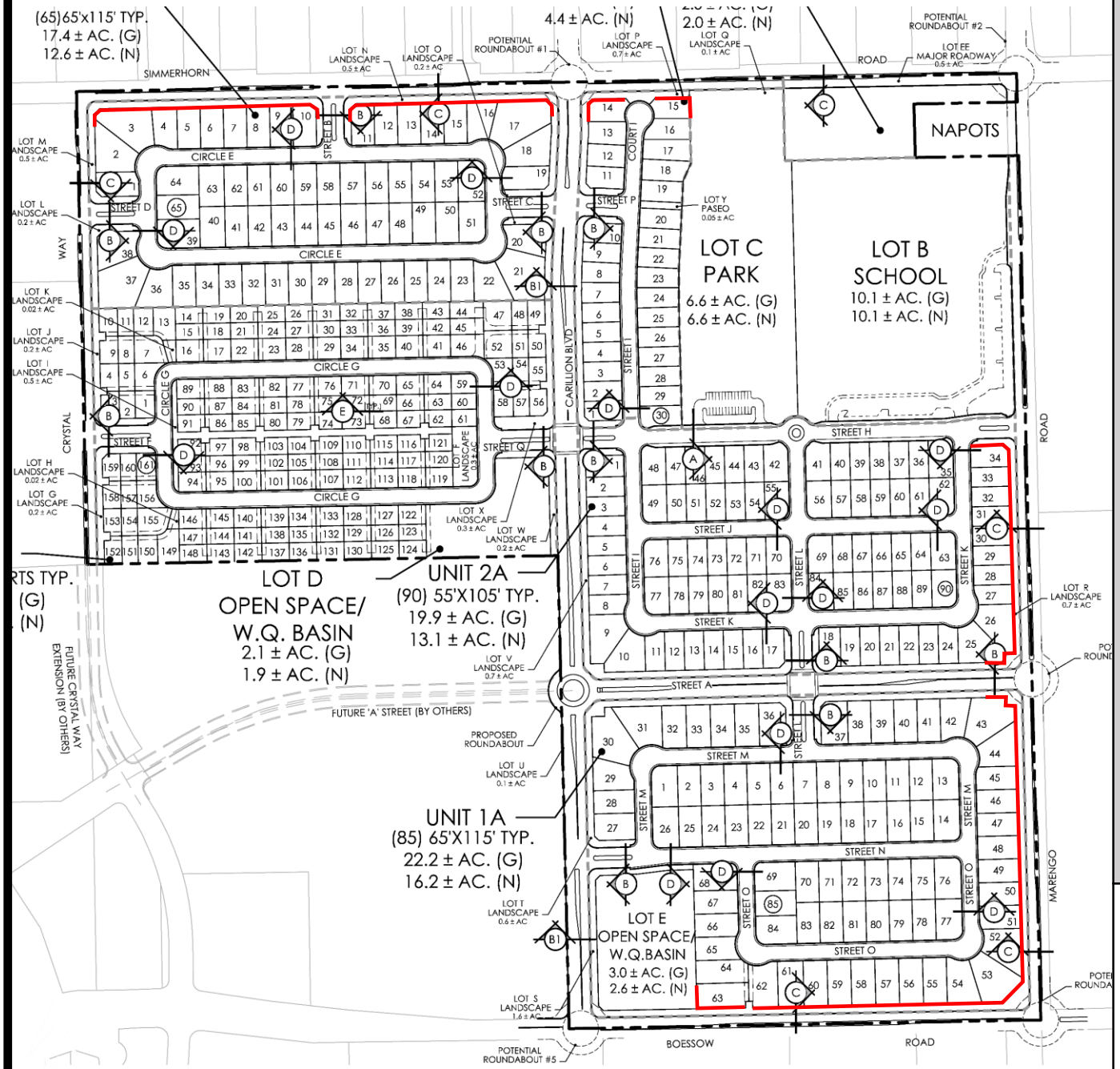
Operational Noise Increases

The proposed project would include typical residential noise which would be compatible with the adjacent existing residential uses.

Traffic Noise at New Sensitive Receptors – Exterior Areas

As shown on **Figure 3**, the eastern boundary of the project site is predicted to be exposed to exterior noise levels up to approximately 69 dBA L_{dn}. This would exceed the 60 dB limit for "Normally Acceptable" land use but would not exceed the City's "Conditionally Acceptable" limit of 70 dBA L_{dn}. Exterior noise control measures would be recommended to ensure that future residents are not exposed to exterior noise levels exceeding City standards. Various sound wall heights were analyzed at the locations shown on **Figure 5.** Based upon the noise predictions shown in **Table 8**, exterior noise levels can be reduced to less than 60 dBA Ldn along most roadways with the use of 6-foot tall sound walls. To reduce exterior noise levels to below 60 dBA L_{dn} along Marengo Road, a 9-foot wall would be required. This could take the form of an 8-foot tall wall on 1-foot berm. Additionally, a wall in the range of 6-8 feet in height would reduce noise levels to 61-63 dBA L_{dn} which is well under the City's 70 dBA L_{dn} "Conditionally Acceptable" exterior noise standard range.

See **Appendix D** for a complete barrier analysis for each roadway segment. **Figure 5** shows approximate recommended sound wall locations.



Simmerhorn Ranch

City of Galt, California

Figure 5

Recommended Sound Wall Locations

Legend

Recommended Sound Walls

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TABLE 8: FUTURE (2040) NOISE LEVELS AT SENSITIVE RECEPTORS

Segment	Approximate Residential Setback, feet[1]	ADT	Predicted Traffic Noise Levels, dB Ldn[2]					
			No Wall	6' Wall	7' Wall	8' Wall	9' Wall	10' Wall
Simmerhorn Road - West of Carillion Blvd.	65	5,710	64	58	57	56	55	54
Simmerhorn Road - East of Carillion Blvd.	65	6,810	65	59	58	57	55	55
Marengo Road - South of Simmerhorn Road	65	16,800	69	63	62	61	59	58
Boessow Road - West of Marengo Road	65	4,550	63	57	56	55	54	53

[1] Setback distances are measured in feet from the centerlines of the roadways to the center of residential backyards.

[2] The modeled noise barriers assume flat site conditions where roadway elevations, base of wall elevations, and building pad elevations are approximately equivalent. Sound wall height may be achieve d through the use a wall and earthen berm to achieve the total height (i.e. 6-foot wall on 2-foot berm is equivalent to an 8-foot tall wall).

Impacts resulting from exterior traffic noise levels would be considered ***potentially significant*** and would require mitigation.

Traffic Noise at New Sensitive Receptors – Interior Areas

Based upon **Table 8**, the proposed project would be exposed to exterior noise levels of up to 69 dBA L_{dn} at the ground floor building facades closest to Marengo Road, prior to construction of sound walls. Second floor locations would not benefit from shielding from sound walls and would be exposed to exterior noise levels approximately 2-3 dB higher, or up to 72 dBA L_{dn}.

Modern building construction typically yields an exterior-to-interior noise level reduction of 25 dBA. Therefore, where exterior noise levels are 70 dBA L_{dn}, or less, no additional interior noise control measures are typically required. For this project, exterior noise levels at lots along Marengo Road are predicted to be up to 72 dBA L_{dn}, resulting in an interior noise level of 47 dBA L_{dn} based on typical building construction. This would exceed the City's 45 dBA L_{dn} interior noise level standard.

Impacts resulting from interior traffic noise levels would be considered ***potentially significant*** and would require mitigation.

Park and School Uses

The proposed project includes lots for future school and park uses. Future uses development on these parcels could cause exterior noise levels to exceed the City's non-transportation noise level standards at new residential receptors located near to these parcels. Children playing at neighborhood parks, outdoor recreational fields (softball, soccer, basketball, tennis), and school playgrounds are often considered potentially significant noise sources which could adversely affect adjacent noise-sensitive land uses. Typical noise levels associated with groups of approximately 50 children playing at a distance of 50 feet generally range from 55 to 60 dB L_{eq} and 70-75 dB L_{max}. It is expected that park and school activities would occur during daytime hours. Therefore, noise levels from the playgrounds would need to comply with the City of Galt exterior noise level standards of 50 dB L_{eq} and 70 dB L_{max} at the nearest residential uses.

Based upon the reference noise level data discussed above, the 50 dB L_{eq} noise contour would be located approximately 160 feet from the center of playgrounds or recreational fields. The 70 dB L_{max} noise contour would extend approximately 90 feet from the center of playground or recreational fields.

Based upon the project site plan, the school facilities would generally be separated by local roadways and the center of the park and school uses would be approximately 160 feet, or more, from the nearest residential uses. Therefore, park and playground-related noise levels would be less than 50 dB L_{eq} and 70 dB L_{max} and no additional mitigation would be required.

Construction Noise

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. As indicated in **Table 4**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dBA L_{max} at a distance of 50 feet. Most of the building construction would occur at distances of 50 feet or greater from the nearest residences. Construction noise associated with streets would be similar to noise that would be associated with public works projects, such as a roadway widening or paving projects.

Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours.

Noise would also be generated during the construction phase by increased truck traffic on area roadways. A project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from the construction site. This noise increase would be of short duration, and would likely occur primarily during daytime hours.

Construction activities are conditionally exempt from the Noise Ordinance during certain hours. Construction activities are exempt from the noise standard from 6 AM to 8 PM Monday through Friday, and from 7 AM to 8 PM on Saturdays and Sundays.

Although construction activities are temporary in nature and would likely occur during normal daytime working hours, construction-related noise could result in sleep interference at existing noise-sensitive land uses in the vicinity of the construction if construction activities were to occur outside the normal daytime hours. Therefore, impacts resulting from noise levels temporarily exceeding the threshold of significance due to construction would be considered ***potentially significant***.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant* level.

1(a) *Prior to approval of project improvement plans, the improvement plans for the proposed project shall show that the first-row lots shall be shielded from Simmerhorn Road, Marengo Road, and Boessow Road through the use of 6-9 foot tall masonry sound walls per the approval of the City Engineer. The approximate locations of these barriers are shown on* ***Figure 5****. Other types of barrier may be employed but shall be reviewed by an acoustical engineer prior to being constructed.*

1(b) *Prior to issuance of building permits, the applicant shall provide a detailed analysis of interior noise control measures. The analysis should be prepared by a qualified noise control engineer and shall outline the specific measures required to meet the City's 45 dBA Ldn interior noise level standard. Such measures shall be required for Lots bordering*

Marengo Road. Implementation of the appropriate construction techniques and noise control measures shall be shown on building plans for the proposed project, and such plans shall be reviewed by the City Engineer.

1(c) *Construction activities shall comply with the City of Galt Noise Ordinance and shall be limited to the hours set forth below:*

Monday-Friday	*6:00 AM to 8:00 PM*
Saturday and Sunday	*7:00 AM to 8:00 PM*

These criteria shall be included in the grading plan submitted by the applicant/developer for review and approval of the Public Works Department prior to issuance of grading permits. Exceptions to allow expanded construction activities shall be reviewed on a case-by-case basis as determined by the Chief Building Official and/or City Engineer.

1(d) *Construction activities shall adhere to the requirements of the City of Galt with respect to hours of operation, muffling of internal combustion engines, and other factors that affect construction noise generation and its effects on noise-sensitive land uses. Prior to issuance of grading permits, these criteria shall be included in the grading plan submitted by the applicant/developer for the review and approval of the Public Works Department.*

1(e) *During construction, the applicant/developer shall designate a disturbance coordinator and conspicuously post this person's number around the project site and in adjacent public spaces. The disturbance coordinator will receive all public complaints about construction noise disturbances and will be responsible for determining the cause of the complaint, and implement feasible measures to be taken to alleviate the problem. The disturbance coordinator shall report all complaints and corrective measures taken to the Community Development Director.*

IMPACT 2: WOULD THE PROJECT GENERATE EXCESSIVE GROUNDBORNE VIBRATION OR GROUNDBORNE NOISE LEVELS?

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural.

With the exception of vibratory compactors, the **Table 5** data indicate that construction vibration levels anticipated for the project are less than the 0.2 in/sec threshold at distance of 26 feet. The proposed project construction would occur at distances greater than 26 feet from the adjacent single-family residential uses. Therefore, this is a ***less-than-significant*** impact.

IMPACT 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 PROJECT EXPOSE PEOPLE RESIDING OR WORKING IN THE PROJECT AREA TO EXCESSIVE NOISE LEVELS?

There are no airports in the project vicinity. Therefore, this impact is not applicable to the proposed project.

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Appendix A: Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
ASTC	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by +5 dBA and nighttime hours weighted by +10 dBA.
DNL	See definition of Ldn.
IIC	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
NIC	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
NNIC	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
RT60	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
SEL	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
SPC	Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

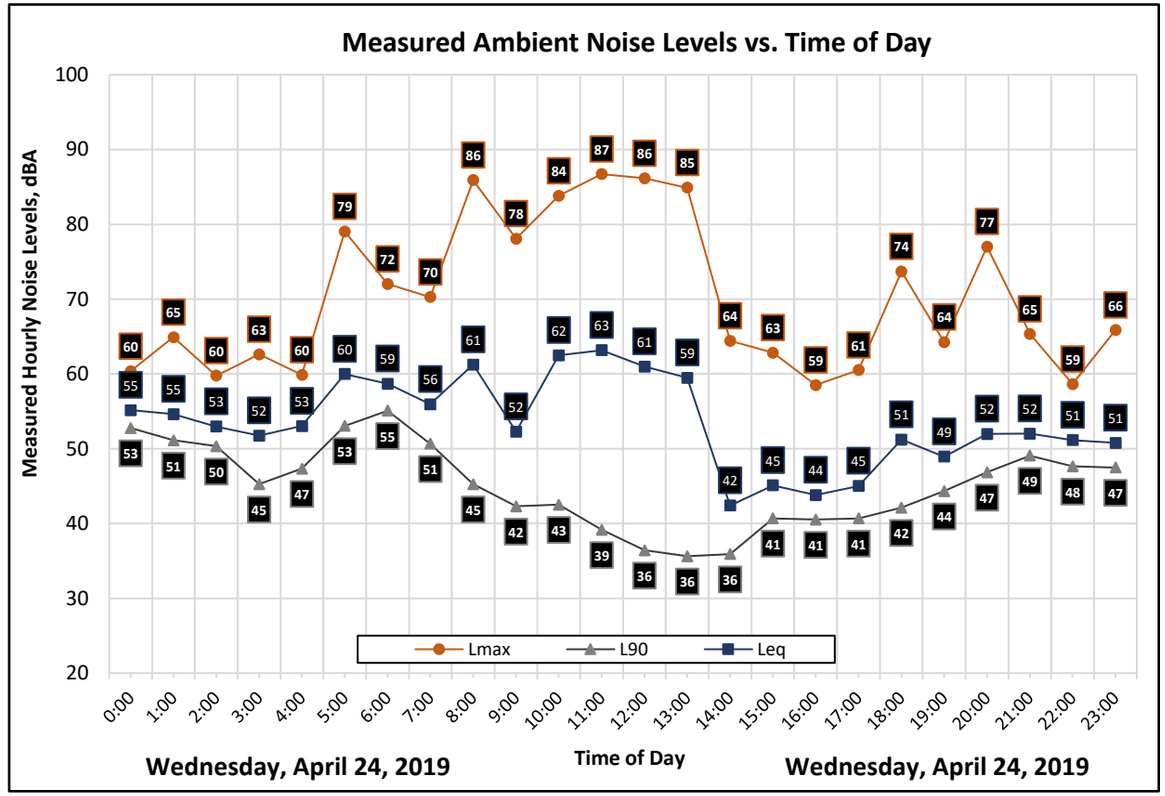
Appendix B: Continuous and Short-Term Ambient Noise Measurement Results

Appendix B1: Continuous Noise Monitoring Results

Site: LT-1
Project: Simmerhorn Ranch
Location: Roundstone Park
Coordinates: 38.2698673°, -121.2912348°
Meter: LDL 820-1
Calibrator: B&K 4230

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, April 24, 2019	0:00	55	60	55	53
Wednesday, April 24, 2019	1:00	55	65	54	51
Wednesday, April 24, 2019	2:00	53	60	52	50
Wednesday, April 24, 2019	3:00	52	63	51	45
Wednesday, April 24, 2019	4:00	53	60	53	47
Wednesday, April 24, 2019	5:00	60	79	55	53
Wednesday, April 24, 2019	6:00	59	72	58	55
Wednesday, April 24, 2019	7:00	56	70	54	51
Wednesday, April 24, 2019	8:00	61	86	53	45
Wednesday, April 24, 2019	9:00	52	78	45	42
Wednesday, April 24, 2019	10:00	62	84	46	43
Wednesday, April 24, 2019	11:00	63	87	45	39
Wednesday, April 24, 2019	12:00	61	86	38	36
Wednesday, April 24, 2019	13:00	59	85	40	36
Wednesday, April 24, 2019	14:00	42	64	39	36
Wednesday, April 24, 2019	15:00	45	63	43	41
Wednesday, April 24, 2019	16:00	44	59	42	41
Wednesday, April 24, 2019	17:00	45	61	42	41
Wednesday, April 24, 2019	18:00	51	74	45	42
Wednesday, April 24, 2019	19:00	49	64	47	44
Wednesday, April 24, 2019	20:00	52	77	49	47
Wednesday, April 24, 2019	21:00	52	65	51	49
Wednesday, April 24, 2019	22:00	51	59	50	48
Wednesday, April 24, 2019	23:00	51	66	50	47

Statistics	Leq	Lmax	L50	L90
Day Average	58	73	45	42
Night Average	55	65	53	50
Day Low	42	59	38	36
Day High	63	87	54	51
Night Low	51	59	50	45
Night High	60	79	58	55
Ldn	62	Day %		73
CNEL	62	Night %		27

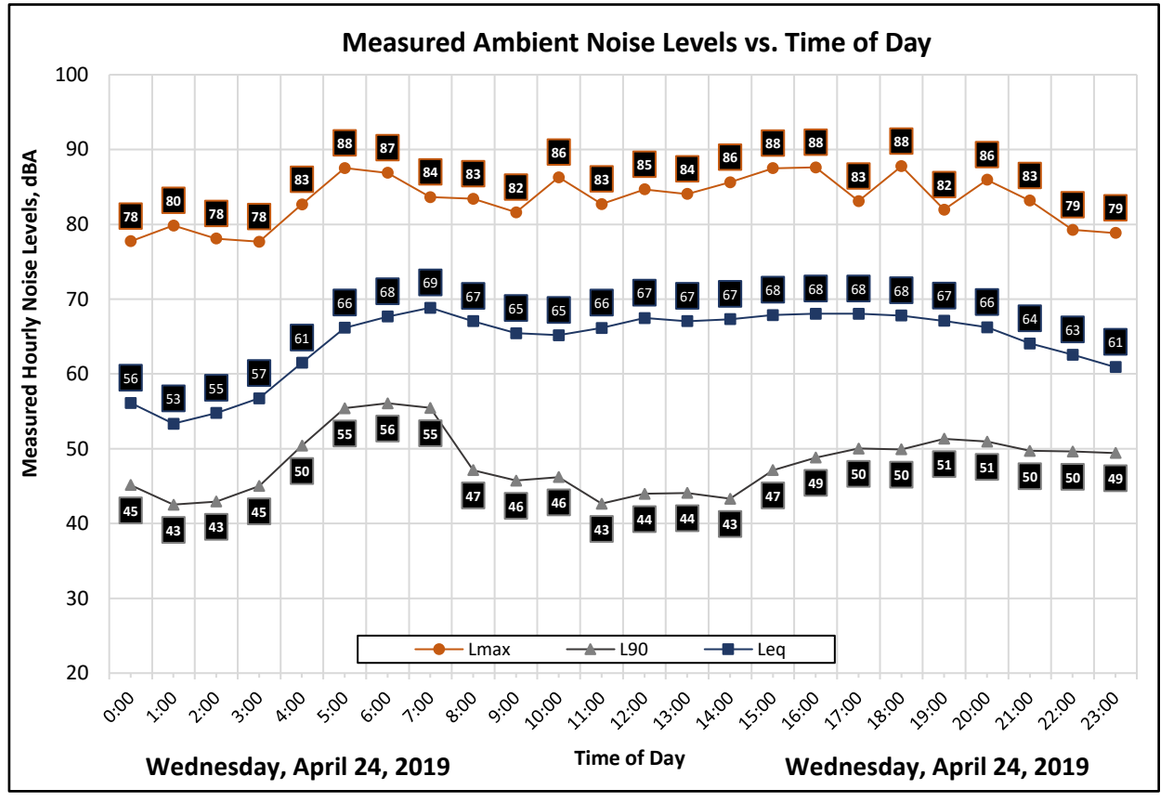


Appendix B2: Continuous Noise Monitoring Results

Site: LT-2
Project: Simmerhorn Ranch
Meter: LDL 820-2
Location: Simmerhorn Rd. & Steiner Rd. intersection
Calibrator: B&K 4230
Coordinates: 38.2620991°, -121.2911137°

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, April 24, 2019	0:00	56	78	49	45
Wednesday, April 24, 2019	1:00	53	80	47	43
Wednesday, April 24, 2019	2:00	55	78	47	43
Wednesday, April 24, 2019	3:00	57	78	49	45
Wednesday, April 24, 2019	4:00	61	83	54	50
Wednesday, April 24, 2019	5:00	66	88	59	55
Wednesday, April 24, 2019	6:00	68	87	59	56
Wednesday, April 24, 2019	7:00	69	84	62	55
Wednesday, April 24, 2019	8:00	67	83	56	47
Wednesday, April 24, 2019	9:00	65	82	52	46
Wednesday, April 24, 2019	10:00	65	86	52	46
Wednesday, April 24, 2019	11:00	66	83	51	43
Wednesday, April 24, 2019	12:00	67	85	58	44
Wednesday, April 24, 2019	13:00	67	84	57	44
Wednesday, April 24, 2019	14:00	67	86	56	43
Wednesday, April 24, 2019	15:00	68	88	59	47
Wednesday, April 24, 2019	16:00	68	88	60	49
Wednesday, April 24, 2019	17:00	68	83	60	50
Wednesday, April 24, 2019	18:00	68	88	60	50
Wednesday, April 24, 2019	19:00	67	82	59	51
Wednesday, April 24, 2019	20:00	66	86	57	51
Wednesday, April 24, 2019	21:00	64	83	54	50
Wednesday, April 24, 2019	22:00	63	79	54	50
Wednesday, April 24, 2019	23:00	61	79	53	49

Statistics	Leq	Lmax	L50	L90
Day Average	67	85	57	48
Night Average	62	81	52	49
Day Low	64	82	51	43
Day High	69	88	62	55
Night Low	53	78	47	43
Night High	68	88	59	56
Ldn	70	Day %		83
CNEL	70	Night %		17

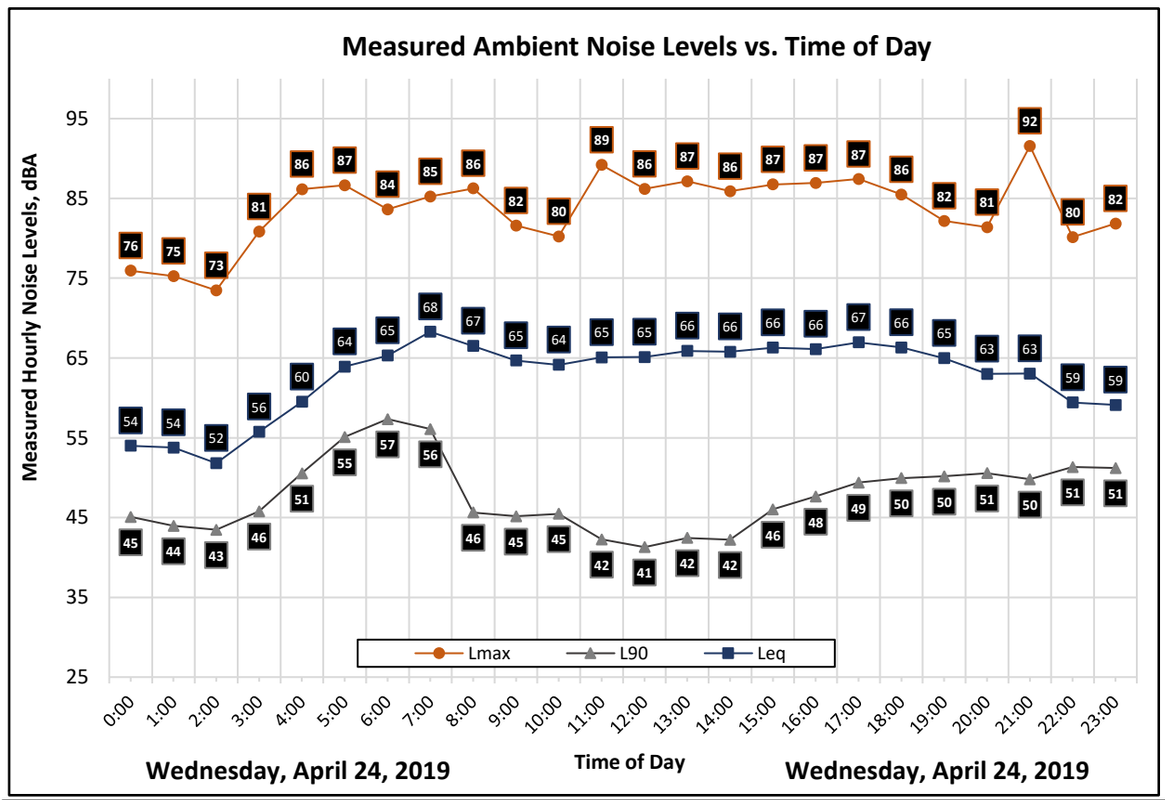


Appendix B3: Continuous Noise Monitoring Results

Site: LT-3
Project: Simmerhorn Ranch
Meter: LDL 812-1
Location: Boessow Road, near Crystal Way
Calibrator: B&K 4230
Coordinates: 38.2549909°, -121.2873466°

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, April 24, 2019	0:00	54	76	50	45
Wednesday, April 24, 2019	1:00	54	75	49	44
Wednesday, April 24, 2019	2:00	52	73	48	43
Wednesday, April 24, 2019	3:00	56	81	50	46
Wednesday, April 24, 2019	4:00	60	86	54	51
Wednesday, April 24, 2019	5:00	64	87	58	55
Wednesday, April 24, 2019	6:00	65	84	60	57
Wednesday, April 24, 2019	7:00	68	85	62	56
Wednesday, April 24, 2019	8:00	67	86	58	46
Wednesday, April 24, 2019	9:00	65	82	54	45
Wednesday, April 24, 2019	10:00	64	80	52	45
Wednesday, April 24, 2019	11:00	65	89	52	42
Wednesday, April 24, 2019	12:00	65	86	54	41
Wednesday, April 24, 2019	13:00	66	87	58	42
Wednesday, April 24, 2019	14:00	66	86	56	42
Wednesday, April 24, 2019	15:00	66	87	56	46
Wednesday, April 24, 2019	16:00	66	87	58	48
Wednesday, April 24, 2019	17:00	67	87	60	49
Wednesday, April 24, 2019	18:00	66	86	59	50
Wednesday, April 24, 2019	19:00	65	82	56	50
Wednesday, April 24, 2019	20:00	63	81	55	51
Wednesday, April 24, 2019	21:00	63	92	53	50
Wednesday, April 24, 2019	22:00	59	80	54	51
Wednesday, April 24, 2019	23:00	59	82	54	51

Statistics	Leq	Lmax	L50	L90
Day Average	66	86	56	47
Night Average	60	80	53	49
Day Low	63	80	52	41
Day High	68	92	62	56
Night Low	52	73	48	43
Night High	65	87	60	57
Ldn	68	Day %		85
CNEL	68	Night %		15



Appendix B4: Short Term Noise Monitoring Results

Site: ST-1
Project: Simmerhorn Ranch
Location: Simmerhorn Rd. - East
Coordinates: 38.2622329°, -121.2958354°

Meter: LDL 812-2
Calibrator: B&K 4230

Start: 2019-04-25 09:13:15
Stop: 2019-04-25 09:23:15
SLM: 812
Serial: A0509

Measurement Results, dBA

Duration:	10:00
L_{eq}:	63
L_{max}:	77
L_{min}:	49
L_{50}:	56

Notes

Primary noise source is traffic on CA-99 & Simmerhorn Rd.
Ambient noise level is approximately 56 dB.

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Appendix B5: Short Term Noise Monitoring Results

Site: ST-2
Project: Simmerhorn Ranch
Location: Simmerhorn Rd. - West
Coordinates: 38.2621541°, -121.2838617°

Meter: LDL 812-2
Calibrator: B&K 4230

Start: 2019-04-25 09:35:10
Stop: 2019-04-25 09:45:10
SLM: 812
Serial: A0509

Measurement Results, dBA

Duration:	10:00
L_{eq}:	63
L_{max}:	81
L_{min}:	39
L_{50}:	47

Notes

Primary noise source is traffic on Simmerhorn Road. Traffic on Marengo Road is audible.

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Appendix B6: Short Term Noise Monitoring Results

Site: ST-3
Project: Simmerhorn Ranch
Location: Crystal Way, adjacent to CA-99
Coordinates: 38.2568973°, -121.2911791°

Meter: LDL 812-2
Calibrator: B&K 4230

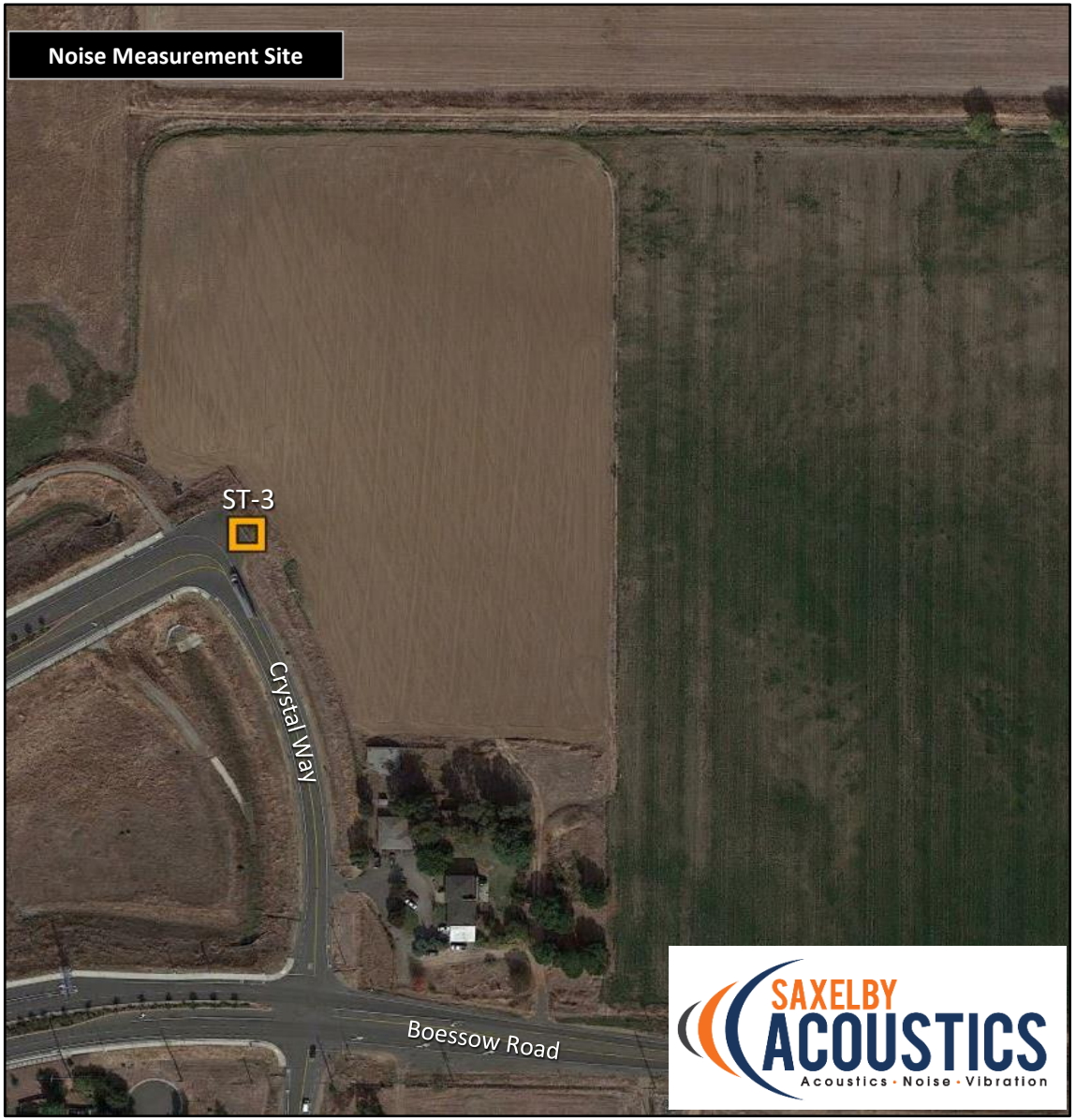
Start: 2019-04-25 08:38:51
Stop: 2019-04-25 08:48:51
SLM: 812
Serial: A0509

Measurement Results, dBA

Duration:	10:00
L_{eq}:	54
L_{max}:	70
L_{min}:	50
L_{50}:	54

Notes

CA-99 is primary noise source.



Appendix B7: Short Term Noise Monitoring Results

Site: ST-4
Project: Simmerhorn Ranch
Location: Marengo Rd, near Boessow Rd.
Coordinates: 38.2561509°, -121.2825380°

Meter: LDL 812-2
Calibrator: B&K 4230

Start: 2019-04-25 08:10:10
Stop: 2019-04-25 08:20:10
SLM: 812
Serial: A0509

Measurement Results, dBA

Duration:	10:00
L_{eq}:	63
L_{max}:	79
L_{min}:	41
L_{50}:	48

Notes

Traffic on Marengo Road is the primary noise source.

Appendix C: Traffic Noise Calculation Inputs and Results

Appendix C-1

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

Project #: 190602
Description: Simmmerhorn Ranch - Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Carillion Blvd.	3,600	83	0	17	1.0%	1.0%	45	60	-5	78	36	17	56.7
2	Carillion Blvd.	3,720	83	0	17	1.0%	1.0%	45	70	-5	80	37	17	55.9
3	Walnut Ave.	2,970	83	0	17	1.0%	1.0%	45	70	-5	69	32	15	54.9
4	Walnut Ave.	2,810	83	0	17	1.0%	1.0%	45	60	-5	66	31	14	55.7
5	Simmerhorn Rd.	3,800	83	0	17	1.0%	1.0%	55	60	0	114	53	25	64.2
6	Simmerhorn Rd.	2,360	83	0	17	1.0%	1.0%	55	70	0	83	39	18	61.1
7	Simmerhorn Rd.	3,720	83	0	17	1.0%	1.0%	55	90	0	113	52	24	61.5
8	Marengo Rd.	2,910	83	0	17	1.0%	1.0%	55	50	0	96	44	21	64.2
9	Marengo Rd.	3,210	83	0	17	1.0%	1.0%	55	90	0	102	47	22	60.8
10	Simmerhorn Rd.	1,640	83	0	17	1.0%	1.0%	55	80	0	65	30	14	58.7
11	A Street	5,590	83	0	17	1.0%	1.0%	25	65	0	46	22	10	57.8
12	C Street	10,610	83	0	17	1.0%	1.0%	30	50	0	91	42	20	63.9
13	Boessow Rd.	5,030	83	0	17	1.0%	1.0%	55	80	0	138	64	30	63.6
14	Marengo Rd.	3,070	83	0	17	1.0%	1.0%	55	50	0	99	46	21	64.5
15	Boessow Rd.	1,420	83	0	17	1.0%	1.0%	55	80	0	59	28	13	58.1
16	Boessow Rd.	4,370	83	0	17	1.0%	1.0%	55	50	0	126	58	27	66.0

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Appendix C-2

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

Project #: 190602

Description: Simmmerhorn Ranch - Existing Plus Project Traffic

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Carillion Blvd.	3,990	83	0	17	1.0%	1.0%	45	60	-5	84	39	18	57.2
2	Carillion Blvd.	4,300	83	0	17	1.0%	1.0%	45	70	-5	88	41	19	56.5
3	Walnut Ave.	3,090	83	0	17	1.0%	1.0%	45	70	-5	71	33	15	55.1
4	Walnut Ave.	2,880	83	0	17	1.0%	1.0%	45	60	-5	68	31	15	55.8
5	Simmerhorn Rd.	5,390	83	0	17	1.0%	1.0%	55	60	0	144	67	31	65.7
6	Simmerhorn Rd.	2,600	83	0	17	1.0%	1.0%	55	70	0	89	41	19	61.6
7	Simmerhorn Rd.	4,990	83	0	17	1.0%	1.0%	55	90	0	137	64	30	62.7
8	Marengo Rd.	3,390	83	0	17	1.0%	1.0%	55	50	0	106	49	23	64.9
9	Marengo Rd.	3,490	83	0	17	1.0%	1.0%	55	90	0	108	50	23	61.2
10	Simmerhorn Rd.	1,680	83	0	17	1.0%	1.0%	55	80	0	66	31	14	58.8
11	A Street	5,790	83	0	17	1.0%	1.0%	25	65	0	47	22	10	58.0
12	C Street	10,910	83	0	17	1.0%	1.0%	30	50	0	93	43	20	64.0
13	Boessow Rd.	6,320	83	0	17	1.0%	1.0%	55	80	0	161	75	35	64.5
14	Marengo Rd.	3,090	83	0	17	1.0%	1.0%	55	50	0	100	46	21	64.5
15	Boessow Rd.	1,420	83	0	17	1.0%	1.0%	55	80	0	59	28	13	58.1
16	Boessow Rd.	4,390	83	0	17	1.0%	1.0%	55	50	0	126	58	27	66.0

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Appendix C-3

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

Project #: 190602
Description: Simmmerhorn Ranch - 2040 Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Carillion Blvd.	11,650	83	0	17	1.0%	1.0%	45	60	-5	171	80	37	61.8
2	Carillion Blvd.	18,050	83	0	17	1.0%	1.0%	45	70	-5	230	107	49	62.7
3	Walnut Ave.	13,300	83	0	17	1.0%	1.0%	45	70	-5	187	87	40	61.4
4	Walnut Ave.	14,600	83	0	17	1.0%	1.0%	45	60	-5	199	93	43	62.8
5	Simmerhorn Rd.	5,650	83	0	17	1.0%	1.0%	55	60	0	149	69	32	65.9
6	Simmerhorn Rd.	8,000	83	0	17	1.0%	1.0%	55	70	0	188	87	41	66.4
7	Simmerhorn Rd.	5,300	83	0	17	1.0%	1.0%	55	90	0	143	66	31	63.0
8	Marengo Rd.	17,300	83	0	17	1.0%	1.0%	55	50	0	314	146	68	72.0
9	Marengo Rd.	16,200	83	0	17	1.0%	1.0%	55	90	0	301	140	65	67.9
10	Simmerhorn Rd.	6,700	83	0	17	1.0%	1.0%	55	80	0	167	78	36	64.8
11	A Street	10,800	83	0	17	1.0%	1.0%	25	65	0	72	33	15	60.7
12	C Street	16,500	83	0	17	1.0%	1.0%	30	50	0	122	57	26	65.8
13	Boessow Rd.	10,950	83	0	17	1.0%	1.0%	55	80	0	232	108	50	66.9
14	Marengo Rd.	4,050	83	0	17	1.0%	1.0%	55	50	0	119	55	26	65.7
15	Boessow Rd.	2,400	83	0	17	1.0%	1.0%	55	80	0	84	39	18	60.3
16	Boessow Rd.	4,550	83	0	17	1.0%	1.0%	55	50	0	129	60	28	66.2

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Appendix C-4

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

Project #: 190602

Description: Simmmerhorn Ranch 2040 Plus Project Traffic

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
1	Carillion Blvd.	12,040	83	0	17	1.0%	1.0%	45	60	-5	175	81	38	62.0
2	Carillion Blvd.	18,630	83	0	17	1.0%	1.0%	45	70	-5	234	109	51	62.9
3	Walnut Ave.	13,410	83	0	17	1.0%	1.0%	45	70	-5	188	87	41	61.4
4	Walnut Ave.	14,680	83	0	17	1.0%	1.0%	45	60	-5	200	93	43	62.8
5	Simmerhorn Rd.	6,810	83	0	17	1.0%	1.0%	55	60	0	169	78	36	66.7
6	Simmerhorn Rd.	8,240	83	0	17	1.0%	1.0%	55	70	0	192	89	41	66.6
7	Simmerhorn Rd.	5,710	83	0	17	1.0%	1.0%	55	90	0	150	70	32	63.3
8	Marengo Rd.	17,980	83	0	17	1.0%	1.0%	55	50	0	323	150	69	72.1
9	Marengo Rd.	16,800	83	0	17	1.0%	1.0%	55	90	0	308	143	66	68.0
10	Simmerhorn Rd.	6,780	83	0	17	1.0%	1.0%	55	80	0	168	78	36	64.8
11	A Street	10,990	83	0	17	1.0%	1.0%	25	65	0	73	34	16	60.7
12	C Street	16,820	83	0	17	1.0%	1.0%	30	50	0	124	57	27	65.9
13	Boessow Rd.	11,350	83	0	17	1.0%	1.0%	55	80	0	237	110	51	67.1
14	Marengo Rd.	4,090	83	0	17	1.0%	1.0%	55	50	0	120	56	26	65.7
15	Boessow Rd.	2,440	83	0	17	1.0%	1.0%	55	80	0	85	40	18	60.4
16	Boessow Rd.	4,550	83	0	17	1.0%	1.0%	55	50	0	129	60	28	66.2

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Appendix D: Traffic Noise Barrier Calculations

Appendix D-1

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

Noise Barrier Calculation: Data Input Sheet

Project #: 190408
Description: Simmerhorn Ranch
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Level, dBA	Distance to Noise Contours		
												70 dB	65 dB	60 dB
1	Simmerhorn Road	West of Carillion Blvd.	5,710	80	20	1	1	55	50		67	33	72	155
2	Simmerhorn Road	East of Carillion Blvd.	6,810	80	20	1	1	55	50		68	38	81	175
3	Marengo Road	South of Simmerhorn Road	16,800	80	20	1	1	55	50		72	69	148	319
4	Boessow Road	West of Marengo Road	4,550	80	20	1	1	55	50		66	29	62	133
				80		1	1	55	50					
				80		1	1	55	50					

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Appendix D-2
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 190408
Description Simmerhorn Ranch
Roadway Name: Simmerhorn Road
Location(s): 1

Noise Level Data:

Year: 2040
Auto L_{dn}, dB: 67
Medium Truck L_{dn}, dB: 54
Heavy Truck L_{dn}, dB: 55

Site Geometry:

Receiver Description: West of Carillion Blvd.
Centerline to Barrier Distance (C_1): 50
Barrier to Receiver Distance (C_2): 20
Automobile Elevation: 2
Medium Truck Elevation: 4
Heavy Truck Elevation: 10
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

		---------- L_{dn}, dB ----------				Barrier Breaks Line of Sight to…		
Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	61	49	50	61	Yes	Yes	No
7	7	60	47	50	60	Yes	Yes	Yes
8	8	58	46	49	59	Yes	Yes	Yes
9	9	57	45	48	58	Yes	Yes	Yes
10	10	56	44	47	57	Yes	Yes	Yes
11	11	56	43	46	56	Yes	Yes	Yes
12	12	55	42	45	55	Yes	Yes	Yes
13	13	54	41	44	54	Yes	Yes	Yes
14	14	53	41	43	54	Yes	Yes	Yes

Notes: [1] Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).

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Appendix D-3
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 190408
Description Simmerhorn Ranch
Roadway Name: Simmerhorn Road
Location(s): 2

Noise Level Data:

Year: 2040
Auto L_{dn}, dB: 68
Medium Truck L_{dn}, dB: 55
Heavy Truck L_{dn}, dB: 56

Site Geometry:

Receiver Description: East of Carillion Blvd.
Centerline to Barrier Distance (C_1): 50
Barrier to Receiver Distance (C_2): 20
Automobile Elevation: 2
Medium Truck Elevation: 4
Heavy Truck Elevation: 10
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

		---------- L_{dn}, dB ----------				Barrier Breaks Line of Sight to…		
Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	62	49	51	62	Yes	Yes	No
7	7	60	48	51	61	Yes	Yes	Yes
8	8	59	47	50	60	Yes	Yes	Yes
9	9	58	46	49	59	Yes	Yes	Yes
10	10	57	45	48	58	Yes	Yes	Yes
11	11	56	44	47	57	Yes	Yes	Yes
12	12	55	43	45	56	Yes	Yes	Yes
13	13	54	42	45	55	Yes	Yes	Yes
14	14	54	41	44	54	Yes	Yes	Yes

Notes: [1] Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).

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Appendix D-4
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 190408
Description Simmerhorn Ranch
Roadway Name: Marengo Road
Location(s): 3

Noise Level Data:

Year: 2040
Auto L_{dn}, dB: 72
Medium Truck L_{dn}, dB: 59
Heavy Truck L_{dn}, dB: 60

Site Geometry:

Receiver Description: South of Simmerhorn Road
Centerline to Barrier Distance (C_1): 50
Barrier to Receiver Distance (C_2): 20
Automobile Elevation: 2
Medium Truck Elevation: 4
Heavy Truck Elevation: 10
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

		---------- L_{dn}, dB ----------				Barrier Breaks Line of Sight to…		
Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	66	53	55	66	Yes	Yes	No
7	7	64	52	55	65	Yes	Yes	Yes
8	8	63	51	54	64	Yes	Yes	Yes
9	9	62	50	53	63	Yes	Yes	Yes
10	10	61	49	52	62	Yes	Yes	Yes
11	11	60	48	50	61	Yes	Yes	Yes
12	12	59	47	49	60	Yes	Yes	Yes
13	13	58	46	49	59	Yes	Yes	Yes
14	14	58	45	48	58	Yes	Yes	Yes

Notes: [1] Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).

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Appendix D-5
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 190408
Description Simmerhorn Ranch
Roadway Name: Boessow Road
Location(s): 4

Noise Level Data:

Year: 2040
Auto L_{dn}, dB: 66
Medium Truck L_{dn}, dB: 53
Heavy Truck L_{dn}, dB: 54

Site Geometry:

Receiver Description: West of Marengo Road
Centerline to Barrier Distance (C_1): 50
Barrier to Receiver Distance (C_2): 20
Automobile Elevation: 2
Medium Truck Elevation: 4
Heavy Truck Elevation: 10
Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 6

Barrier Effectiveness:

		---------- L_{dn}, dB ----------				Barrier Breaks Line of Sight to…		
Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	60	48	49	60	Yes	Yes	No
7	7	59	46	49	59	Yes	Yes	Yes
8	8	57	45	48	58	Yes	Yes	Yes
9	9	56	44	47	57	Yes	Yes	Yes
10	10	55	43	46	56	Yes	Yes	Yes
11	11	55	42	45	55	Yes	Yes	Yes
12	12	54	41	44	54	Yes	Yes	Yes
13	13	53	40	43	53	Yes	Yes	Yes
14	14	52	40	42	53	Yes	Yes	Yes

Notes: [1] Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).

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