Environmental Noise & Vibration Assessment

Iron Ridge Development I & II

Visalia, California

BAC Job # 2021-133

Prepared For:

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CEQA Checklist

NOISE AND VIBRATION – **Would the Project Result in:**	**NA – Not Applicable**	**Potentially Significant Impact**	**Less than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a) Generation of 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?				**X**	
b) Generation of excessive groundborne vibration or groundborne noise levels?				**X**	
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?				**X**	

Introduction

The Iron Ridge Development I & II (project) is located south of W. Goshen Avenue, between Road 88 (Clancy Road) and Road 92 (Shirk Road) in Visalia, California. The project proposes the development of residential uses on two parcels totaling 50-acres. Existing land uses in the project vicinity include light industrial to the north, and a combination of agricultural and residential in all other directions. The project site location with aerial imagery is provided as Figure 1. The project concept lotting plan is shown in Figure 2.

The purposes of this assessment are to quantify the existing noise and vibration environments, identify potential noise and vibration impacts resulting from the project, identify appropriate mitigation measures, and provide a quantitative and qualitative analysis of impacts associated with the project. Specifically, impacts are identified if project-related activities would cause a substantial increase in ambient noise levels at existing sensitive uses in the project vicinity, or if traffic, industrial, or project-generated noise or vibration levels would exceed applicable federal, state, or local (City of Visalia) standards at existing or proposed sensitive uses.

Noise and Vibration Fundamentals

Noise

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

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals of pressure) as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in decibel levels correspond closely to human perception of relative loudness. Noise levels associated with common noise sources are provided in Figure 3.

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 filtering the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}). The L_{eq} is the foundation of the day-night average noise descriptor, DNL (or L_{dn}), and shows very good correlation with community response to noise. DNL is based upon the average noise level over a 24-hour day, with a +10-decibel weighting 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 DNL represents a 24-hour average, it tends to disguise short-term variations in the noise environment. DNL-based noise standards are commonly used to assess noise impacts associated with traffic, railroad, and aircraft noise sources.

Vibration

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

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration in terms of velocity in inches per second peak particle velocity (IPS, PPV) or root-mean-square (VdB, RMS). Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity as well as RMS velocities. As vibrations travel outward from the source, they excite the particles of rock and soil through which they pass and cause them to oscillate. Differences in subsurface geologic conditions and distance from the source of vibration will result in different vibration levels characterized by different frequencies and intensities. In all cases, vibration amplitudes will decrease with increasing distance. The maximum rate, or velocity of particle movement, is the commonly accepted descriptor of the vibration "strength".

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does frequency. Generally, as the duration and vibration frequency increase, the potential for adverse human response increases.

According to the Caltrans Transportation and Construction-Induced Vibration Guidance Manual (April 2020), operation of construction equipment and construction techniques generate ground vibration. Traffic traveling on roadways can also be a source of such vibration. At high enough amplitudes, ground vibration has the potential to damage structures and/or cause cosmetic damage. Ground vibration can also be a source of annoyance to individuals who live or work close to vibration-generating activities. However, traffic, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage.

Legend

Project Boundary (Approximate)

Long-term Noise Measurement Locations

N

Scale (Feet)

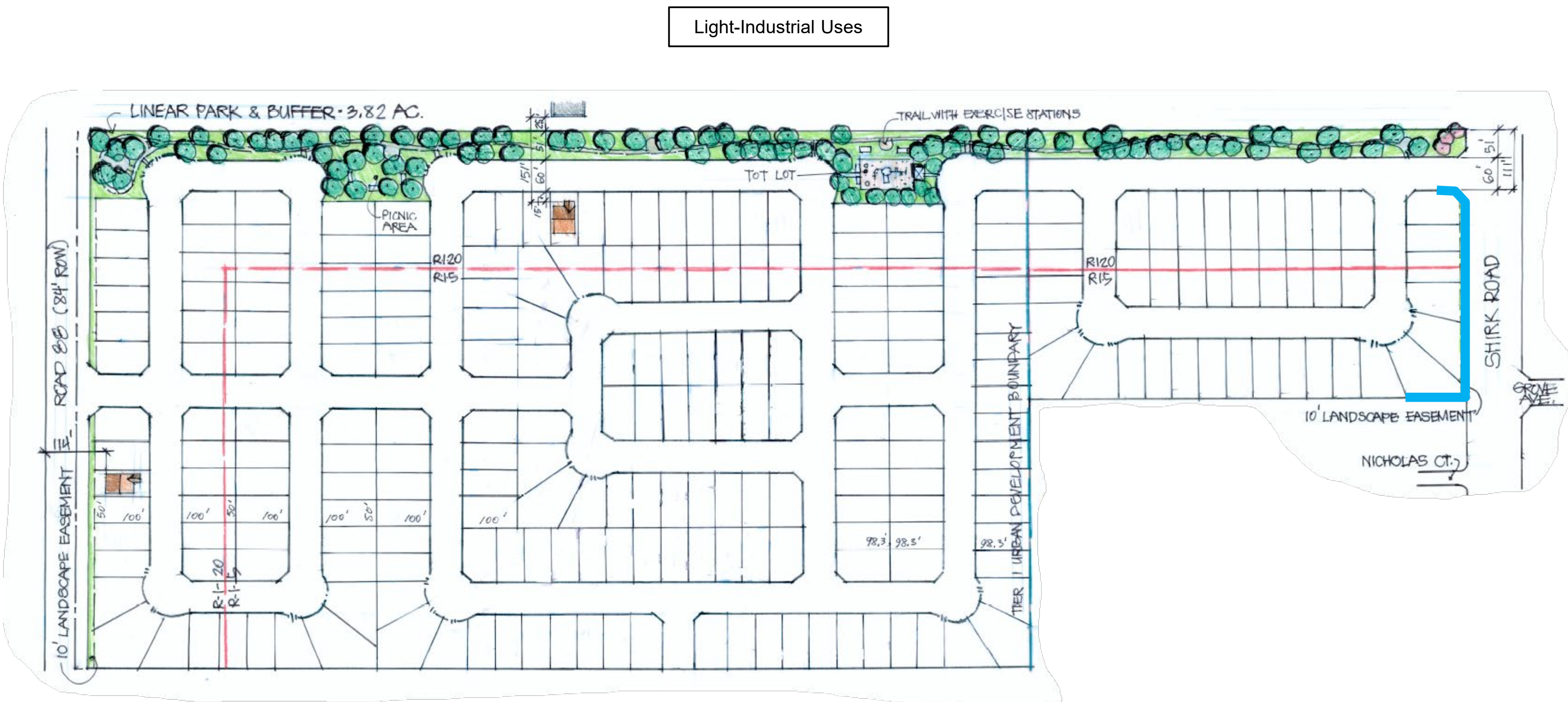
0 250 500

Iron Ridge Development I & II
Visalia, California

Project Area

Figure 1

BOLLARD Acoustical Consultants



Legend

Proposed 6' Traffic Noise Barrier

N

Scale (Feet)

0 100 200

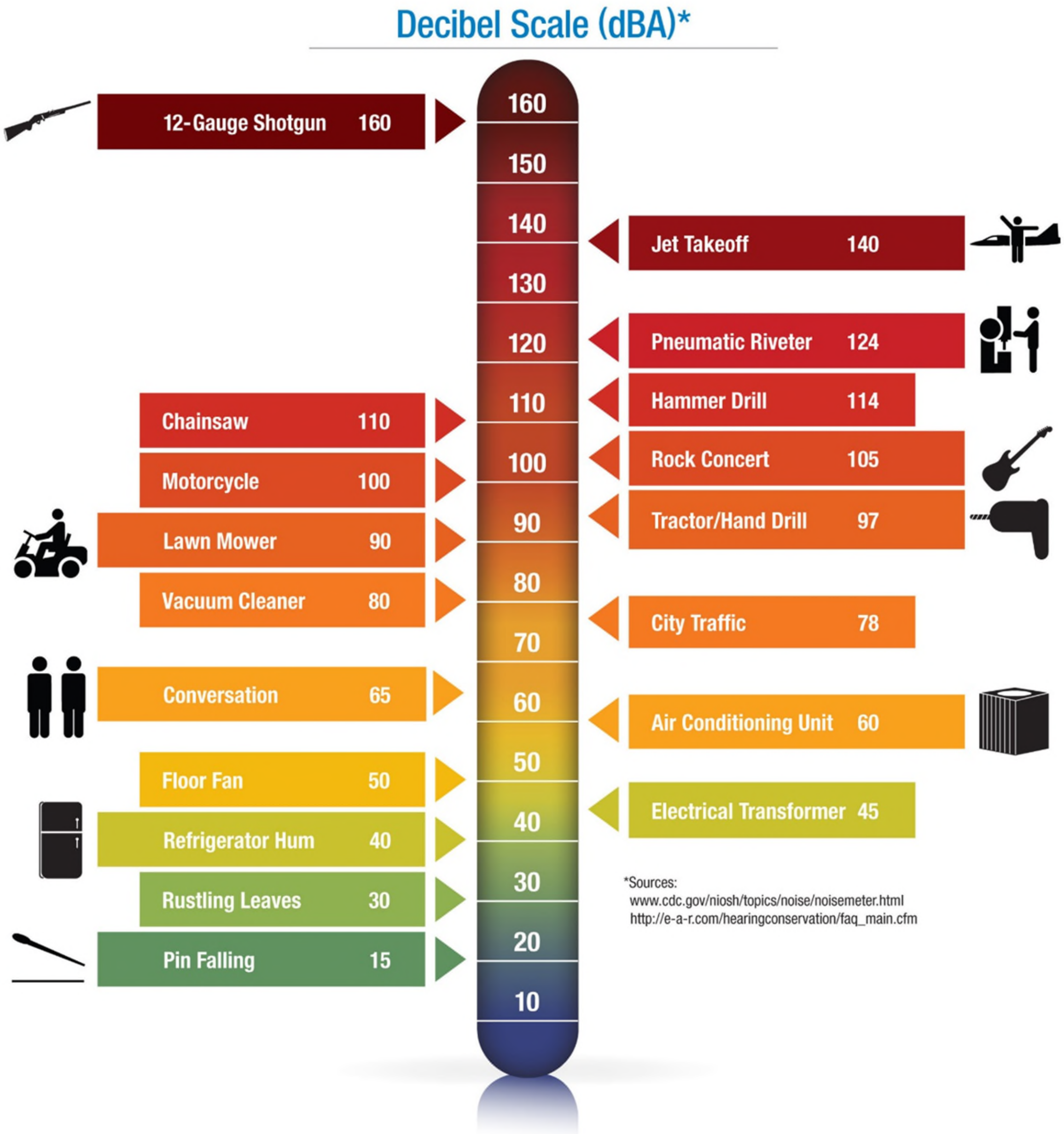
Iron Ridge Development I & II
Visalia, California

Project Concept Lotting Plan

Figure 2

BOLLARD Acoustical Consultants

Figure 3
Noise Levels Associated with Common Noise Sources



Regulatory Setting: Criteria for Acceptable Noise and Vibration Exposure

Federal

There are no federal noise or vibration criteria which would be directly applicable to this project. However, the City of Visalia does not currently have established criteria for assessing noise impacts associated with increases in ambient noise levels from project-generated noise sources. As a result, the following federal noise criteria was applied to the project.

Federal Interagency Commission on Noise

The Federal Interagency Commission on Noise (FICON) has developed a graduated scale for use in the assessment of project-related noise level increases. The criteria shown in Table 1 was developed by FICON as a means of developing thresholds for impact identification for project-related noise level increases. The FICON standards have been used extensively in recent years in the preparation of the noise sections of Environmental Impact Reports that have been certified in many California cities and counties.

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

Table 1
Significance of Changes in Cumulative Noise Exposure

Ambient Noise Level Without Project (DNL or CNEL)	Change in Ambient Noise Level Due to Project
<60 dB	+5.0 dB or more
60 to 65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more
Source: Federal Interagency Committee on Noise (FICON)	

Based on the FICON research, as shown in Table 1, a 5 dB increase in noise levels due to a project is required for a finding of significant noise impact where ambient noise levels without the project are less than 60 dB DNL. Where pre-project ambient conditions are between 60 and 65 dB DNL, a 3 dB increase is applied as the standard of significance. Finally, in areas already exposed to higher noise levels, specifically pre-project noise levels in excess of 65 dB DNL, a 1.5 dB increase is considered by FICON as the threshold of significance.

State of California

<u>California Environmental Quality Act</u>

The State of California has established regulatory criteria that are applicable to this assessment. Specifically, Appendix G of the State of California Environmental Quality Act (CEQA) Guidelines are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. According to Appendix G of the CEQA guidelines, the project would result in a significant noise or vibration impact if the following occur:

A. 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 other applicable standards of other agencies; or

B. Generation of excessive groundborne vibration or groundborne noise levels; or

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.

It should be noted that audibility is not a test of significance according to CEQA. If this were the case, any project which added any audible amount of noise to the environment would be considered significant according to CEQA. Because every physical process creates noise, the use of audibility alone as significance criteria would be unworkable. CEQA requires a substantial increase in noise levels before noise impacts are identified, not simply an audible change.

<u>California Department of Transportation (Caltrans)</u>

The City of Visalia does not currently have adopted standards for groundborne vibration. As a result, the vibration impact criteria developed by the California Department of Transportation (Caltrans) was applied to the project. The Caltrans criteria applicable to damage and annoyance from transient and continuous vibration typically associated with construction activities are presented in Tables 2 and 3. Equipment or activities typical of continuous vibration include: excavation equipment, static compaction equipment, tracked vehicles, traffic on a highway, vibratory pile drivers, pile-extraction equipment, and vibratory compaction equipment. Equipment or activities typical of single-impact (transient) or low-rate repeated impact vibration include impact pile drivers, blasting, drop balls, “pogo stick” compactors, and crack-and-seat equipment (California Department of Transportation 2020).

Table 2
Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (inches/second)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

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

PPV = Peak Particle Velocity

Source: Caltrans Transportation and Construction Vibration Guidance Manual (2020)

Table 3
Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (inches/second)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.40	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

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

PPV = Peak Particle Velocity

Source: Caltrans Transportation and Construction Vibration Guidance Manual (2020)

Local

Visalia General Plan

The Safety and Noise Element of the Visalia General Plan contains objectives and policies to ensure that city residents are not subjected to noise beyond acceptable levels. The General Plan objectives and policies which would be most applicable to this project are reproduced below.

Objectives

N-O-1 Strive to achieve an acceptable noise environment for present and future residents of Visalia.

N-O-2 Protect the City's economic base by preventing the encroachment of incompatible land uses near known noise producing industries, railroads, airports, and other sources.

N-O-3 Protect noise-sensitive land uses such as schools, hospitals, and senior care facilities from encroachment of and exposure to excessive levels of noise.

Policies

N-P-1 Update the City's Noise Ordinance as needed to be in conformance with the General Plan.

N-P-2 Promote the use of noise attenuation measures to improve the acoustic environment inside residences where existing single-family residential development is located in a noise-impacted environment such as along an arterial street or adjacent to a noise-producing use.

N-P-4 Where new development of industrial, commercial or other noise-generating land uses (including roadways, railroads, and airports) may result in noise levels that exceed the noise level exposure criteria established by Tables 8-3 and 8-4 (Tables 4 and 5 of this report), require a noise study to determine impacts, and require developers to mitigate these impacts in conformance with Tables 8-3 and 8-4 (Tables 4 and 5 of this report) as a condition of permit approval through appropriate means.

Noise mitigation measures may include but are not limited to:

- Screen and control noise sources, such as parking and loading facilities, outdoor activities, and mechanical equipment;
- Increase setbacks for noise sources from adjacent dwellings;
- Retain fences, walls, and landscaping that serve as noise buffers;
- Use soundproofing materials and double-glazed windows;
- Use open space, building orientation and design, landscaping and running water to mask sounds; and
- Control hours of operation, including deliveries and trash pickup, to minimize noise impacts.

Alternative acoustical designs that achieve the prescribed noise level reduction may be approved, provided a qualified acoustical consultant submits information demonstrating that the alternative designs will achieve and maintain the specific targets for outdoor activity areas and interior spaces. As a last resort, developers may propose to construct noise walls along state highways and arterials when compatible with aesthetic concerns and neighborhood character. This would be a developer responsibility, with no City funding.

N-P-5 Continue to enforce applicable State Noise Insulation Standards (California Administrative Code, Title 24) and Uniform Building Code (UBC) noise requirements.

Table 4
Transportation Noise Sources

Noise-Sensitive Land Use	Outdoor Activity Areas (dBA) DNL/CNEL[2]	Interior Spaces (dBA) DNL/CNEL[2]	Interior Spaces (dBA) L_{eq}[3]
Residential	65	45	--
Transient Lodging	65	45	--
Hospitals, Nursing Homes	65	45	--
Theatres, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	65	--	45
Office Buildings	--	--	45
Schools, Libraries, Museums	--	--	45

1 Outdoor activity areas generally include backyards of single-family residences and outdoor patios, decks or common recreation areas for multi-family developments.
2 The CNEL is used for quantification of aircraft noise exposure as required by CAC Title 21.
3 As determined for a typical worst-case hour during periods of use.
Source: Visalia General Plan, Safety and Noise Element, Table 8-3

Table 5
Stationary Noise Sources[1]

Noise Level Descriptor	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Hourly Equivalent Sound Level, L_{eq} (dBA)	50	45
Maximum Sound Level, L_{max} (dBA)	70	65

1 As determined as the property line of the receiving noise-sensitive use.
Source: Visalia General Plan, Safety and Noise Element, Table 8-4

Visalia Municipal Code

The provisions of the Visalia Municipal Code which would be most applicable to this project are reproduced below.

Chapter 8.36 Noise

8.36.040 Exterior noise standards – fixed noise sources.

A. It is unlawful for any person at any location within the city to create any noise, or to allow the creation of any noise, on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level, when measured at the property line of any affected noise-sensitive land use, to exceed any of the categorical noise level standards as set forth in the following table:

Exterior Noise Level Standards (dBA)

Category	Cumulative Number of Minutes in Any 1-Hour Time Period	Evening and Daytime (6:00 a.m. to 7:00 p.m.)	Nighttime (7:00 p.m. to 6:00 a.m.)
1	30 (L_{50})	50	45
2	15 (L_{25})	55	50
3	5 (L_{8})	60	55
4	1 (L_{2})	65	60
5	0 (L_{max})	70	65
Source: Visalia Municipal Code, Section 8.36.040(A)			

B. In the event the measured ambient noise level without the alleged offensive source in operation exceeds an applicable noise level standard in any category above, the applicable standard shall be adjusted so as to equal the ambient noise level.

C. Each of the noise level standards specified above shall be reduced by 5 dB for pure tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

8.36.050 Exterior noise standards – mobile noise sources prohibition against use.

It is unlawful to operate any of the below-listed devices, appliances, equipment or vehicles on public or private property abutting noise-sensitive land uses between the weekday hours of 7:00 p.m. and 6:00 a.m., and between the weekend hours of 7:00 p.m. and 9:00 a.m.

C. Construction equipment including jackhammers, portable generators, pneumatic equipment, trenchers, or other such equipment, except for emergency repair purposes as provided in Section 8.36.070.

8.36.060 Residential interior noise standards.

A. It is unlawful for any person, at any location within the city, to operate or cause to be operated, any source of sound or to allow the creation of any noise which causes the noise level when measured inside a dwelling unit to exceed any of the categorized noise level standards as set forth in the following table:

Interior Noise Level Standards (dBA)

Category	Cumulative Number of Minutes in Any 1-Hour Time Period	Evening and Daytime (6:00 a.m. to 7:00 p.m.)	Nighttime (7:00 p.m. to 6:00 a.m.)
1	5 (L_{8})	45	35
2	1 (L_{2})	50	40
3	0 (L_{max})	55	45
Source: Visalia Municipal Code, Section 8.36.040(A)			

B. In the event the measured ambient noise level without the alleged offensive source in operation exceeds an applicable noise level standard in any category above, the applicable standard shall be adjusted so as to equal the ambient noise level.

C. Each of the noise level standards specified above shall be reduced by 5 dB for pure tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

Environmental Setting – Existing Ambient Noise Environment

Existing Land Uses in the Project Vicinity

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the primary intended use of the land. Places where people live, sleep, worship, and study are generally considered to be sensitive to noise because intrusive noise can be disruptive to these activities.

The existing noise-sensitive land uses which would potentially be affected by the project consist of residential uses. Specifically, single-family residential land uses are located to the south and east of the project area. Existing industrial uses are located to the north of the project, however these uses are not considered to be noise-sensitive, but rather noise-generating.

Existing Traffic Noise Levels along Project Area Roadway Network

The FHWA Traffic Noise Model (FHWA-RD-77-108) was used to develop existing noise contours expressed in terms of DNL for major roadways within the project study area. The FHWA Model predicts hourly L_{eq} values for free-flowing traffic conditions. Estimates of the hourly distribution of traffic for a typical 24-hour period were used to develop DNL values from L_{eq} values.

Traffic data in the form of AM and PM peak hour movements for existing (2021) conditions were obtained from the project traffic impact study prepared by VRPA Technologies, Inc. Average daily traffic (ADT) volumes were conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions. Using these data and the FHWA Model, traffic noise levels were calculated. The traffic noise level at 100 feet from the roadway centerline and distances from the centerlines of selected roadways to the 60 dB, 65 dB, and 70 dB DNL contours are summarized in Table 6. A complete listing of the FWHA Model inputs for existing conditions are provided as Appendix B.

In many cases, the actual distances to noise level contours may vary from the distances predicted by the FHWA Model. Factors such as roadway curvature, roadway grade, shielding from local topography or structures, elevated roadways, or elevated receivers may affect actual sound propagation. It is also recognized that existing sensitive land uses within the project vicinity are located at varying distances from the centerlines of the local roadway network. The 100-foot reference distance is utilized in this assessment to provide a reference position at which changes in existing and future traffic noise levels resulting from the project can be evaluated.

Table 6
Existing Traffic Noise Modeling Results

Seg.	Intersection	Direction	DNL 100 ft from Roadway	Distance to Contour (ft)		
				70 dB DNL	65 dB DNL	60 dB DNL
1	(1) SR-198 EB Ramps / Road 92	North	63	35	75	162
2		South	62	28	60	130
3		East	62	31	68	146
4		West	62	29	63	136
5	(2) SR-198 WB Ramps / Road 92	North	64	41	89	192
6		South	63	35	75	162
7		East	62	30	64	137
8		West	62	29	63	136
9	(3) Hillsdale Ave / Road 92	North	64	41	88	189
10		South	64	41	89	192
11		East	48	3	7	15
12		West	--	--	--	--
13	(4) School Ave / Road 92	North	64	40	86	185
14		South	64	41	87	188
15		East	44	2	4	9
16		West	--	--	--	--
17	(5) Hurley Ave / Road 92	North	63	33	70	151
18		South	64	40	86	185
19		East	57	13	28	61
20		West	--	--	--	--
21	(6) Allen Ave / Road 92	North	62	31	67	144
22		South	62	31	67	144
23		East	--	--	--	--
24		West	--	--	--	--
25	(7) Goshen Ave / Road 92	North	61	25	53	114
26		South	62	29	63	136
27		East	63	34	74	160
28		West	64	38	82	176
29	(8) Project Drvwy / Road 88	North	48	3	7	16
30		South	48	3	7	16
31		East	--	--	--	--
32		West	--	--	--	--
33	(9) Goshen Ave / Road 88	North	--	--	--	--
34		South	48	3	7	16
35		East	64	38	81	174
36		West	64	37	80	173

Blank cell = no traffic data was provided

Source: FHWA-RD-77-108 with inputs from VRPA. Appendix B contains FHWA model inputs.

Existing Overall Ambient Noise Environment within the Project Area

The existing ambient noise environment within the project area is defined primarily by traffic on Road 92 to the east, and by industrial operations from adjacent uses to the north. However, during evening hours, it was noted that noise generated by insects significantly contributed to the project area noise environment. To quantify the existing ambient noise environment at the project site, BAC conducted long-term (72-hour) noise level measurements at four (4) locations on the project site from August 28th to 31st, 2021. The noise survey locations are shown on Figure 1. Photographs of the noise level survey locations are provided in Appendix C.

Larson-Davis Laboratories (LDL) Model 820 and LxT precision integrating sound level meters were used to complete the noise level measurement survey. The meters were calibrated immediately before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy off the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

The results of the long-term ambient noise survey are shown numerically and graphically in Appendices D and E (respectively) and are summarized in Table 7.

Table 7
Summary of Long-Term Noise Survey Measurement Results – August 28-31, 2021[1]

			Average Measured Hourly Noise Levels, dBA					
			Daytime[3]			Nighttime[4]		
Description[2]	**Date**	**DNL**	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
Site 1: Northwest end of project adjacent to industrial uses	8/28-8/29	55	49	47	60	48	48	57
	8/29-8/30	56	48	46	60	50	50	57
	8/30-8/31	57	49	46	62	51	50	58
Site 2: Centrally located along the northern project boundary	8/28-8/29	63	60	59	64	56	53	62
	8/29-8/30	66	60	59	66	60	58	64
	8/30-8/31	66	61	60	67	59	58	64
Site 3: Northeast end of project adjacent to industrial uses	8/28-8/29	64	56	48	62	58	48	67
	8/29-8/30	65	56	48	66	59	52	68
	8/30-8/31	67	56	51	67	61	55	73
Site 4: Approximately 100' from centerline of Road 92	8/28-8/29	62	59	52	76	54	47	73
	8/29-8/30	66	60	53	77	59	52	74
	8/30-8/31	66	62	59	77	59	53	75

[1] Detailed summaries of the noise monitoring results are provided in Appendices D and E.
[2] Long-term noise survey locations are identified on Figure 1.
[3] Daytime hours: 7:00 a.m. to 10:00 p.m.
[4] Nighttime hours: 10:00 p.m. to 7:00 a.m.
Source: Bollard Acoustical Consultants, Inc. (2021)

Noise measurement sites 1 through 3 were specifically selected to capture operations noise levels from adjacent light industrial operations north of the project site. Noise measurement site 4 was specifically selected to be representative of the ambient traffic noise level environment at the project site from Road 92.

After close inspection of the collected ambient noise level data (Appendices D and E), it appears that the measured noise levels at the monitoring sites were significantly influenced by noise sources present during nighttime hours. Based on the proximity to Road 92, it is believed that the elevated measured levels at site 4 are likely attributed to nighttime traffic on the nearby roadway. In addition, the elevated nighttime noise levels at site 3 are believed to be attributable to insect activity within close proximity to the monitoring location. However, based on BAC field observations during setup of monitoring site 2, and subsequently confirmed in analysis of the measurement data, it is believed that the measured elevated daytime and nighttime noise levels at site 2 are attributed to stationary equipment operations on an adjacent industrial parcel to the immediate north of the site. Photographs of the stationary equipment area adjacent to site 2 are provided in Appendix C.

Impacts and Mitigation Measures

Thresholds of Significance

For the purposes of this report, a noise and vibration impact is considered significant if the project would result in:

- 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 other applicable standards of other agencies.
- Generation of excessive groundborne vibration or groundborne noise levels.
- 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, exposing people residing or working in the project area to excessive noise levels.

The following criteria based on standards established by the Federal Interagency Commission on Noise (FICON), Caltrans, Visalia General Plan and Municipal Code were used to evaluate the significance of environmental noise and vibration resulting from the project:

- A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the Visalia General Plan or Municipal Code.
- A significant impact would be identified if off-site traffic or on-site construction activities would substantially increase noise levels at existing sensitive receptors in the vicinity. A substantial increase would be identified relative to the FICON noise level increase significance criteria provided in Table 1.
- A significant impact would be identified if project construction activities would expose sensitive receptors to excessive groundborne vibration levels. Specifically, an impact would be identified if groundborne vibration levels due to these sources would exceed the Caltrans vibration impact criteria.

Noise Impacts Associated with Project-Generated Increases in Off-Site Traffic

With development of the project, traffic volumes on the local roadway network will increase. Those increases in daily traffic volumes will result in a corresponding increase in traffic noise levels at existing uses located along those roadways. The FHWA Model was used with traffic input data from the project traffic impact analysis prepared by VRPA to predict project-generated traffic noise level increases relative to Opening Year, 5-Year Horizon, 10-Year Horizon, and 20-Year Horizon project and no project conditions.

Impact 1: Increases in Opening Year Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for Opening Year and Opening Year Plus Project conditions in the project area roadway network were obtained from the project traffic impact study prepared by VRPA. Average daily traffic (ADT) volumes were conservatively estimated by applying a factor of 5 to the sum of weekday AM and PM peak hour conditions.

Predicted Opening Year versus Opening Year Plus Project traffic noise levels on the local roadway network are shown in Table 8. The following section includes an assessment of predicted traffic noise levels relative to the FICON increase significance noise criteria identified in Table 1. The data in Table 8 are provided in terms of DNL at a standard distance of 100 feet from the centerlines of the project-area roadways. Appendix B contains the FWHA Model inputs.

It should be noted that the FHWA Model predictions presented in Table 8 are based on inputs that include peak hour traffic volumes, day/night and truck type percentages (e.g., medium and heavy trucks), vehicle speed, and distance from roadway centerlines. The FHWA Model does not account for non-traffic ambient noise sources such as nearby wildlife (e.g., birds chipping) or other anthropogenic noise sources within an area (e.g., distant traffic from other roadways, recreational activities, commercial or industrial operations, etc.).

Table 8
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
Opening Year vs. Opening Year Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			OY	OY+P	Increase	
1	(1) SR-198 EB Ramps / Road 92	North	63.8	64.1	0.3	No
2		South	62.1	62.1	0.0	No
3		East	63.2	63.7	0.5	No
4		West	62.7	62.9	0.2	No
5	(2) SR-198 WB Ramps / Road 92	North	65.1	65.5	0.4	No
6		South	63.8	64.1	0.3	No
7		East	62.9	63.4	0.5	No
8		West	62.6	62.9	0.3	No
9	(3) Hillsdale Ave / Road 92	North	64.9	65.3	0.4	No
10		South	65.1	65.5	0.4	No
11		East	49.7	49.7	0.0	No
12		West	--	--	--	--
13	(4) School Ave / Road 92	North	64.8	65.2	0.4	No

Table 8
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
Opening Year vs. Opening Year Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			OY	OY+P	Increase	
14		South	64.9	65.3	0.4	No
15		East	44.1	44.1	0.0	No
16		West	--	--	--	--
17	(5) Hurley Ave / Road 92	North	63.5	63.9	0.4	No
18		South	64.8	65.2	0.4	No
19		East	57.7	57.9	0.2	No
20		West	--	--	--	--
21	(6) Allen Ave / Road 92	North	63.2	63.3	0.1	No
22		South	63.2	63.7	0.5	No
23		East	--	--	--	--
24		West	--	50.2	50.2	Yes
25	(7) Goshen Ave / Road 92	North	61.8	61.8	0.0	No
26		South	62.9	63.0	0.1	No
27		East	63.4	63.5	0.1	No
28		West	64.5	64.5	0.0	No
29	(8) Project Drvwy / Road 88	North	47.9	49.7	1.8	No
30		South	47.9	47.9	0.0	No
31		East	--	40.5	40.5	Yes
32		West	--	--	--	--
33	(9) Goshen Ave / Road 88	North	--	--	--	--
34		South	53.8	54.3	0.5	No
35		East	64.1	64.2	0.1	No
36		West	64.2	64.2	0.0	No

Blank cell = no data was provided in traffic study
Source: FHWA-RD-77-108 with inputs from VRPA. Appendix B contains the FHWA Model inputs.

As stated previously, the FHWA Model does not account for non-traffic ambient noise sources such as nearby wildlife or other anthropogenic noise sources within an area. Consideration of such sources typically results in higher ambient noise levels (i.e., existing no project) than those predicted by the FHWA Model alone.

As indicated in Table 8, the proposed project's contribution to traffic noise level increases is predicted to exceed applicable FICON increase significance criteria along two (2) of the roadway segments evaluated in the Opening Year conditions analysis – segments 24 and 31, which are access points to the development located on the project site. Specifically, the traffic noise level increases along roadway segments 24 and 31 are calculated to be approximately 50 dB DNL and to 41 dB DNL, respectively.

As discussed above, baseline (no project) ambient conditions are considerably higher than baseline traffic noise levels alone. When project traffic noise generation is conservatively compared to the lowest measured ambient day-night average (DNL) levels within the vicinity of roadway segment 24 on the project site (62 dB DNL at site 4), the project-generated traffic noise level increase along the roadway segment is calculated be less than 1 dB DNL (0.3 dB DNL).

Similarly, when project traffic noise generation is conservatively compared to the lowest measured ambient day-night average (DNL) levels within the vicinity of roadway segment 31 on the project site (55 dB DNL at site 1), the project-generated traffic noise level increase along the roadway segment is also calculated be less than 1 dB DNL (0.2 dB DNL). This is a more accurate representation of actual project-related noise level increases than the "traffic-only" noise increases shown in Table 8. Thus, project-related increases in traffic noise levels would not substantially exceed measured ambient noise conditions in the project area relative to the applicable FICON increase significance criteria.

Finally, although existing residential uses were not identified within 100 feet from the centerline of roadway segments 24 and 31, it should be noted that the predicted Opening Year Plus Project traffic noise levels of approximately 50 dB DNL and 41 dB DNL at 100 feet along the segments is well below the Visalia General Plan exterior noise level standard of 65 dB DNL applicable to transportation noise sources affecting residential uses.

Based on the analysis presented above, including consideration of measured existing ambient noise conditions within the project area, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (Opening Year vs. Opening Year Plus Project conditions) are identified as being ***less than significant***.

Impact 2: Increases in 5-Year Horizon Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for 5-Year Horizon and 5-Year Horizon Plus Project conditions in the project area roadway network were obtained from the project traffic impact study prepared by VRPA. Average daily traffic (ADT) volumes were conservatively estimated by applying a factor of 5 to the sum of weekday AM and PM peak hour conditions.

Predicted 5-Year Horizon and 5-Year Horizon Plus Project traffic noise levels on the local roadway network are shown in Table 9. The following section includes an assessment of predicted traffic noise levels relative to the FICON increase significance noise criteria identified in Table 1. The data in Table 9 are provided in terms of DNL at a standard distance of 100 feet from the centerlines of the project-area roadways. Appendix B contains the FWHA Model inputs.

Table 9
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
5-Year Horizon vs. 5-Year Horizon Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			5YH	5YH+P	Increase	
1	(1) SR-198 EB Ramps / Road 92	North	64.2	64.4	0.2	No
2		South	62.5	62.5	0.0	No
3		East	63.5	64.0	0.5	No
4		West	63.1	63.3	0.2	No
5	(2) SR-198 WB Ramps / Road 92	North	65.5	65.8	0.3	No
6		South	64.2	64.5	0.3	No
7		East	63.3	63.7	0.4	No
8		West	63.0	63.3	0.3	No

Table 9
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
5-Year Horizon vs. 5-Year Horizon Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			5YH	5YH+P	Increase	
9	(3) Hillsdale Ave / Road 92	North	65.3	65.6	0.3	No
10		South	65.5	65.8	0.3	No
11		East	50.0	50.0	0.0	No
12		West	--	--	--	--
13	(4) School Ave / Road 92	North	65.2	65.5	0.3	No
14		South	65.3	65.6	0.3	No
15		East	44.6	44.6	0.0	No
16		West	--	--	--	--
17	(5) Hurley Ave / Road 92	North	63.9	64.3	0.4	No
18		South	65.2	65.5	0.3	No
19		East	58.0	58.2	0.2	No
20		West	--	--	--	--
21	(6) Allen Ave / Road 92	North	63.7	63.7	0.0	No
22		South	63.7	64.1	0.4	No
23		East	--	--	--	--
24		West	--	50.2	50.2	Yes
25	(7) Goshen Ave / Road 92	North	62.2	62.2	0.0	No
26		South	63.3	63.3	0.0	No
27		East	63.8	63.9	0.1	No
28		West	64.8	64.9	0.1	No
29	(8) Project Drvwy / Road 88	North	48.4	50.0	1.6	No
30		South	48.4	48.4	0.0	No
31		East	--	40.5	40.5	Yes
32		West	--	--	--	--
33	(9) Goshen Ave / Road 88	North	--	--	--	--
34		South	53.9	54.4	0.5	No
35		East	64.5	64.6	0.1	No
36		West	64.6	64.7	0.1	No

Blank cell = no data was provided in traffic study
Source: FHWA-RD-77-108 with inputs from VRPA. Appendix B contains the FHWA Model inputs.

As indicated in Table 9, the proposed project's contribution to traffic noise level increases is predicted to exceed applicable FICON increase significance criteria along two (2) of the roadway segments evaluated in the 5-Year Horizon conditions analysis – segments 24 and 31, which are access points to the development located on the project site. Specifically, the traffic noise level increases along roadway segments 24 and 31 are calculated to be approximately 50 dB DNL and to 41 dB DNL, respectively.

As discussed previously, baseline (no project) ambient conditions are considerably higher than baseline traffic noise levels alone. When project traffic noise generation is conservatively compared to the lowest measured ambient day-night average (DNL) levels within the vicinity of roadway segment 24 on the project site (62 dB DNL at site 4), the project-generated traffic noise level increase along the roadway segment is calculated be less than 1 dB DNL (0.3 dB DNL).

Similarly, when project traffic noise generation is conservatively compared to the lowest measured ambient day-night average (DNL) levels within the vicinity of roadway segment 31 on the project site (55 dB DNL at site 1), the project-generated traffic noise level increase along the roadway segment is also calculated be less than 1 dB DNL (0.2 dB DNL). This is a more accurate representation of actual project-related noise level increases than the "traffic-only" noise increases shown in Table 9. Thus, project-related increases in traffic noise levels would not substantially exceed measured ambient noise conditions in the project area relative to the applicable FICON increase significance criteria.

Finally, although existing residential uses were not identified within 100 feet from the centerline of roadway segments 24 and 31, it should be noted that the predicted 5-Year Horizon Plus Project traffic noise levels of approximately 50 dB DNL and 41 dB DNL at 100 feet along the segments is well below the Visalia General Plan exterior noise level standard of 65 dB DNL applicable to transportation noise sources affecting residential uses.

Based on the analysis presented above, including consideration of measured existing ambient noise conditions within the project area, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (5-Year Horizon vs. 5-Year Horizon Plus Project conditions) are identified as being ***less than significant***.

Impact 3: Increases in 10-Year Horizon Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for 10-Year Horizon and 10-Year Horizon Plus Project conditions in the project area roadway network were obtained from the project traffic impact study prepared by VRPA. Average daily traffic (ADT) volumes were conservatively estimated by applying a factor of 5 to the sum of weekday AM and PM peak hour conditions.

Predicted 10-Year Horizon and 10-Year Horizon Plus Project traffic noise levels are shown in Table 10. It should be noted that 10-Year Horizon conditions were only evaluated for Road 92 and SR-198 intersections in the project traffic impact study. The following section includes an assessment of predicted traffic noise levels relative to the FICON increase significance noise criteria identified in Table 1. The data in Table 10 are provided in terms of DNL at a standard distance of 100 feet from the centerlines of the project-area roadways. Appendix B contains the FWHA Model inputs.

Table 10
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
10-Year Horizon vs. 10-Year Horizon Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			10YH	10YH+P	Increase	
1	(1) SR-198 EB Ramps / Road 92	North	64.7	64.9	0.2	No
2		South	63.0	63.1	0.1	No
3		East	64.0	64.4	0.4	No
4		West	63.6	63.7	0.1	No
5	(2) SR-198 WB Ramps / Road 92	North	66.0	66.3	0.3	No
6		South	64.7	64.9	0.2	No
7		East	63.8	64.1	0.3	No
8		West	63.6	63.8	0.2	No

Blank cell = no data was provided in traffic study
Source: FHWA-RD-77-108 with inputs from VRPA. Appendix B contains the FHWA Model inputs.

As indicated in Table 10, the proposed project's contribution to traffic noise level increases is predicted to satisfy the applicable FICON increase significance criteria along all the roadway segments evaluated in the 10-Year Horizon conditions analysis. As a result, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (10-Year Horizon vs. 10-Year Horizon Plus Project conditions) are identified as being ***less than significant***.

Impact 4: Increases in 20-Year Horizon Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for 20-Year Horizon and 20-Year Horizon Plus Project conditions in the project area roadway network were obtained from the project traffic impact study prepared by VRPA. Average daily traffic (ADT) volumes were conservatively estimated by applying a factor of 5 to the sum of weekday AM and PM peak hour conditions.

Predicted 20-Year Horizon and 20-Year Horizon Plus Project traffic noise levels are shown in Table 11. It should be noted that 20-Year Horizon conditions were only evaluated for Road 92 and SR-198 intersections in the project traffic impact study. The following section includes an assessment of predicted traffic noise levels relative to the FICON increase significance noise criteria identified in Table 1. The data in Table 11 are provided in terms of DNL at a standard distance of 100 feet from the centerlines of the project-area roadways. Appendix B contains the FWHA Model inputs.

Table 11
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
20-Year Horizon vs. 20-Year Horizon Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			20YH	20YH+P	Increase	
1	(1) SR-198 EB Ramps / Road 92	North	65.6	65.8	0.2	No
2		South	64.0	64.0	0.0	No
3		East	64.9	65.3	0.4	No
4		West	64.5	64.6	0.1	No
5	(2) SR-198 WB Ramps / Road 92	North	66.8	67.1	0.3	No
6		South	65.6	65.8	0.2	No
7		East	64.6	64.9	0.3	No
8		West	64.4	64.6	0.2	No

Blank cell = no data was provided in traffic study
Source: FHWA-RD-77-108 with inputs from VRPA. Appendix B contains the FHWA Model inputs.

As indicated in Table 11, the proposed project's contribution to traffic noise level increases is predicted to satisfy the applicable FICON increase significance criteria along all the roadway segments evaluated in the 20-Year Horizon conditions analysis. As a result, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (20-Year Horizon vs. 20-Year Horizon Plus Project conditions) are identified as being ***less than significant***.

Noise Impacts Associated with Project On-Site Construction Activities

Impact 5: Project Construction Noise Levels at Existing Residential Uses

During project construction, heavy equipment would be used for grading excavation, paving, and building construction, which would increase ambient noise levels when in use. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Noise exposure at any single point outside the project work area would also vary depending upon the proximity of equipment activities to that point. The nearest existing sensitive uses (residential) are located approximately 30 feet away from where construction activities could occur within the project area.

Table 12 includes the range of maximum noise levels for equipment commonly used in general construction projects at full-power operation at a distance of 50 feet. Not all of these construction activities would be required of this project. The Table 12 data also include predicted maximum equipment noise levels at the nearest existing residential uses located 30 feet away, which assumes a standard spherical spreading loss of 6 dB per doubling of distance.

Table 12
Construction Equipment Reference and Projected Noise Levels Noise Levels

Equipment Description	Maximum Noise Level at 50 Feet (dB)	Predicted Maximum Noise Level at 30 Feet (dB)
Air compressor	80	84
Backhoe	80	84
Ballast equalizer	82	86
Ballast tamper	83	87
Compactor	82	86
Concrete mixer	85	89
Concrete pump	82	86
Concrete vibrator	76	80
Crane, mobile	83	87
Dozer	85	89
Excavator	85	89
Generator	82	86
Grader	85	89
Impact wrench	85	89
Loader	80	84
Paver	85	89
Pneumatic tool	85	89
Pump	77	81
Saw	76	80
Scarifier	83	87
Scraper	85	89
Shovel	82	86
Spike driver	77	81
Tie cutter	84	88
Tie inserter	85	89
Truck	84	88

Source: Federal Transit Administration Noise and Vibration Impact Assessment Manual, Table 7-1 (2020)

Based on the equipment noise levels in Table 12, worst-case on-site project construction equipment noise levels at the nearest residential uses located 30 feet away are expected to range from approximately 80 to 89 dB. Thus, it is possible that a portion of the project construction equipment could result in substantial short-term increases over ambient maximum noise levels at nearby existing residential uses. Further, it is possible that those noise levels could exceed the applicable Visalia General Plan and Municipal Code noise level limits.

As mentioned previously, not all of the construction equipment/activities presented in Table 12 would be required of this project. Nonetheless, because project construction activities would result in short-term periods of elevated ambient noise levels in the immediate project vicinity, and because engineering techniques may not be practical in addressing noise attenuation for some equipment types, the following noise abatement measures should be incorporated into project construction operations to reduce the potential for adverse reaction at nearby existing residences:

- Pursuant to Visalia Municipal Code Section 8.36.050(C), the operation of construction equipment including jackhammers, portable generators, pneumatic equipment, trenchers, or other such equipment shall not be operated on the project site between the weekday hours of 7:00 p.m. and 6:00 a.m., and between the weekend hours of 7:00 p.m. and 9:00 a.m.

- All noise-producing project equipment and vehicles using internal-combustion engines shall be equipped with manufacturers-recommended mufflers and be maintained in good working condition.
- All mobile or fixed noise-producing equipment used on the project site that are regulated for noise output by a federal, state, or local agency shall comply with such regulations while in the course of project activity.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion-powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise-sensitive receptors.
- Project area and site access road speed limits shall be established and enforced during the construction period.
- Nearby residences shall be notified of construction schedules so that arrangements can be made, if desired, to limit their exposure to short-term increases in ambient noise levels.

Provided that the project implements the above recommended construction noise measures, adverse construction noise impacts are not expected for this project, and this impact is identified as being ***less than significant***.

Vibration Impacts Associated with Project Activities

Impact 6: Project Construction and Operations Vibration at Existing Sensitive Uses

During project construction, heavy equipment would be used for grading, excavation, paving, and building construction, which would generate localized vibration in the immediate vicinity of the construction. The nearest existing sensitive receptors have been identified as residential structures located approximately 30 feet from construction activities which would occur within the project area. Table 13 includes the range of vibration levels for equipment commonly used in general construction projects at a distance of 25 feet. The Table 13 data also include projected equipment vibration levels at the nearest existing residences to the project area located approximately 30 feet away.

Table 13
Vibration Source Levels for Construction Equipment and Projected Levels at 30 Feet

Equipment	Maximum Vibration Level at 25 Feet (PPV)[1]	Predicted Maximum Vibration Level at 30 Feet (PPV)
Vibratory roller	0.210	0.160
Hoe ram	0.089	0.068
Large bulldozer	0.089	0.068
Caisson drilling	0.089	0.068
Loaded trucks	0.076	0.058
Jackhammer	0.035	0.027
Small bulldozer	0.003	0.002

[1] PPV = Peak Particle Velocity
Source: 2020 FTA Transit Noise and Vibration Impact Assessment Manual and BAC calculations

As shown in Table 13, vibration levels generated from on-site construction activities at the nearest existing sensitive structures located approximately 30 feet away (residences) are predicted to be below the strictest Caltrans thresholds for damage to residential structures of 0.30 in/sec PPV shown in Table 2. Further, construction activities are not expected to result in adverse human response relative to the vibration annoyance criteria as defined by Caltrans in Table 3. Therefore, on-site construction within the project area is not expected to result in excessive groundborne vibration levels at nearby existing sensitive uses.

During a site visit on August 27th, 2021, vibration levels were below the threshold of perception at the project site. Based on those observations, it is believed that existing vibration levels at the project site are well below the strictest Caltrans thresholds for damage to structures and thresholds for annoyance. Therefore, it is expected that the project would not result in the exposure of persons to excessive groundborne vibration levels at proposed uses of the project.

Finally, the project proposes the development of residential uses. It is the experience of BAC that residential uses do not typically have equipment that generates appreciable vibration. Further, it is our understanding that the project does not propose equipment that will produce appreciable vibration.

Because vibration levels due to and upon the proposed project are expected to satisfy the applicable Caltrans groundborne impact vibration criteria, this impact is identified as being ***less than significant***.

Noise Impacts Upon the Development

The California Supreme Court issued an opinion in *California Building Industry Association v. Bay Area Air Quality Management District (2015)* holding that CEQA is primarily concerned with the impacts of a project on the environment and generally does not require agencies to analyze the impact of existing conditions on a project's future users or residents. Nevertheless, the City of Visalia has policies that address existing/future conditions affecting the proposed project, which are discussed in the following section. The following section includes assessments of future traffic, industrial, and construction-related noise exposure at proposed noise-sensitive receptors (residential) within the project area and recommended improvement measures to ensure consistency with City noise requirements.

Impact 7: Future Exterior Traffic Noise at Proposed Residential Uses

The FHWA Model was used with future traffic data to predict future Road 88 and Road 92 traffic noise levels at the proposed residential uses of the development. Future traffic volume data for the roadways were obtained from the project traffic impact study prepared by VRPA Technologies, Inc. (*Iron Ridge Residential Development Traffic Impact Study, December 13, 2021*). The day/night distribution, truck percentages, and traffic speeds for the roadways were derived from BAC file data for similar roadways and field observations. The FHWA Model inputs and predicted future traffic noise levels at the project site are provided in Appendix F and are summarized in Table 14.

It should be noted that the project traffic impact study contains future traffic conditions for Opening Year (2022), 5-Year Horizon, 10-Year Horizon, and 20-Year Horizon project and no project scenarios. However, future traffic data for segments of Road 88 and Road 92 adjacent to the project site are not included in the 10-Year Horizon or 20-Year Horizon forecasts. As a result, traffic data for the 5-Year Horizon Plus Project scenario was utilized in the prediction of future Road 88 and Road 92 traffic noise levels at the project site.

Table 14
Predicted Future Exterior Traffic Noise Levels at the Project Site

Roadway	Receiver Description	Predicted Noise Level, DNL (dB)[1,2]
Road 88	Nearest backyards	59
	Nearest first-floor building facades	58
	Nearest upper-floor building facades	60
Road 92	Nearest backyards	68
	Nearest first-floor building facades	67
	Nearest upper-floor building facades	69

[1] A complete listing of FHWA Model inputs for future traffic noise levels are provided as Appendix F.
[2] An offset of +2 dB was applied at upper-floor locations due to reduced ground absorption of sound at elevated positions.

As indicated in Table 14, future Road 88 traffic noise level exposure is predicted to satisfy the applicable Visalia General Plan 65 dB DNL exterior noise level standard at the nearest single-family residential outdoor activity areas (backyards) proposed within the development. However, future Road 92 traffic noise level exposure is predicted to exceed the General Plan 65 dB DNL exterior noise level standard at the nearest backyards.

However, the project site plans indicate that a 6-foot-tall block (masonry) wall is proposed to be constructed along residential lots adjacent to Road 92. The location of the proposed wall is illustrated on Figure 2. The results presented in Table 15 contain predicted future Road 92 traffic noise levels at proposed ground level locations with consideration of the noise attenuation that would be provided by the proposed 6-foot-tall wall. Barrier insertion loss calculation worksheets are provided as Appendix G. Because elevated upper-floor building facades of the residences constructed adjacent to Road 92 would not receive shielding from the proposed 6-foot-tall wall, attenuated noise levels for those locations were not included in Table 15.

Table 15
Predicted Future Exterior Road 92 Traffic Noise Levels with Proposed 6' Wall

Roadway	Receiver Description	Predicted Noise Level, DNL (dB)[1]
Road 92	Nearest backyards	62
	Nearest first-floor building facades	61

[1] Barrier insertion loss calculation worksheets are provided as Appendix G.

The Table 15 data indicate that future Road 92 traffic noise level exposure at the backyards proposed nearest to the roadway is predicted to comply with the Visalia General Plan 65 dB DNL exterior noise level standard, including consideration of the shielding that would be provided by the proposed 6-foot-tall wall at the location illustrated on Figure 2. Provided that proposed 6-foot-tall wall is constructed at the location shown in Figure 2, no further consideration of Road 92 traffic noise reduction measures would be warranted for the project relative to the General Plan 65 dB DNL exterior noise level limit.

It should be noted that the barrier analysis for the proposed 6-foot-tall wall provided in this report assumes that the difference in elevation between the roadway and proposed adjacent residential lots are within ± 2 feet. Should a difference greater than ± 2 feet be present, an additional analysis would be warranted. Nonetheless, the barrier height is relative to lot or roadway elevation, whichever is greater.

Impact 8: Future Interior Traffic Noise within Proposed Residential Uses

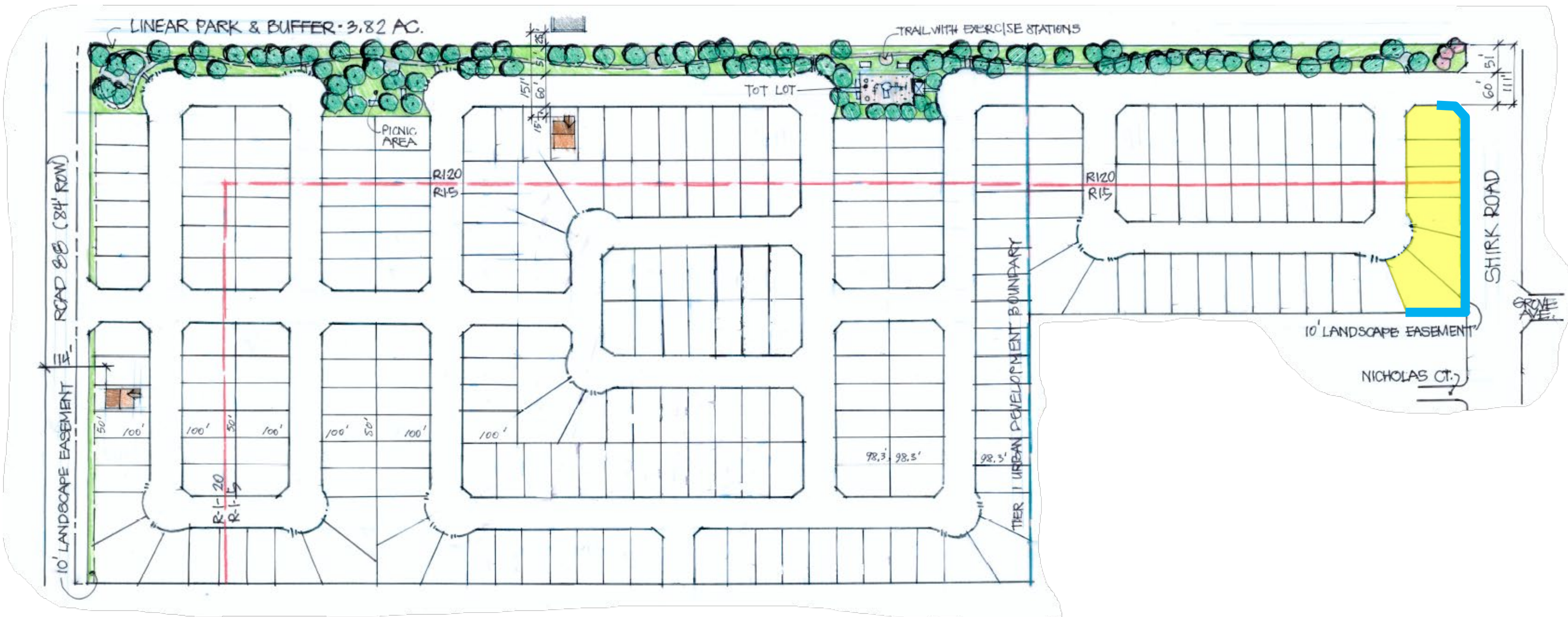
As indicated in Table 14 of Impact 7, future Road 88 traffic noise level exposure is predicted to be 58 dB DNL at the nearest first-floor building facades proposed within the development. Due to reduced ground absorption of sound at elevated positions, noise levels at the upper-floor facades of those residences are predicted to approach 60 dB DNL. Additionally, after consideration of shielding that would be provided by the proposed 6-foot-tall traffic noise barrier as indicated in Figure 2, future Road 92 traffic noise level exposure is calculated to be reduced to 61 dB DNL at the nearest first-floor building facades to the roadway (Table 15 of Impact 7). Due to reduced ground absorption of sound at elevated positions, and lack of shielding provided by the proposed traffic noise barrier, noise levels at the upper-floor facades of those residences are predicted to approach 69 dB DNL.

To satisfy the Visalia General Plan 45 dB DNL interior noise level standard, minimum noise reductions of 13 and 15 dB would be required of the first- and upper-floor building facades (respectively) of residences constructed nearest to Road 88. Further, minimum noise reductions of 17 and 24 dB would be needed for compliance within the first- and upper-floor interior areas (respectively) of residences constructed nearest to Road 92.

Standard residential construction (i.e., stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), *typically* results in an exterior to interior noise reduction of approximately 25 dB with windows closed and approximately 15 dB with windows open. This level of noise reduction would be adequate to reduce future Road 88 traffic noise exposure to 45 dB DNL or less within the first- and upper-floors of all residences constructed within the development. Standard residential construction is also expected to be adequate to reduce future Road 92 traffic noise levels to 45 dB DNL or less within the first-floors of all residences within the development but would fail to provide for a factor of safety within the upper-floors of the closest residences to the roadway.

To satisfy the General Plan 45 dB DNL interior noise level standard *including* a factor of safety, it is recommended that the upper-floor window assemblies of residences from which a view of Road 92 would be present (i.e., north-, east- and south-facing windows) be upgraded to a minimum STC rating of 32. The locations of the window construction upgrades are illustrated on Figure 4. In addition, it is recommended that mechanical ventilation (air conditioning) be provided for all residences within the development to allow the occupants to close doors and windows as desired for additional acoustical isolation.

Light-Industrial Uses



Legend

Proposed 6' Traffic Noise Barrier

Recommended Window Construction Upgrades: STC-32 (Upper-Floors Only)

N

Scale (Feet)

0 100 200

Iron Ridge Development I & II

Visalia, California

Recommended Window Assembly Upgrades

Figure 4

BOLLARD Acoustical Consultants

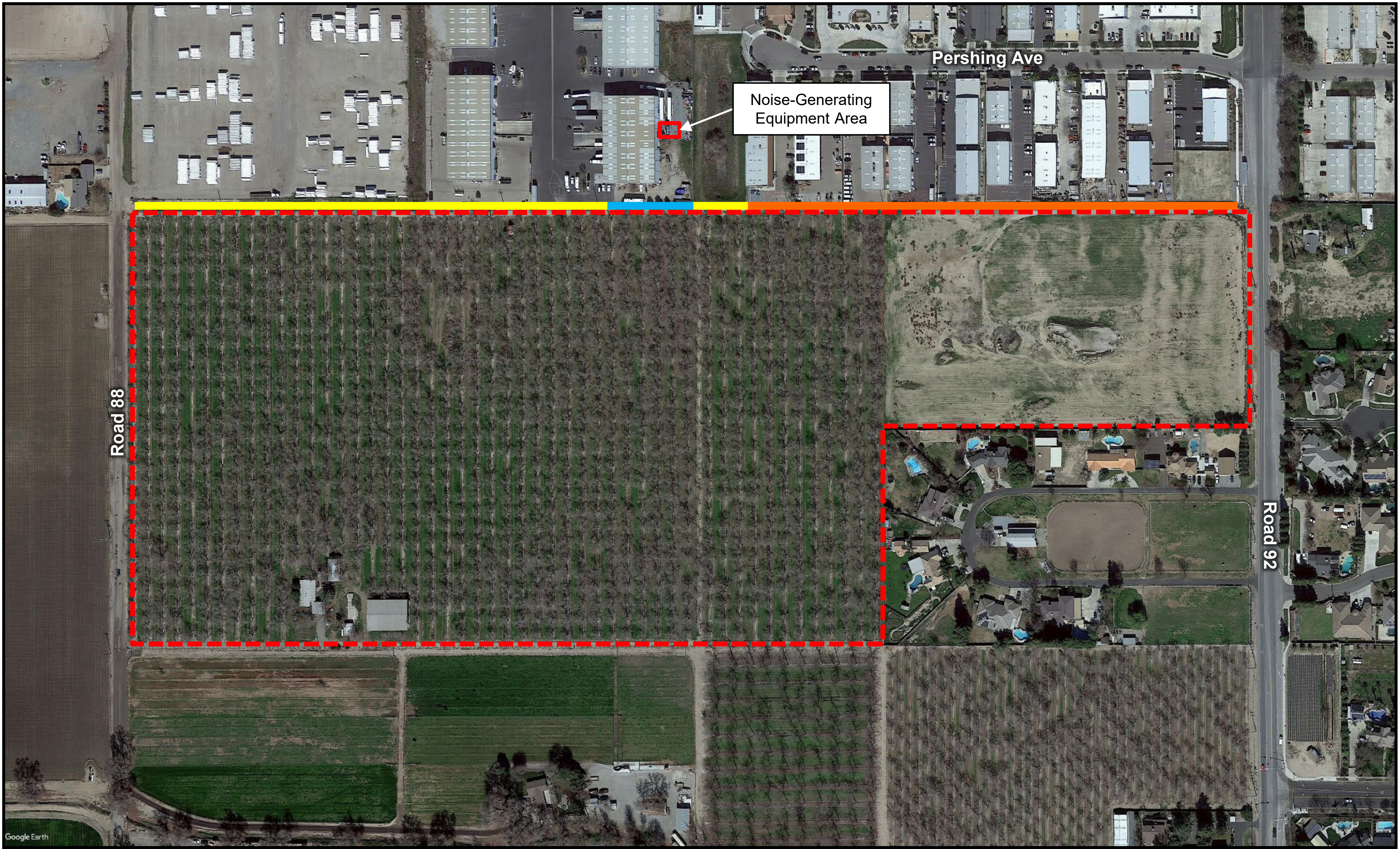
Impact 9: Industrial Operations Noise at Proposed Residential Uses

Existing light industrial uses are located to the north of the proposed development. According to BAC field observations, the industrial uses consist primarily of storage yards, warehouse and loading docks, stationary equipment, and parking areas. The locations of the industrial uses are shown on Figure 1. BAC field observations also noted that existing CMU walls ranging from 6 to 8-feet in height are constructed along portions of the northern project property boundary. Chain-link fencing is constructed along the remaining portions of the northern project property line. The approximate locations of the existing CMU walls and chain-link fencing are illustrated on Figures 5 and 6. Photographs of existing walls and fencing are provided in Appendix C.

Noise measurement sites 1 through 3 were selected to quantify the existing ambient noise level environment along the northern project property line, including noise levels associated with adjacent existing industrial operations. As discussed previously, average measured hourly noise levels at the monitoring locations exceeded the General Plan/Municipal Code daytime and nighttime exterior noise level standards for non-transportation (stationary) noise sources. After close inspection of the collected ambient noise level data (Appendices D and E), it appears that the measured noise levels at the monitoring sites were significantly influenced by noise sources present during nighttime hours. For example, the elevated nighttime noise levels at site 3 are believed to be attributable to insect activity within close proximity to the monitoring location. However, based on BAC field observations during setup of noise monitoring site 2, and subsequently confirmed in analysis of the measurement data, it is believed that the measured elevated daytime and nighttime noise levels at site 2 are attributed to stationary equipment operations on an adjacent industrial parcel to the immediate north of the site. The location of the noise-generating stationary equipment area is shown on Figure 5. Photographs of the equipment area adjacent to site 2 are provided in Appendix C.

BAC staff conducted noise level measurements of the identified stationary equipment while in operation during a site visit on August 28th, 2021. According to the data, noise from the equipment area was measured to be approximately 63 dB at 180 feet with an unshielded view of the equipment area. However, equipment noise was measured to be approximately 54 dB at 180 feet (or 9 dB lower) when measured from behind a nearby existing 8-foot-tall CMU wall. Photographs of the noise meter and associated readings during the equipment noise measurements are provided in Appendix C.

Based on the measured equipment area reference noise level of 63 dB at 180 feet, and assuming standard spherical spreading loss (-6 dB per doubling of distance from a stationary noise source), noise level exposure associated with the identified equipment area was projected to be approximately 58 dB at the property line of the nearest single-family residence proposed within the development. Because sound from the stationary equipment is identified as being steady state in nature, noise from the equipment area would be most appropriately assessed relative to Visalia General Plan hourly average (L_{eq}) and Municipal Code median (L_{50}) noise level standards. The projected equipment area noise level of 58 dB L_{eq}/L_{50} at the property line of the nearest proposed residence within the development would exceed the General Plan and Municipal Code daytime and nighttime noise level standards of 50 dB L_{eq}/L_{50} and 45 dB L_{eq}/L_{50}, respectively.

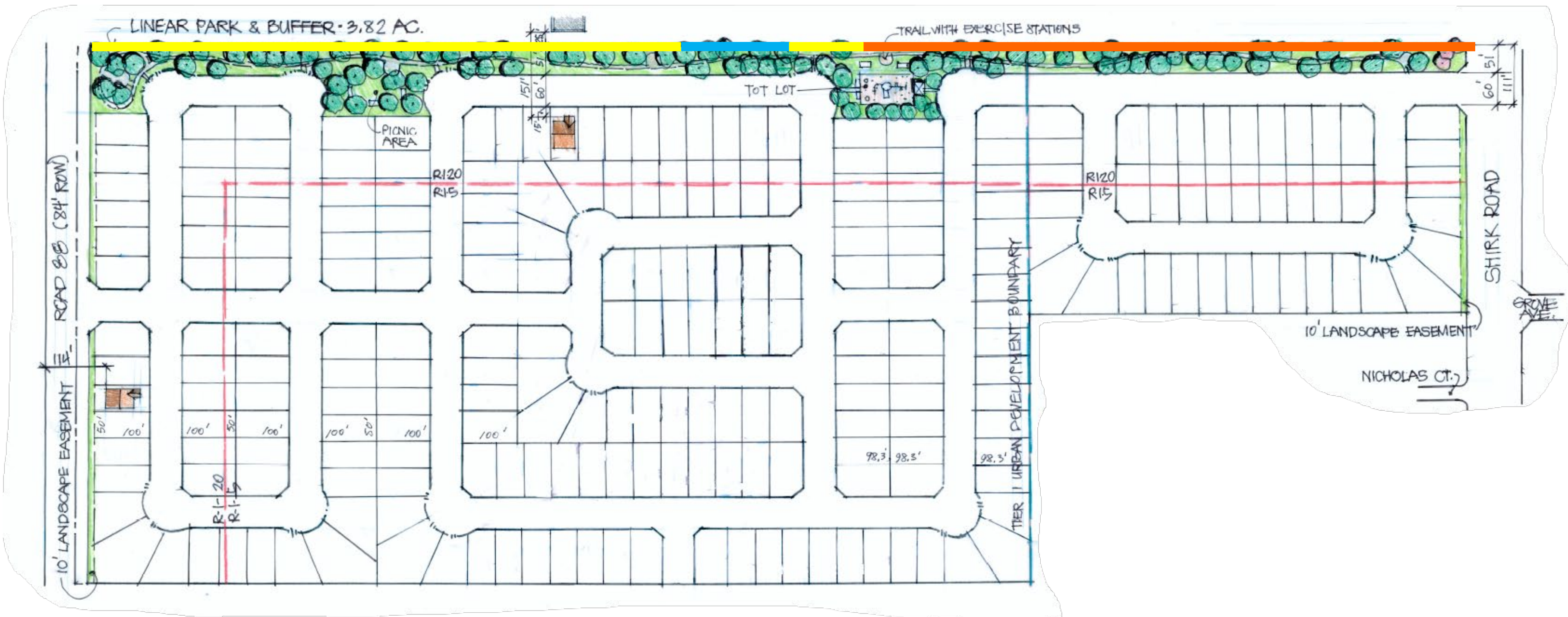


Iron Ridge Development I & II
Visalia, California

Aerial with Existing CMU Walls & Fencing

Figure 5

BOLLARD Acoustical Consultants



Legend

- Existing 6' CMU Wall (Approximate)
- Existing 8' CMU Wall (Approximate)
- Existing Chain-Link Fence (Approximate)

N

Scale (Feet)

0 100 200

Iron Ridge Development I & II

Visalia, California

Site Plan with Existing CMU Walls & Fencing

Figure 6

BOLLARD Acoustical Consultants

Satisfaction of the City's 45 dB L_{eq}/L_{50} nighttime noise level standard at the project site would ensure satisfaction of the City's less restrictive daytime noise level limit of 50 dB L_{eq}/L_{50} at the development.

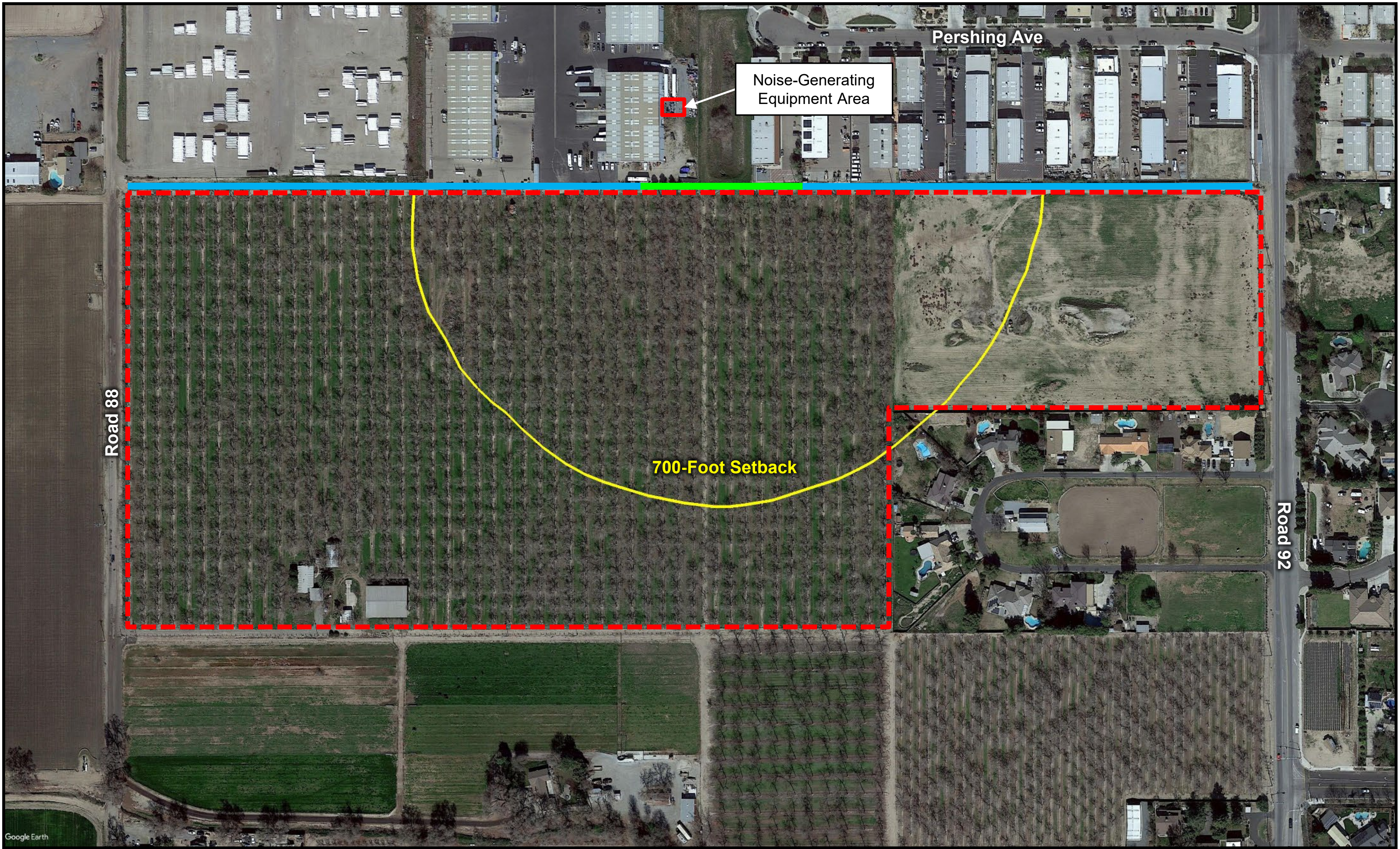
To reduce noise level exposure from the identified stationary equipment at the project site, the effectiveness of the screening provided by a solid noise barrier (CMU wall) along the northern project property boundary was evaluated. The evaluation concluded that a wall having a minimum height of 20 feet would be required along a 400+ foot section of the property line to satisfy the City's 45 dB L_{eq}/L_{50} nighttime noise level standard at the property line of the nearest proposed residential uses. However, the construction of such wall is believed to be an infeasible measure for the project. To comply with the City's 45 dB L_{eq}/L_{50} nighttime noise level standard at the nearest proposed residential uses, one of the following two options (improvement measures) is recommended:

Option 1

a. The project developer should construct a continuous CMU wall ranging from 8 to 12-feet in height at the locations illustrated on Figure 7. This improvement measure would include removal and replacement of existing chain-link fencing with CMU wall and increasing existing CMU wall heights to the indicated heights shown in Figures 7 and 8.
b. In addition to Option 1a above, the project developer should ensure that the residential lots proposed within the development have a minimum setback of 700 feet from the recommended 12-foot wall shown on Figures 7 and 8. The contoured lot setback distance of 700 feet is illustrated on Figure 7.

Option 2

a. The project developer should construct a continuous CMU wall having a minimum height of 8-feet along the northern project property boundary, as indicated on Figure 9. This improvement measure would include removal and replacement of existing chain-link fencing with CMU wall and increasing existing CMU wall heights to 8-feet (where applicable).
b. In addition to Option 2a above, a localized noise barrier should be constructed around the identified equipment area adjacent to BAC monitoring site 2. The location of the stationary equipment area is illustrated on Figure 10. Specifically, the project developer should coordinate with the owner of the adjacent industrial use in the installation a localized noise barrier around the identified stationary equipment on the property. It is estimated that a localized noise barrier would need to be a minimum of 10-feet in height, however a specific noise assessment would need to be completed by a qualified acoustical consultant to determine the ultimate height required for compliance. The benefits of a barrier located immediately adjacent to noise source in question would be that a barrier at that location would be more effective in reducing noise, less of a visual impact, and considerably more cost effective to implement. In addition, it would negate the requirement of a taller barrier along a portion of the property line (i.e., 12 feet), thereby affording a uniform 8-foot tall barrier along the northern property line.



Legend

- Project Boundary (Approximate)
- Recommended 8' CMU Wall (Approximate)
- Recommended 12' CMU Wall (Approximate)
- Recommended 700-Foot Lot Setback

N

Scale (Feet)

0 150 300

Iron Ridge Development I & II
Visalia, California

Industrial Noise Reduction – Option 1a & 1b

Figure 7

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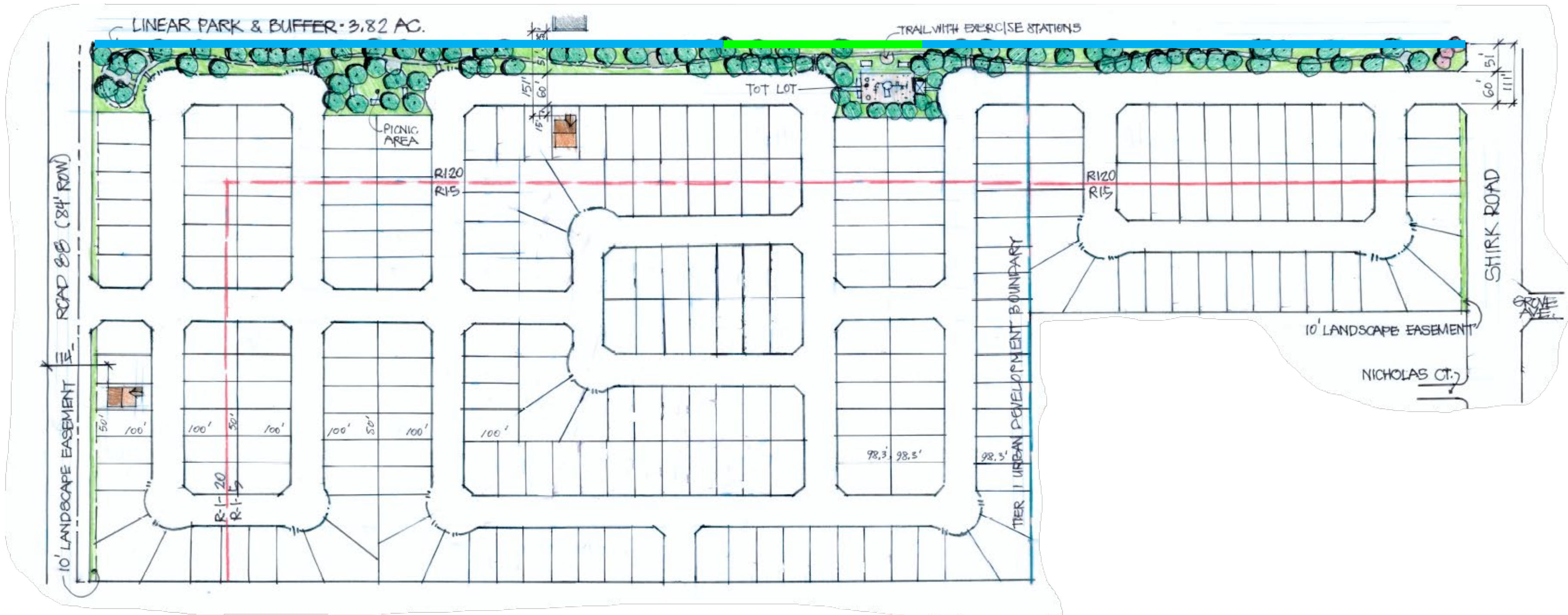


Legend

Recommended 8' CMU Wall (Approximate)

Recommended 12' CMU Wall (Approximate)

N

Scale (Feet)

0 100 200

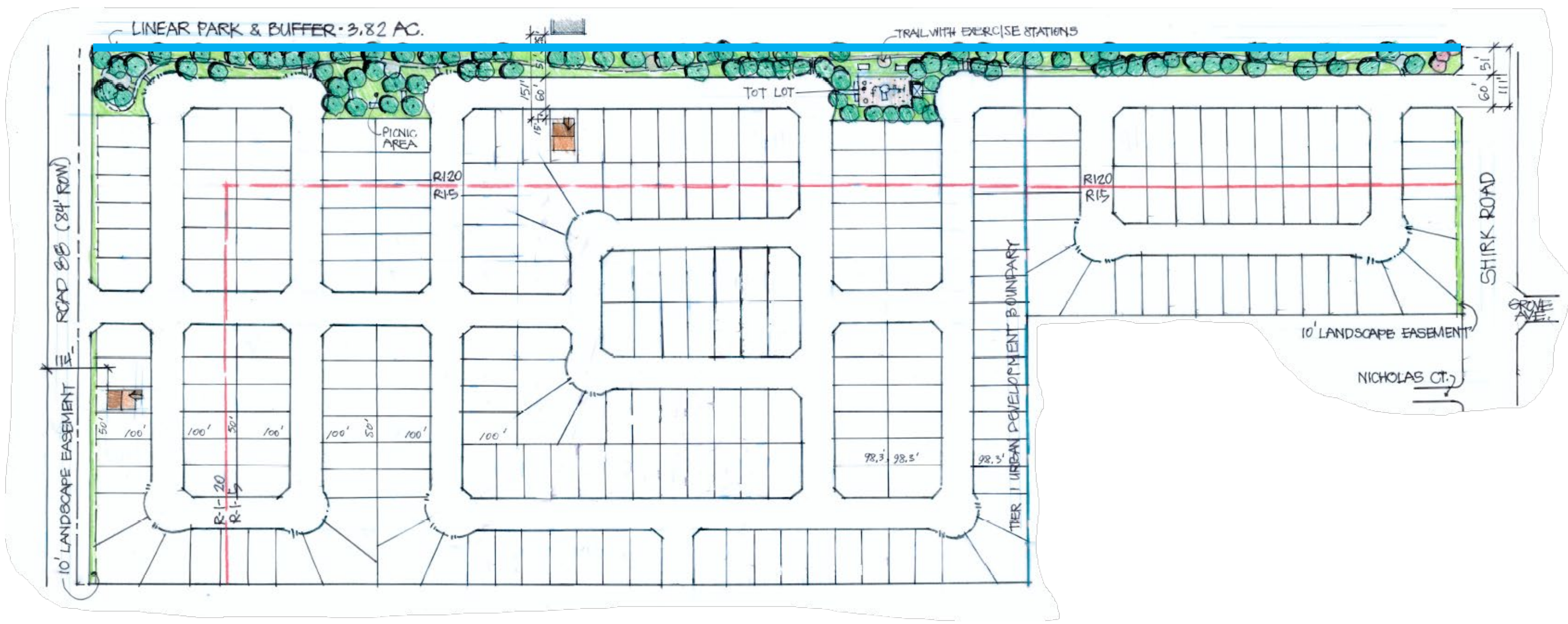
Iron Ridge Development I & II

Visalia, California

Industrial Noise Reduction – Option 1a

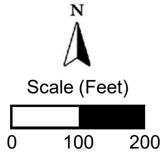
Figure 8

BOLLARD Acoustical Consultants



Legend

Recommended 8' CMU Wall (Approximate)



Iron Ridge Development I & II
Visalia, California

Industrial Noise Reduction – Option 2a

Figure 9

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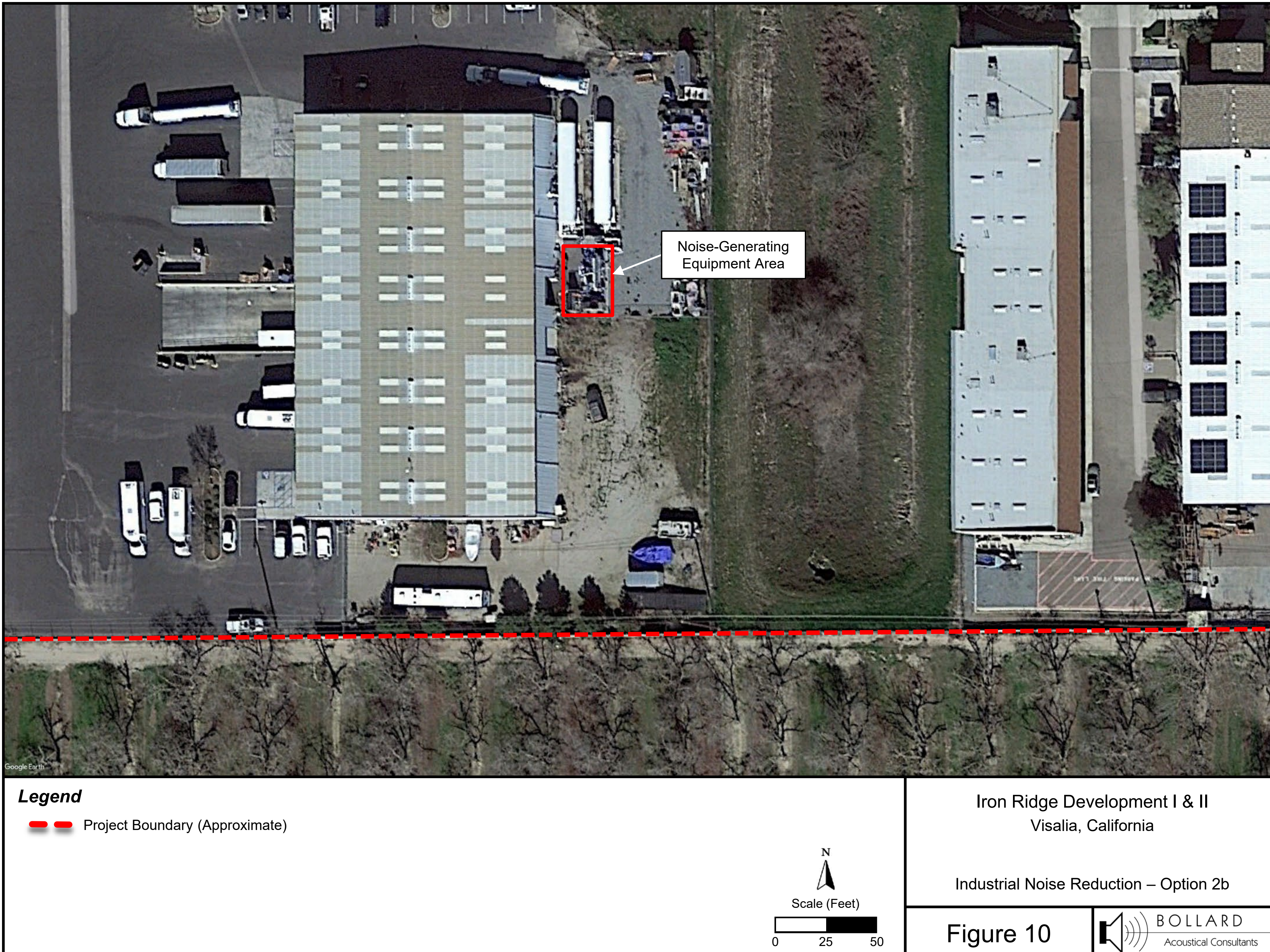


Iron Ridge Development I & II
Visalia, California

Industrial Noise Reduction – Option 2b

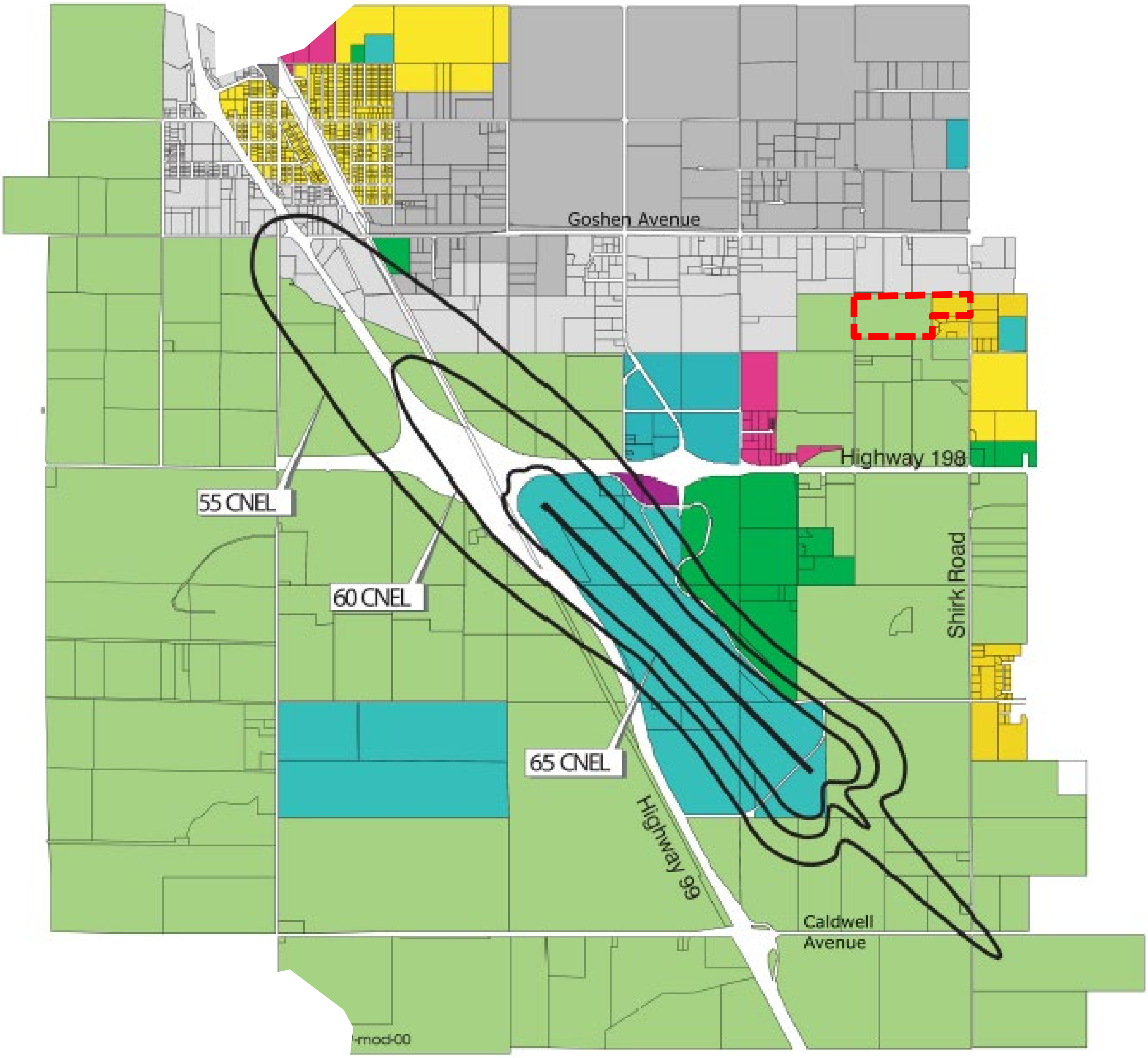
Figure 10

BOLLARD
Acoustical Consultants

Impact 10: Airport Operations Noise at Proposed Residential Uses

The Iron Ridge Development is located approximately 1 ¼ miles to the northeast of Visalia Municipal Airport. According to Figure 3.10-2 (Airport Noise Contours 2019) of the Visalia General Plan Draft Environmental Impact Report, the proposed development is geographically located well outside of the established 55 dB CNEL airport noise contour. The airport noise contour map in provided as Figure 11.

Based on the information above, analysis of the BAC long-term noise level survey results within the project area, and after consideration of the exterior to interior noise level reduction achieved within standard residential building construction (at least 25 dB with windows closed and approximately 15 dB with windows open), noise generated from normal aircraft operations at the Visalia Municipal Airport is not expected to exceed the applicable Visalia General Plan exterior or interior noise level standards for residential uses. As a result, no further consideration of improvement measures would be warranted for aircraft noise at the project site.



Legend

Project Area Boundary (Approximate)

N

Scale (Feet)

0 2,000 4,000

Iron Ridge Development I & II
Visalia, California

Visalia Municipal Airport Noise Contours 2019

Figure 11

BOLLARD Acoustical Consultants

This concludes BAC's noise and vibration assessment of the Iron Ridge Development I & II in Visalia, California. Please contact BAC at (530) 537-2328 or dariog@bacnoise.com if you have any comments or questions regarding this report.

Appendix A
Acoustical Terminology

Acoustics The science of sound.

Ambient Noise The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.

Attenuation The reduction of an acoustic signal.

A-Weighting A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.

Decibel or dB Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.

CNEL Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.

Frequency The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.

IIC Impact Insulation Class (IIC): A single-number representation of a floor/ceiling partition’s impact generated noise insulation performance. The field-measured version of this number is the FIIC.

L_{dn} Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.

L_{eq} Equivalent or energy-averaged sound level.

L_{max} The highest root-mean-square (RMS) sound level measured over a given period of time.

Loudness A subjective term for the sensation of the magnitude of sound.

Masking The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.

Noise Unwanted sound.

Peak Noise The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the “Maximum” level, which is the highest RMS level.

RT_{60} The time it takes reverberant sound to decay by 60 dB once the source has been removed.

STC Sound Transmission Class (STC): A single-number representation of a partition’s noise insulation performance. This number is based on laboratory-measured, 16-band (1/3-octave) transmission loss (TL) data of the subject partition. The field-measured version of this number is the FSTC.

Appendix B-1
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 01 Existing
Model Run Date: 1/20/2022

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	10,240	83	17	2	1	45	100
2		South	7,375	83	17	2	1	45	100
3		East	3,425	83	17	2	1	65	100
4		West	3,070	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	13,220	83	17	2	1	45	100
6		South	10,225	83	17	2	1	45	100
7		East	3,120	83	17	2	1	65	100
8		West	3,085	83	17	2	1	65	100
9	(3) Hillsdale Ave / Road 92	North	12,845	83	17	2	1	45	100
10		South	13,245	83	17	2	1	45	100
11		East	1,020	83	17	1	1	25	100
12		West							
13	(4) School Ave / Road 92	North	12,525	83	17	2	1	45	100
14		South	12,835	83	17	2	1	45	100
15		East	450	83	17	1	1	25	100
16		West							
17	(5) Hurley Ave / Road 92	North	12,280	83	17	2	1	40	100
18		South	12,505	83	17	2	1	45	100
19		East	3,315	83	17	1	1	40	100
20		West							
21	(6) Allen Ave / Road 92	North	11,400	83	17	2	1	40	100
22		South	11,400	83	17	2	1	40	100
23		East							
24		West							
25	(7) Goshen Ave / Road 92	North	8,070	83	17	2	1	40	100
26		South	10,510	83	17	2	1	40	100
27		East	6,065	83	17	2	1	55	100
28		West	6,975	83	17	2	1	55	100
29	(8) Project Drvwy / Road 88	North	405	83	17	2	1	40	100
30		South	405	83	17	2	1	40	100
31		East							
32		West							
33	(9) Goshen Ave / Road 88	North							
34		South	405	83	17	2	1	40	100
35		East	6,885	83	17	2	1	55	100
36		West	6,830	83	17	2	1	55	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-2
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 02 Opening Year
Model Run Date: 1/20/2022

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	11,915	83	17	2	1	45	100
2		South	8,005	83	17	2	1	45	100
3		East	4,015	83	17	2	1	65	100
4		West	3,605	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	16,045	83	17	2	1	45	100
6		South	11,955	83	17	2	1	45	100
7		East	3,795	83	17	2	1	65	100
8		West	3,575	83	17	2	1	65	100
9	(3) Hillsdale Ave / Road 92	North	15,340	83	17	2	1	45	100
10		South	16,075	83	17	2	1	45	100
11		East	1,645	83	17	1	1	25	100
12		West							
13	(4) School Ave / Road 92	North	15,020	83	17	2	1	45	100
14		South	15,340	83	17	2	1	45	100
15		East	460	83	17	1	1	25	100
16		West							
17	(5) Hurley Ave / Road 92	North	14,730	83	17	2	1	40	100
18		South	15,005	83	17	2	1	45	100
19		East	4,055	83	17	1	1	40	100
20		West							
21	(6) Allen Ave / Road 92	North	13,875	83	17	2	1	40	100
22		South	13,875	83	17	2	1	40	100
23		East							
24		West							
25	(7) Goshen Ave / Road 92	North	9,980	83	17	2	1	40	100
26		South	12,925	83	17	2	1	40	100
27		East	6,490	83	17	2	1	55	100
28		West	8,355	83	17	2	1	55	100
29	(8) Project Drvwy / Road 88	North	405	83	17	2	1	40	100
30		South	405	83	17	2	1	40	100
31		East							
32		West							
33	(9) Goshen Ave / Road 88	North							
34		South	1,575	83	17	2	1	40	100
35		East	7,785	83	17	2	1	55	100
36		West	7,850	83	17	2	1	55	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-3
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 03 Opening Year+Project
Model Run Date: 1/20/2022

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	12,710	83	17	2	1	45	100
2		South	8,105	83	17	2	1	45	100
3		East	4,520	83	17	2	1	65	100
4		West	3,795	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	17,480	83	17	2	1	45	100
6		South	12,745	83	17	2	1	45	100
7		East	4,220	83	17	2	1	65	100
8		West	3,795	83	17	2	1	65	100
9	(3) Hillsdale Ave / Road 92	North	16,770	83	17	2	1	45	100
10		South	17,505	83	17	2	1	45	100
11		East	1,645	83	17	1	1	25	100
12		West							
13	(4) School Ave / Road 92	North	16,470	83	17	2	1	45	100
14		South	16,790	83	17	2	1	45	100
15		East	460	83	17	1	1	25	100
16		West							
17	(5) Hurley Ave / Road 92	North	16,360	83	17	2	1	40	100
18		South	16,430	83	17	2	1	45	100
19		East	4,260	83	17	1	1	40	100
20		West							
21	(6) Allen Ave / Road 92	North	14,080	83	17	2	1	40	100
22		South	15,510	83	17	2	1	40	100
23		East							
24		West	1,840	83	17	1	1	25	100
25	(7) Goshen Ave / Road 92	North	10,085	83	17	2	1	40	100
26		South	13,130	83	17	2	1	40	100
27		East	6,690	83	17	2	1	55	100
28		West	8,455	83	17	2	1	55	100
29	(8) Project Drvwy / Road 88	North	615	83	17	2	1	40	100
30		South	410	83	17	2	1	40	100
31		East	205	84	16	1	1	25	100
32		West							
33	(9) Goshen Ave / Road 88	North							
34		South	1,785	83	17	2	1	40	100
35		East	7,890	83	17	2	1	55	100
36		West	7,955	83	17	2	1	55	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-4
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 04 5-Year Horizon
Model Run Date: 1/20/2022

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	13,000	83	17	2	1	45	100
2		South	8,785	83	17	2	1	45	100
3		East	4,380	83	17	2	1	65	100
4		West	3,925	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	17,450	83	17	2	1	45	100
6		South	13,040	83	17	2	1	45	100
7		East	4,115	83	17	2	1	65	100
8		West	3,895	83	17	2	1	65	100
9	(3) Hillsdale Ave / Road 92	North	16,710	83	17	2	1	45	100
10		South	17,485	83	17	2	1	45	100
11		East	1,755	83	17	1	1	25	100
12		West							
13	(4) School Ave / Road 92	North	16,350	83	17	2	1	45	100
14		South	16,695	83	17	2	1	45	100
15		East	505	83	17	1	1	25	100
16		West							
17	(5) Hurley Ave / Road 92	North	16,040	83	17	2	1	40	100
18		South	16,330	83	17	2	1	45	100
19		East	4,410	83	17	1	1	40	100
20		West							
21	(6) Allen Ave / Road 92	North	15,320	83	17	2	1	40	100
22		South	15,320	83	17	2	1	40	100
23		East							
24		West							
25	(7) Goshen Ave / Road 92	North	10,830	83	17	2	1	40	100
26		South	14,040	83	17	2	1	40	100
27		East	7,125	83	17	2	1	55	100
28		West	9,085	83	17	2	1	55	100
29	(8) Project Drvwy / Road 88	North	455	83	17	2	1	40	100
30		South	455	83	17	2	1	40	100
31		East							
32		West							
33	(9) Goshen Ave / Road 88	North							
34		South	1,620	83	17	2	1	40	100
35		East	8,520	83	17	2	1	55	100
36		West	8,570	83	17	2	1	55	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-5
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 05 5-Year Horizon+Project
Model Run Date: 1/20/2022

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	13,780	83	17	2	1	45	100
2		South	8,885	83	17	2	1	45	100
3		East	4,870	83	17	2	1	65	100
4		West	4,115	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	18,890	83	17	2	1	45	100
6		South	13,825	83	17	2	1	45	100
7		East	4,550	83	17	2	1	65	100
8		West	4,115	83	17	2	1	65	100
9	(3) Hillsdale Ave / Road 92	North	18,140	83	17	2	1	45	100
10		South	18,915	83	17	2	1	45	100
11		East	1,755	83	17	1	1	25	100
12		West							
13	(4) School Ave / Road 92	North	17,780	83	17	2	1	45	100
14		South	18,125	83	17	2	1	45	100
15		East	505	83	17	1	1	25	100
16		West							
17	(5) Hurley Ave / Road 92	North	17,645	83	17	2	1	40	100
18		South	17,760	83	17	2	1	45	100
19		East	4,585	83	17	1	1	40	100
20		West							
21	(6) Allen Ave / Road 92	North	15,525	83	17	2	1	40	100
22		South	16,955	83	17	2	1	40	100
23		East							
24		West	1,840	83	17	1	1	25	100
25	(7) Goshen Ave / Road 92	North	10,935	83	17	2	1	40	100
26		South	14,235	83	17	2	1	40	100
27		East	7,335	83	17	2	1	55	100
28		West	9,175	83	17	2	1	55	100
29	(8) Project Drvwy / Road 88	North	660	83	17	2	1	40	100
30		South	455	83	17	2	1	40	100
31		East	205	84	16	1	1	25	100
32		West							
33	(9) Goshen Ave / Road 88	North							
34		South	1,830	83	17	2	1	40	100
35		East	8,620	83	17	2	1	55	100
36		West	8,745	83	17	2	1	55	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-6
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 06 10-Year Horizon
Model Run Date: 1/20/2022

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	14,620	83	17	2	1	45	100
2		South	9,945	83	17	2	1	45	100
3		East	4,920	83	17	2	1	65	100
4		West	4,415	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	19,550	83	17	2	1	45	100
6		South	14,660	83	17	2	1	45	100
7		East	4,620	83	17	2	1	65	100
8		West	4,400	83	17	2	1	65	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-7
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 07 10-Year Horizon+Project
Model Run Date: 1/20/2022

BOLLARD Acoustical

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	15,400	83	17	2	1	45	100
2		South	10,050	83	17	2	1	45	100
3		East	5,410	83	17	2	1	65	100
4		West	4,600	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	20,970	83	17	2	1	45	100
6		South	15,440	83	17	2	1	45	100
7		East	5,045	83	17	2	1	65	100
8		West	4,615	83	17	2	1	65	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-8
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 08 20-Year Horizon
Model Run Date: 1/20/2022

BOLLARD Acoustical

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	17,955	83	17	2	1	45	100
2		South	12,350	83	17	2	1	45	100
3		East	6,040	83	17	2	1	65	100
4		West	5,415	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	23,885	83	17	2	1	45	100
6		South	18,010	83	17	2	1	45	100
7		East	5,640	83	17	2	1	65	100
8		West	5,405	83	17	2	1	65	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix B-9
FHWA Highway Traffic Noise Prediction Model Data Inputs
Iron Ridge Development I II
File Name: 09 20-Year Horizon+Project
Model Run Date: 1/20/2022

BOLLARD Acoustical

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	(1) SR-198 EB Ramps / Road 92	North	18,740	83	17	2	1	45	100
2		South	12,455	83	17	2	1	45	100
3		East	6,530	83	17	2	1	65	100
4		West	5,605	83	17	2	1	65	100
5	(2) SR-198 WB Ramps / Road 92	North	25,350	83	17	2	1	45	100
6		South	18,790	83	17	2	1	45	100
7		East	6,065	83	17	2	1	65	100
8		West	5,665	83	17	2	1	65	100

Note: Blank cells represent roadways for which no traffic data was provided.

Legend

A: Site 1: Facing north towards industrial uses
B: Site 2: Facing north towards industrial uses and noise-generating equipment area
C: Site 3: Facing north towards industrial uses and existing 7’ masonry wall
D: Site 4: Facing east towards Road 92

Iron Ridge Development I & II
Visalia, California

Noise Survey Photographs – All Sites

Appendix C-1

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Legend

A: Site 2: Facing east along existing 8' CMU wall
B: Site 2: Facing east towards section of chain-link fence (no wall)
C: Site 2: Facing north towards noise-generating stationary equipment area at industrial use
D: Site 2: Noise meter reading with equipment in operation - no wall (63 dB at 180' from equipment area)
E: Site 2: Noise meter reading with equipment in operation - behind existing nearby 8' foot wall (54 dB at 180' from equipment area)

Iron Ridge Development I & II
Visalia, California

Noise Survey Photographs – Site 2

Appendix C-2

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Appendix D-1
Ambient Noise Monitoring Results - Site 1
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21

Hour	Leq	Lmax	L50	L90
1:00 PM	47	54	47	45
2:00 PM	47	58	46	44
3:00 PM	48	57	48	45
4:00 PM	48	59	47	45
5:00 PM	50	56	50	47
6:00 PM	50	64	49	47
7:00 PM	51	64	50	46
8:00 PM	52	57	52	50
9:00 PM	51	59	51	49
10:00 PM	50	63	49	48
11:00 PM	51	57	50	48
12:00 AM	47	55	47	45
1:00 AM	48	62	48	46
2:00 AM	48	56	48	46
3:00 AM	47	52	47	46
4:00 AM	47	56	47	46
5:00 AM	47	56	47	46
6:00 AM	48	56	48	47
7:00 AM	49	63	49	48
8:00 AM	48	64	47	44
9:00 AM	43	55	42	40
10:00 AM	48	74	43	39
11:00 AM	41	61	40	39
12:00 PM	42	54	41	39

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	52	41	49	51	47	48
Lmax (Maximum)	74	54	60	63	52	57
L50 (Median)	52	40	47	50	47	48
L90 (Background)	50	39	44	48	45	46

Computed DNL, dB	55
% Daytime Energy	65%
% Nighttime Energy	35%

GPS Coordinates	36°20'17.64" N 119°22'28.28" W

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Appendix D-2
Ambient Noise Monitoring Results - Site 1
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21

Hour	Leq	Lmax	L50	L90
1:00 PM	49	74	41	39
2:00 PM	43	58	42	40
3:00 PM	42	53	41	39
4:00 PM	44	52	43	40
5:00 PM	46	53	45	42
6:00 PM	47	58	47	44
7:00 PM	48	61	48	45
8:00 PM	50	62	50	48
9:00 PM	52	62	51	50
10:00 PM	50	57	50	48
11:00 PM	51	63	51	49
12:00 AM	52	58	51	50
1:00 AM	49	57	49	47
2:00 AM	49	54	49	48
3:00 AM	50	58	50	47
4:00 AM	48	54	48	47
5:00 AM	50	56	50	49
6:00 AM	51	60	51	49
7:00 AM	53	58	53	51
8:00 AM	49	61	48	46
9:00 AM	48	71	45	43
10:00 AM	45	61	44	43
11:00 AM	46	61	44	42
12:00 PM	45	58	44	43

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	53	42	48	52	48	50
Lmax (Maximum)	74	52	60	63	54	57
L50 (Median)	53	41	46	51	48	50
L90 (Background)	51	39	44	50	47	48

Computed DNL, dB	56
% Daytime Energy	51%
% Nighttime Energy	49%

GPS Coordinates	36°20'17.64" N
	119°22'28.28" W

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Appendix D-3
Ambient Noise Monitoring Results - Site 1
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21

Hour	Leq	Lmax	L50	L90
1:00 PM	48	70	44	42
2:00 PM	45	63	43	42
3:00 PM	44	54	44	42
4:00 PM	45	60	45	42
5:00 PM	46	58	46	44
6:00 PM	45	57	45	43
7:00 PM	48	56	48	45
8:00 PM	51	61	50	48
9:00 PM	51	62	51	49
10:00 PM	53	58	51	49
11:00 PM	52	57	51	49
12:00 AM	51	56	50	49
1:00 AM	49	53	49	47
2:00 AM	50	57	49	47
3:00 AM	50	58	49	48
4:00 AM	50	59	50	48
5:00 AM	52	61	51	48
6:00 AM	53	62	53	50
7:00 AM	55	74	54	52
8:00 AM	50	68	48	46
9:00 AM	45	60	44	43
10:00 AM	46	61	44	42
11:00 AM	45	61	42	41
12:00 PM	46	69	43	41

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	55	44	49	53	49	51
Lmax (Maximum)	74	54	62	62	53	58
L50 (Median)	54	42	46	53	49	50
L90 (Background)	52	41	44	50	47	48

Computed DNL, dB	57
% Daytime Energy	48%
% Nighttime Energy	52%

GPS Coordinates	36°20'17.64" N 119°22'28.28" W

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Appendix D-4
Ambient Noise Monitoring Results - Site 2
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21

Hour	Leq	Lmax	L50	L90
1:00 PM	60	64	60	59
2:00 PM	60	63	60	58
3:00 PM	60	64	60	59
4:00 PM	60	66	60	59
5:00 PM	60	65	60	59
6:00 PM	61	68	61	59
7:00 PM	62	65	62	60
8:00 PM	61	65	61	60
9:00 PM	61	66	61	60
10:00 PM	60	62	59	58
11:00 PM	61	64	61	61
12:00 AM	58	69	59	49
1:00 AM	49	57	49	48
2:00 AM	50	54	50	49
3:00 AM	50	56	50	49
4:00 AM	50	56	50	48
5:00 AM	50	70	50	48
6:00 AM	52	69	52	50
7:00 AM	52	57	52	50
8:00 AM	58	71	57	53
9:00 AM	57	60	57	56
10:00 AM	57	59	57	55
11:00 AM	57	60	57	56
12:00 PM	59	62	59	57

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62	52	60	61	49	56
Lmax (Maximum)	71	57	64	70	54	62
L50 (Median)	62	52	59	61	49	53
L90 (Background)	60	50	57	61	48	51

Computed DNL, dB	63
% Daytime Energy	79%
% Nighttime Energy	21%

GPS Coordinates	36°20'17.56" N 119°22'19.23" W

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Appendix D-5
Ambient Noise Monitoring Results - Site 2
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21

Hour	Leq	Lmax	L50	L90
1:00 PM	59	79	59	57
2:00 PM	59	64	58	57
3:00 PM	60	62	60	59
4:00 PM	65	84	60	59
5:00 PM	60	63	60	58
6:00 PM	60	65	60	58
7:00 PM	62	65	62	59
8:00 PM	61	65	61	59
9:00 PM	61	64	61	60
10:00 PM	61	64	61	61
11:00 PM	62	68	62	60
12:00 AM	62	64	62	60
1:00 AM	62	65	62	61
2:00 AM	62	65	62	60
3:00 AM	60	64	60	59
4:00 AM	53	68	49	47
5:00 AM	51	61	51	49
6:00 AM	54	61	52	50
7:00 AM	55	60	55	52
8:00 AM	58	71	58	51
9:00 AM	58	61	58	57
10:00 AM	57	60	57	55
11:00 AM	57	62	57	55
12:00 PM	59	63	59	57

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	65	55	60	62	51	60
Lmax (Maximum)	84	60	66	68	61	64
L50 (Median)	62	55	59	62	49	58
L90 (Background)	60	51	57	61	47	56

Computed DNL, dB	66
% Daytime Energy	62%
% Nighttime Energy	38%

GPS Coordinates	36°20'17.56" N 119°22'19.23" W

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Appendix D-6
Ambient Noise Monitoring Results - Site 2
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21

Hour	Leq	Lmax	L50	L90
1:00 PM	64	82	59	56
2:00 PM	59	62	59	57
3:00 PM	60	64	60	58
4:00 PM	61	66	61	60
5:00 PM	61	66	61	60
6:00 PM	63	67	62	60
7:00 PM	62	64	62	60
8:00 PM	61	64	61	59
9:00 PM	61	63	61	59
10:00 PM	61	64	61	60
11:00 PM	61	65	61	59
12:00 AM	59	62	59	58
1:00 AM	61	63	61	59
2:00 AM	60	63	60	59
3:00 AM	57	62	59	49
4:00 AM	51	65	51	48
5:00 AM	54	67	52	49
6:00 AM	60	67	60	59
7:00 AM	59	72	59	58
8:00 AM	58	66	58	57
9:00 AM	57	60	57	56
10:00 AM	57	61	57	56
11:00 AM	58	61	58	57
12:00 PM	64	82	58	57

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	57	61	61	51	59
Lmax (Maximum)	82	60	67	67	62	64
L50 (Median)	62	57	60	61	51	58
L90 (Background)	60	56	58	60	48	55

Computed DNL, dB	66
% Daytime Energy	71%
% Nighttime Energy	29%

GPS Coordinates	36°20'17.56" N 119°22'19.23" W

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Appendix D-7
Ambient Noise Monitoring Results - Site 3
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21

Hour	Leq	Lmax	L50	L90
12:00 PM	45	67	40	38
1:00 PM	41	51	40	38
2:00 PM	41	50	40	38
3:00 PM	45	55	45	40
4:00 PM	50	60	50	45
5:00 PM	55	70	55	50
6:00 PM	60	75	60	54
7:00 PM	61	78	58	56
8:00 PM	61	76	60	59
9:00 PM	61	71	60	58
10:00 PM	61	76	59	58
11:00 PM	61	73	59	57
12:00 AM	65	96	48	41
1:00 AM	47	62	45	42
2:00 AM	47	60	45	42
3:00 AM	45	58	43	40
4:00 AM	45	58	42	40
5:00 AM	47	59	43	39
6:00 AM	49	62	46	43
7:00 AM	50	63	49	45
8:00 AM	48	60	48	45
9:00 AM	42	52	41	39
10:00 AM	41	50	41	39
11:00 AM	41	51	40	38

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	41	56	65	45	58
Lmax (Maximum)	78	50	62	96	58	67
L50 (Median)	60	40	48	59	42	48
L90 (Background)	59	38	45	58	39	45

Computed DNL, dB	64
% Daytime Energy	50%
% Nighttime Energy	50%

GPS Coordinates	36°20'17.41" N 119°22'10.53" W

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Appendix D-8
Ambient Noise Monitoring Results - Site 3
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21

Hour	Leq	Lmax	L50	L90
12:00 PM	40	54	39	37
1:00 PM	47	72	38	36
2:00 PM	50	65	39	36
3:00 PM	52	67	40	40
4:00 PM	55	70	45	45
5:00 PM	57	72	50	50
6:00 PM	60	75	55	55
7:00 PM	60	75	58	56
8:00 PM	60	73	59	57
9:00 PM	61	74	60	58
10:00 PM	61	72	60	58
11:00 PM	60	70	60	58
12:00 AM	66	98	49	46
1:00 AM	48	60	47	44
2:00 AM	46	61	45	43
3:00 AM	49	59	47	45
4:00 AM	52	62	50	45
5:00 AM	54	63	53	48
6:00 AM	55	67	54	50
7:00 AM	56	64	56	53
8:00 AM	51	65	50	47
9:00 AM	48	57	47	45
10:00 AM	47	57	47	45
11:00 AM	46	56	45	43

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	40	56	66	46	59
Lmax (Maximum)	75	54	66	98	59	68
L50 (Median)	60	38	48	60	45	52
L90 (Background)	58	36	47	58	43	49

Computed DNL, dB	65
% Daytime Energy	44%
% Nighttime Energy	56%

GPS Coordinates	36°20'17.41" N 119°22'10.53" W

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Appendix D-9
Ambient Noise Monitoring Results - Site 3
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21

Hour	Leq	Lmax	L50	L90
12:00 PM	44	59	43	41
1:00 PM	46	68	43	40
2:00 PM	48	63	42	39
3:00 PM	50	65	45	40
4:00 PM	52	67	50	45
5:00 PM	55	70	55	50
6:00 PM	57	72	60	55
7:00 PM	60	75	64	58
8:00 PM	61	77	59	57
9:00 PM	61	72	60	58
10:00 PM	60	75	59	58
11:00 PM	60	72	58	57
12:00 AM	60	73	59	58
1:00 AM	59	70	58	56
2:00 AM	68	102	51	46
3:00 AM	50	72	48	46
4:00 AM	52	62	51	47
5:00 AM	55	62	54	49
6:00 AM	55	70	55	52
7:00 AM	57	66	57	54
8:00 AM	51	70	50	47
9:00 AM	48	60	47	45
10:00 AM	47	60	46	43
11:00 AM	44	59	43	40

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	44	56	68	50	61
Lmax (Maximum)	77	59	67	102	62	73
L50 (Median)	64	42	51	59	48	55
L90 (Background)	58	39	48	58	46	52

Computed DNL, dB	67
% Daytime Energy	33%
% Nighttime Energy	67%

GPS Coordinates	36°20'17.41" N 119°22'10.53" W

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Appendix D-10
Ambient Noise Monitoring Results - Site 4
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21

Hour	Leq	Lmax	L50	L90
1:00 PM	59	75	53	43
2:00 PM	58	77	52	43
3:00 PM	64	95	52	42
4:00 PM	58	73	52	44
5:00 PM	58	74	53	46
6:00 PM	57	70	51	45
7:00 PM	60	82	55	47
8:00 PM	61	82	56	51
9:00 PM	57	72	53	49
10:00 PM	56	74	50	45
11:00 PM	55	70	51	47
12:00 AM	56	83	47	42
1:00 AM	53	74	47	44
2:00 AM	52	71	46	43
3:00 AM	52	68	44	41
4:00 AM	52	70	43	40
5:00 AM	54	69	44	40
6:00 AM	56	74	48	44
7:00 AM	57	73	50	45
8:00 AM	57	70	51	46
9:00 AM	57	73	49	41
10:00 AM	56	73	49	41
11:00 AM	58	76	51	40
12:00 PM	56	71	48	39

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	56	59	56	52	54
Lmax (Maximum)	95	70	76	83	68	73
L50 (Median)	56	48	52	51	43	47
L90 (Background)	51	39	44	47	40	43

Computed DNL, dB	62
% Daytime Energy	82%
% Nighttime Energy	18%

GPS Coordinates	36°20'17.60" N 119°22'04.87" W

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Appendix D-11
Ambient Noise Monitoring Results - Site 4
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21

Hour	Leq	Lmax	L50	L90
1:00 PM	56	71	48	39
2:00 PM	56	75	48	40
3:00 PM	56	74	47	39
4:00 PM	57	73	48	40
5:00 PM	57	71	50	42
6:00 PM	57	75	49	43
7:00 PM	60	74	55	46
8:00 PM	62	90	51	47
9:00 PM	58	74	51	47
10:00 PM	56	73	49	47
11:00 PM	55	71	51	49
12:00 AM	56	76	49	46
1:00 AM	53	72	48	46
2:00 AM	54	73	47	44
3:00 AM	57	71	51	47
4:00 AM	60	74	57	48
5:00 AM	63	74	60	51
6:00 AM	64	82	61	54
7:00 AM	64	76	63	57
8:00 AM	63	76	61	52
9:00 AM	62	80	59	51
10:00 AM	61	75	58	49
11:00 AM	61	86	57	48
12:00 PM	60	79	57	47

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	56	60	64	53	59
Lmax (Maximum)	90	71	77	82	71	74
L50 (Median)	63	47	53	61	47	52
L90 (Background)	57	39	46	54	44	48

Computed DNL, dB	66
% Daytime Energy	68%
% Nighttime Energy	32%

GPS Coordinates	36°20'17.60" N
	119°22'04.87" W

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Appendix D-12
Ambient Noise Monitoring Results - Site 4
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21

Hour	Leq	Lmax	L50	L90
1:00 PM	61	76	58	47
2:00 PM	61	76	59	47
3:00 PM	62	76	60	49
4:00 PM	62	84	60	50
5:00 PM	62	80	61	49
6:00 PM	60	75	57	47
7:00 PM	61	75	58	50
8:00 PM	59	72	56	50
9:00 PM	58	77	53	50
10:00 PM	56	71	51	49
11:00 PM	57	74	50	47
12:00 AM	54	70	48	46
1:00 AM	54	74	47	45
2:00 AM	55	75	49	45
3:00 AM	60	88	51	48
4:00 AM	60	73	57	50
5:00 AM	62	75	60	52
6:00 AM	63	76	61	56
7:00 AM	64	76	63	58
8:00 AM	63	76	62	53
9:00 AM	62	75	59	50
10:00 AM	61	78	58	48
11:00 AM	61	76	57	45
12:00 PM	63	90	58	46

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	58	62	63	54	59
Lmax (Maximum)	90	72	77	88	70	75
L50 (Median)	63	53	59	61	47	53
L90 (Background)	58	45	49	56	45	49

Computed DNL, dB	66
% Daytime Energy	74%
% Nighttime Energy	26%

GPS Coordinates	36°20'17.60" N 119°22'04.87" W

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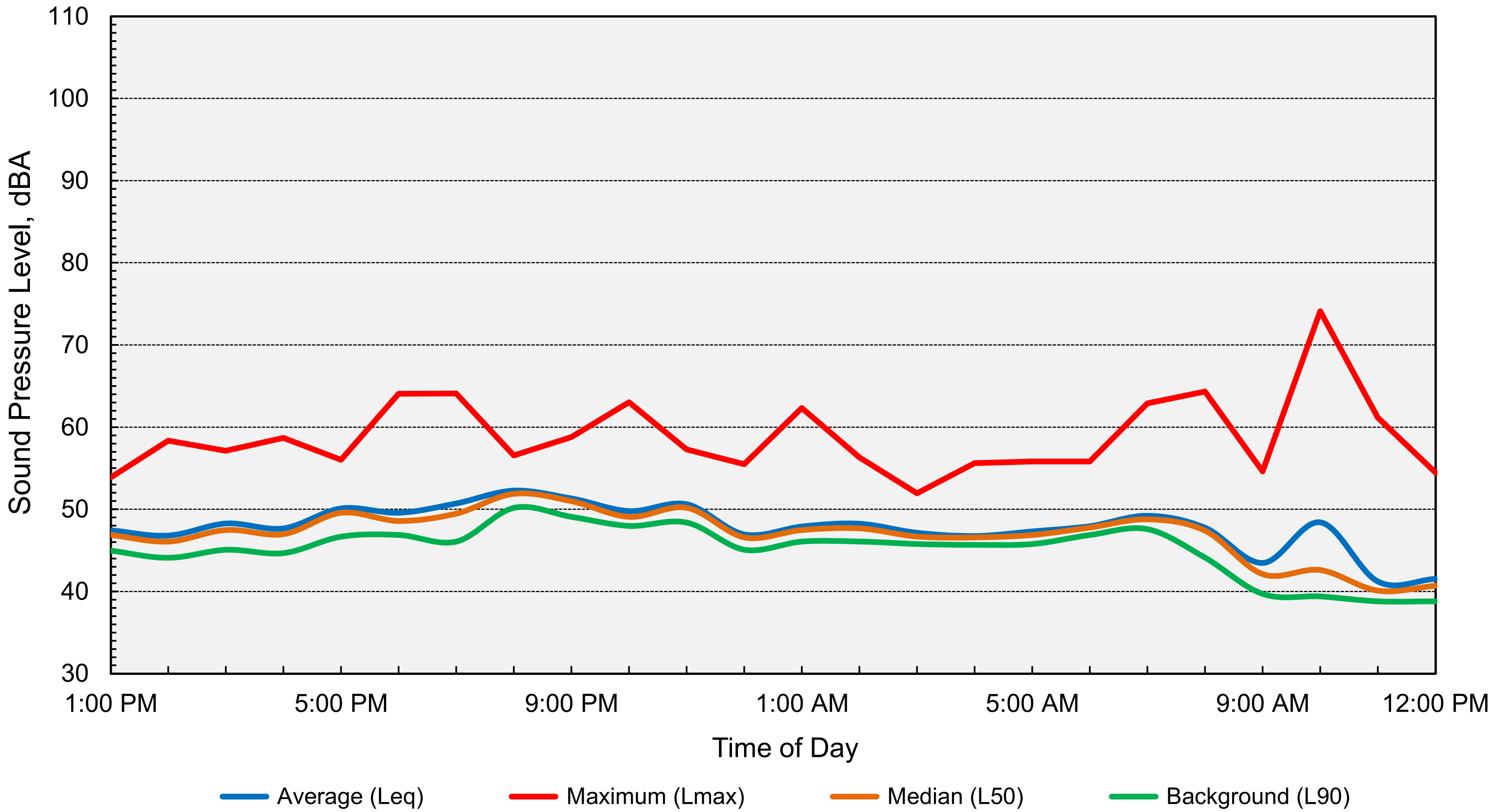
Appendix E-1
Ambient Noise Monitoring Results - Site 1
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21



Computed DNL = 55 dB

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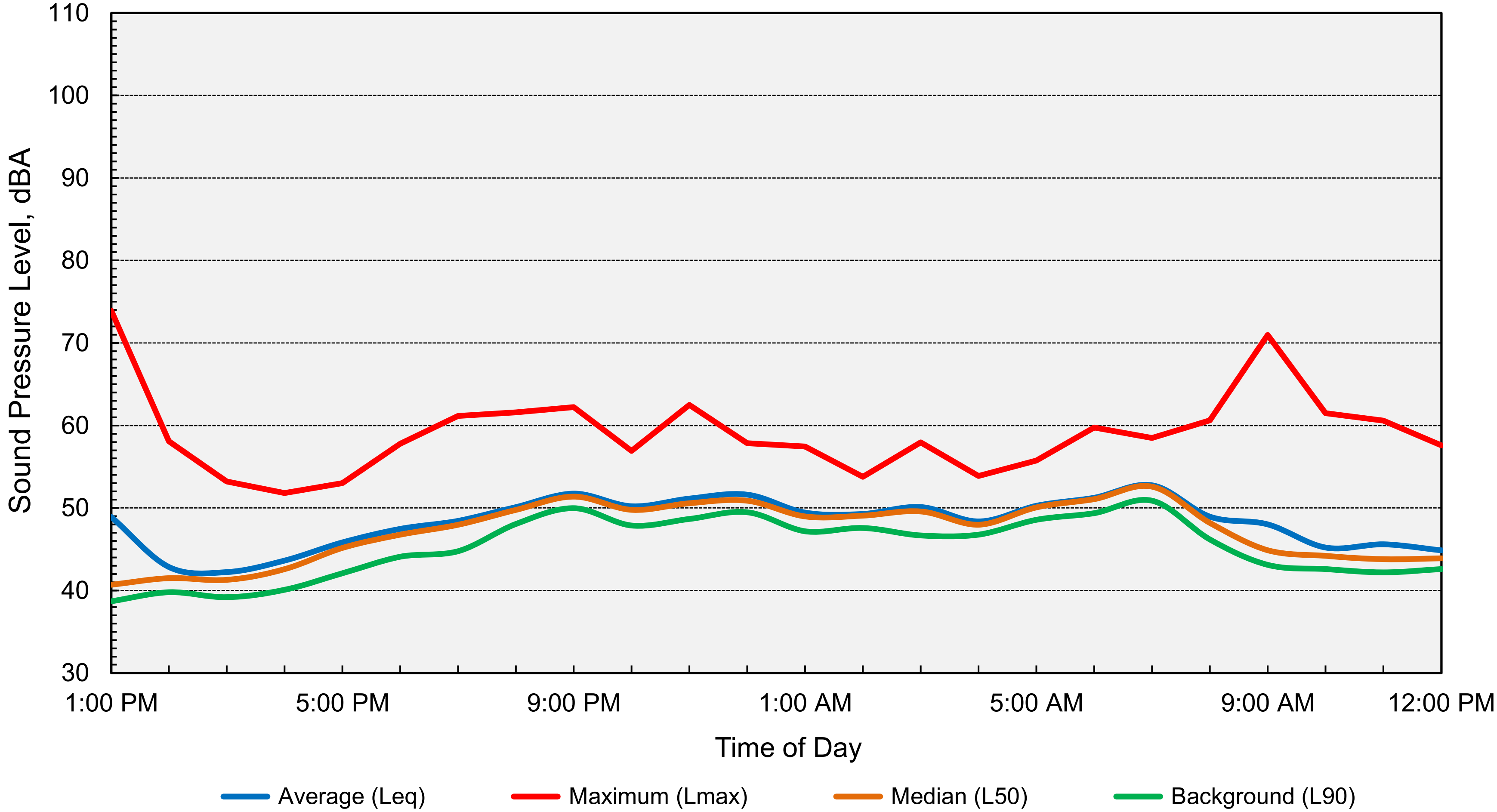
Appendix E-2
Ambient Noise Monitoring Results - Site 1
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21



Computed DNL = 56 dB

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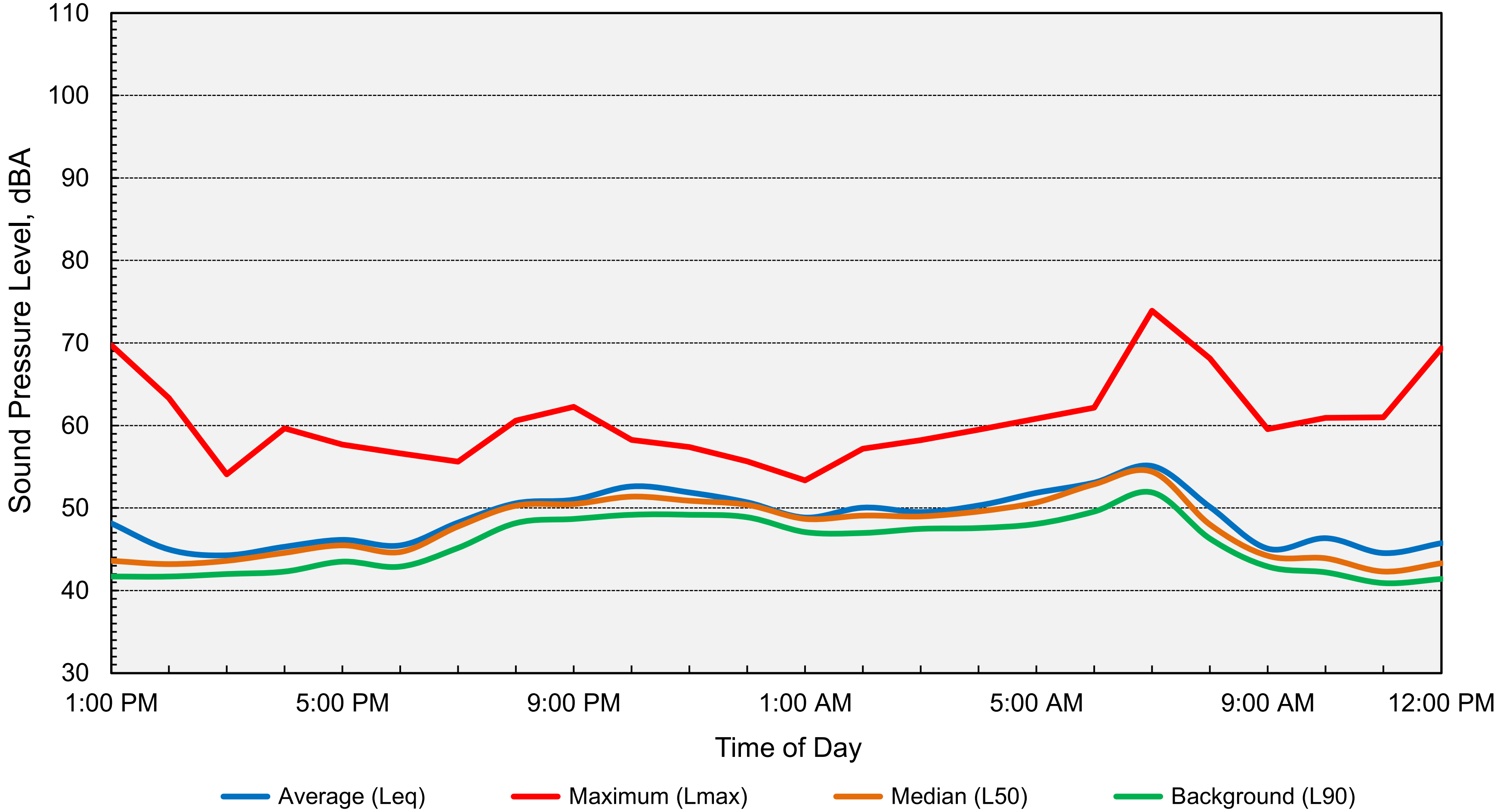
Appendix E-3
Ambient Noise Monitoring Results - Site 1
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21



Computed DNL = 57 dB

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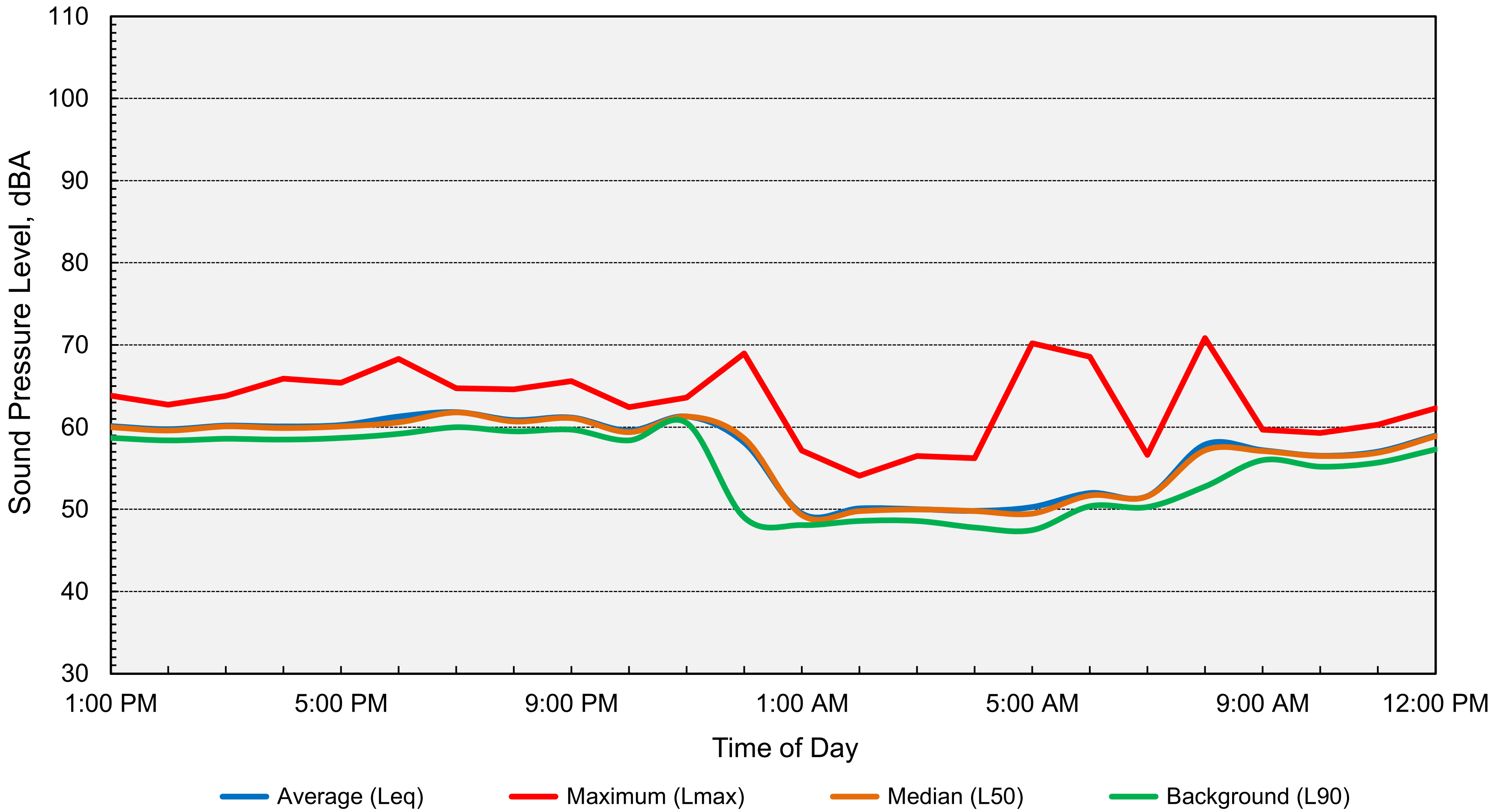
Appendix E-4
Ambient Noise Monitoring Results - Site 2
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21



Computed DNL = 63 dB

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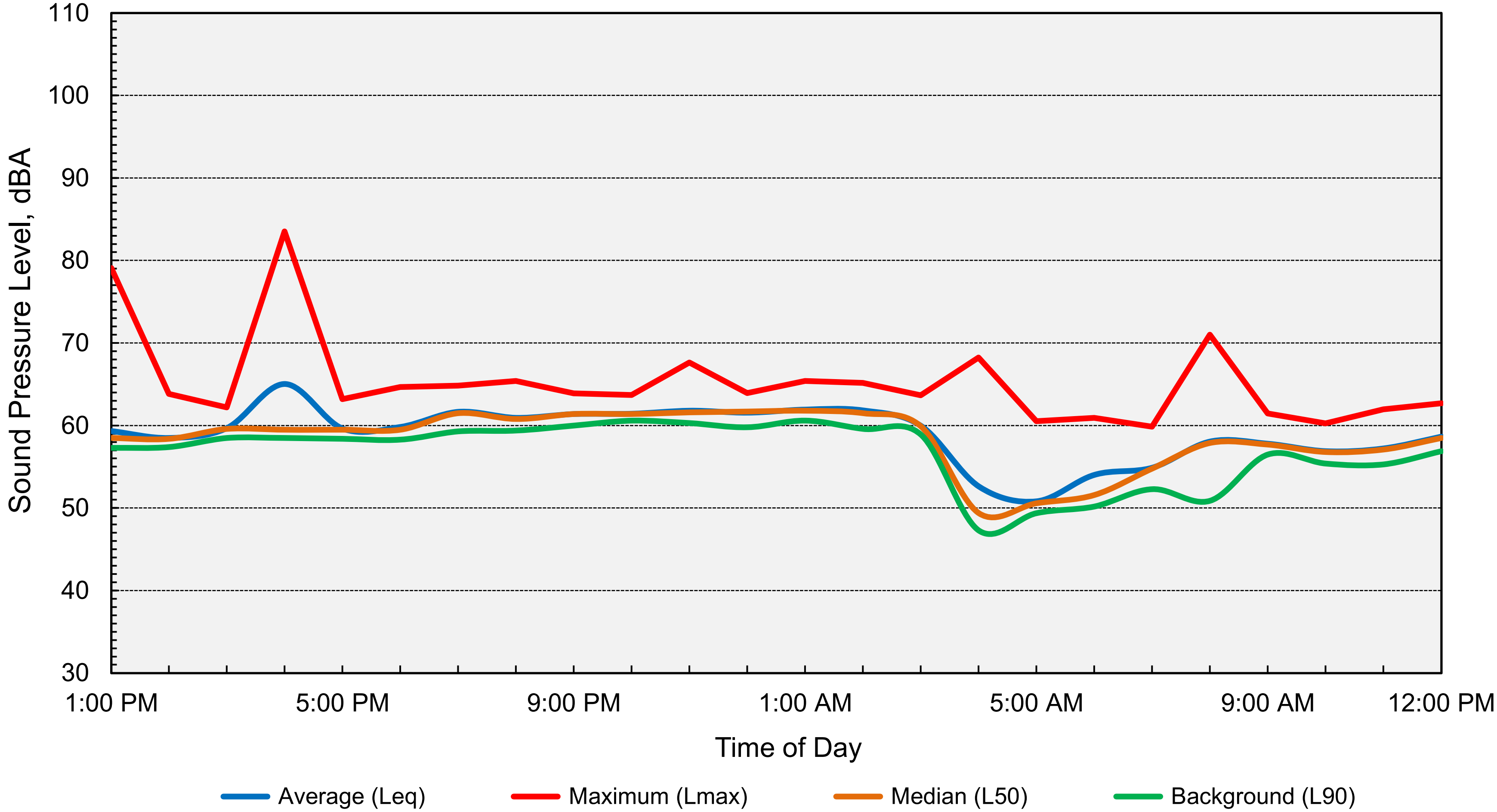
Appendix E-5
Ambient Noise Monitoring Results - Site 2
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21



Computed DNL = 66 dB

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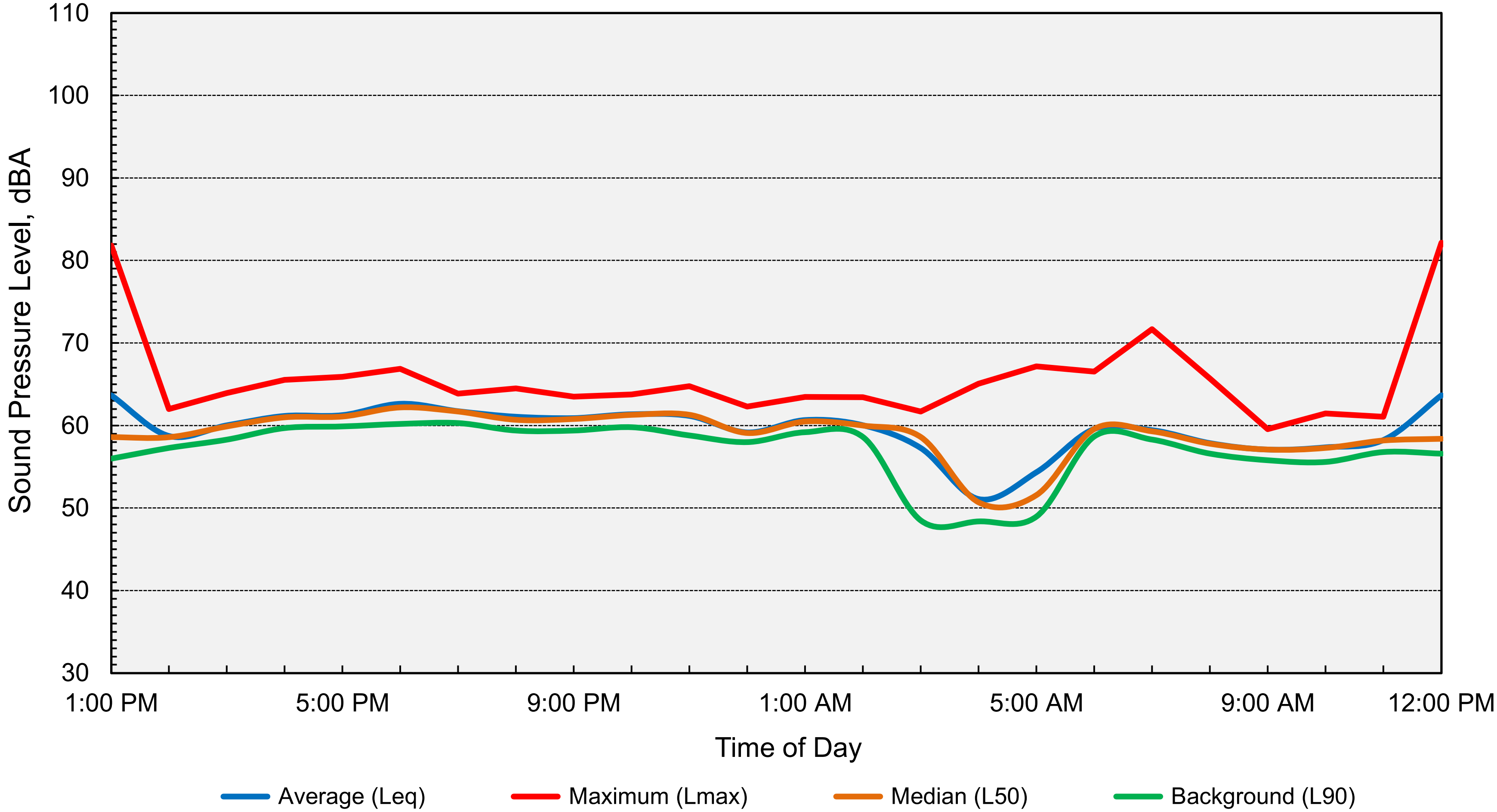
Appendix E-6
Ambient Noise Monitoring Results - Site 2
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21



Computed DNL = 66 dB

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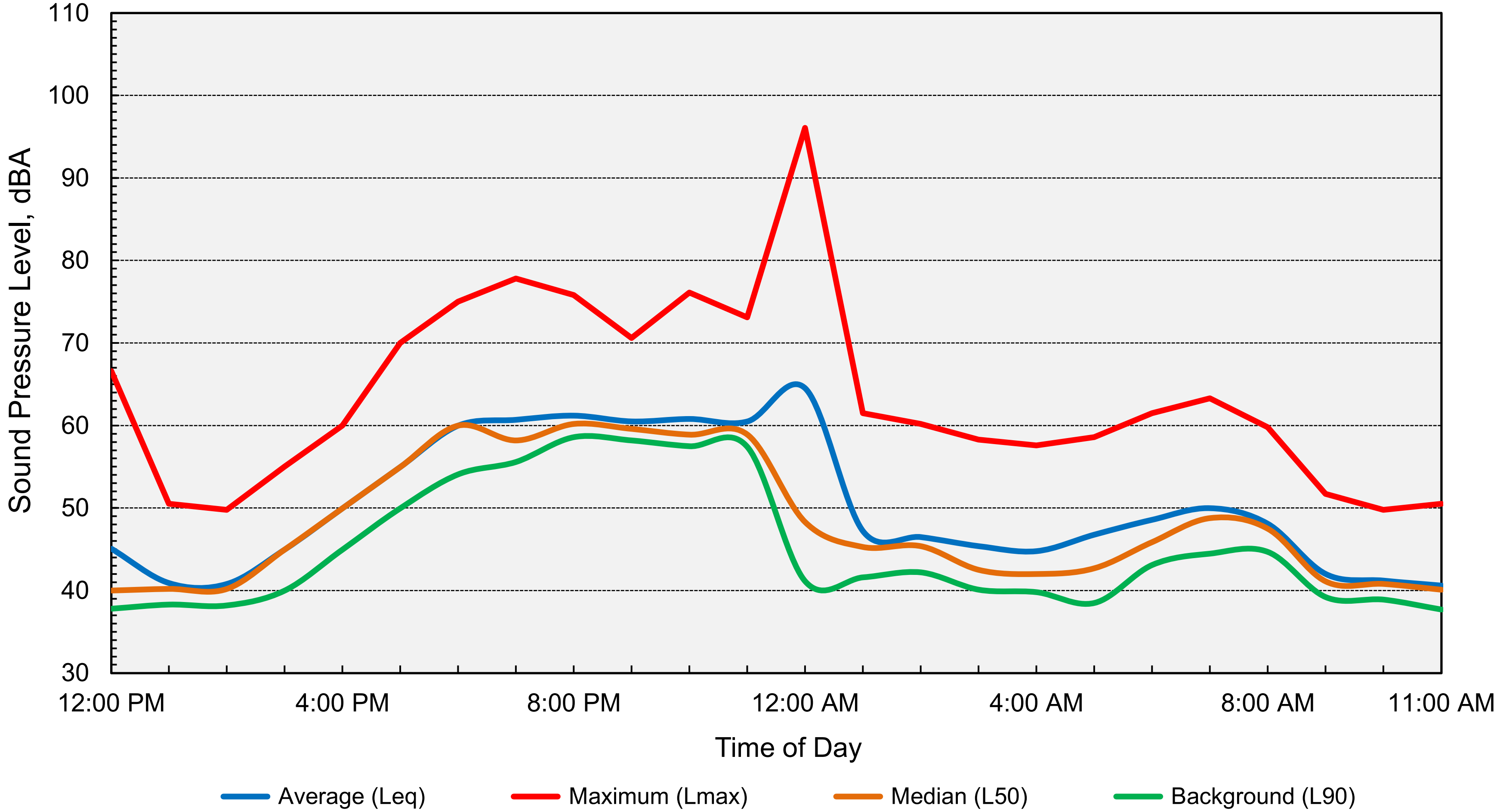
Appendix E-7
Ambient Noise Monitoring Results - Site 3
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21



Computed DNL = 64 dB

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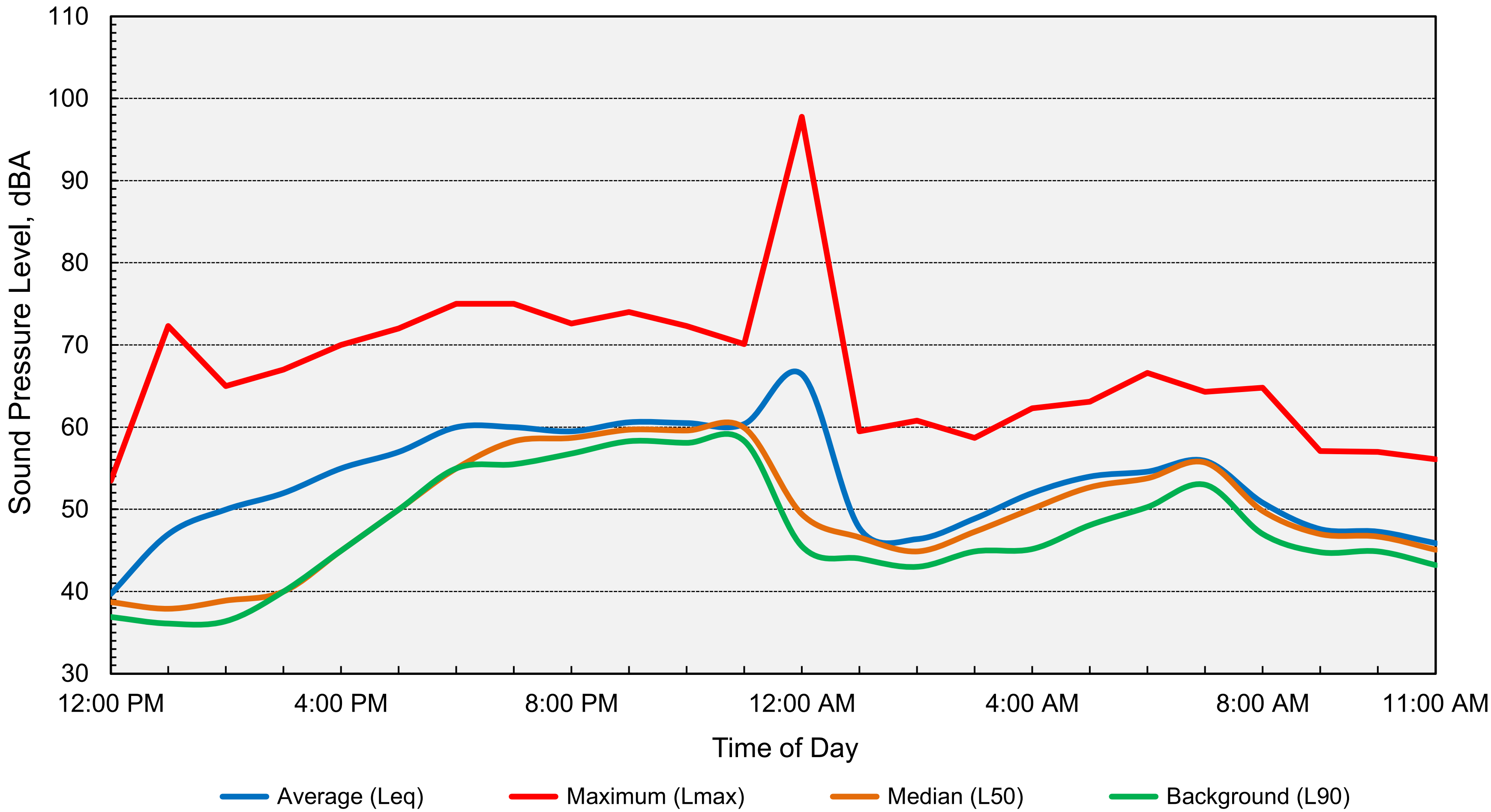
Appendix E-8
Ambient Noise Monitoring Results - Site 3
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21



Computed DNL = 65 dB

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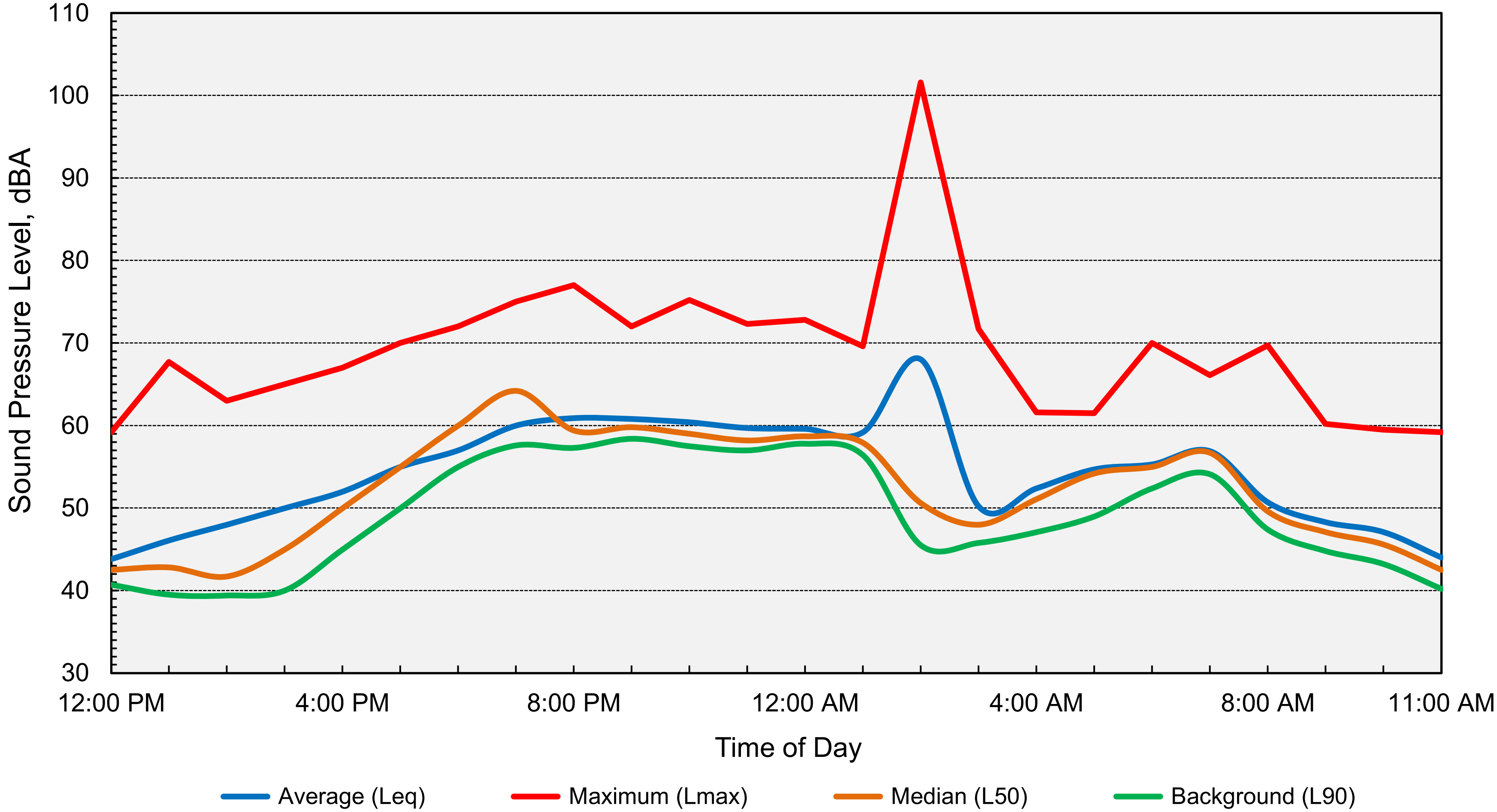
Appendix E-9
Ambient Noise Monitoring Results - Site 3
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21



Computed DNL = 67 dB

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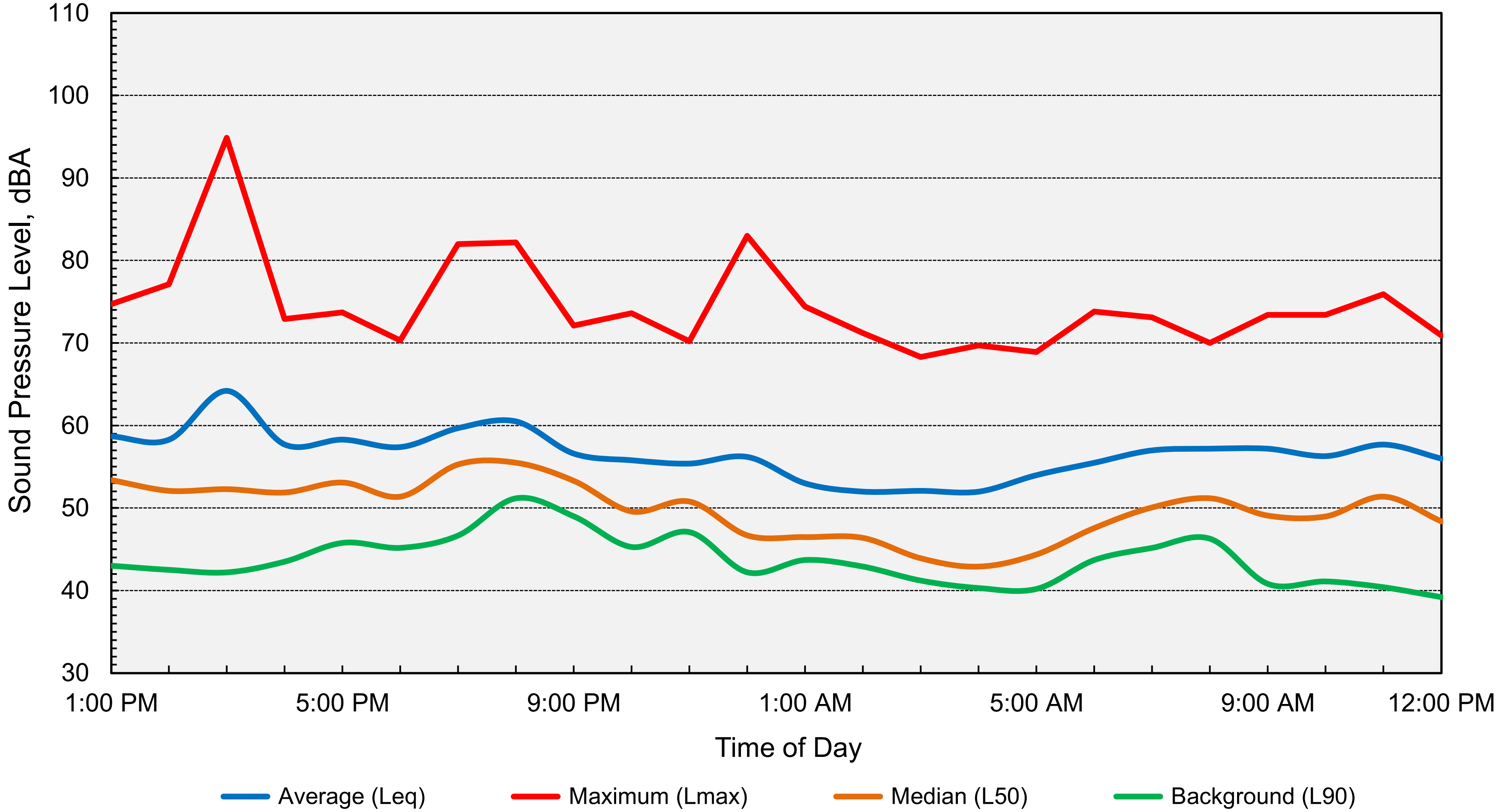
Appendix E-10
Ambient Noise Monitoring Results - Site 4
Iron Ridge Development I & II - Visalia, California
8/28/21 - 8/29/21



Computed DNL = 62 dB

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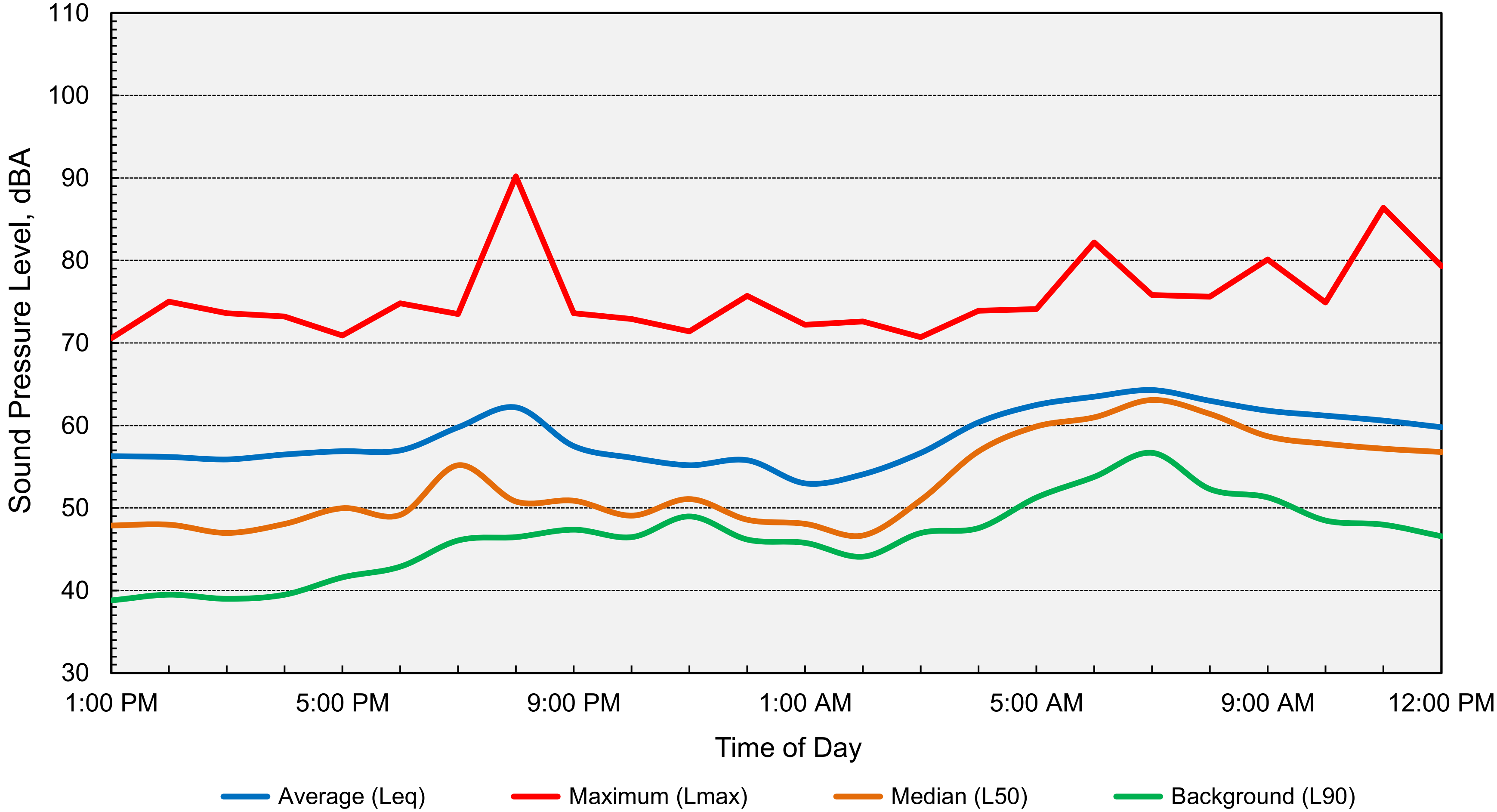
Appendix E-11
Ambient Noise Monitoring Results - Site 4
Iron Ridge Development I & II - Visalia, California
8/29/21 - 8/30/21



Computed DNL = 66 dB

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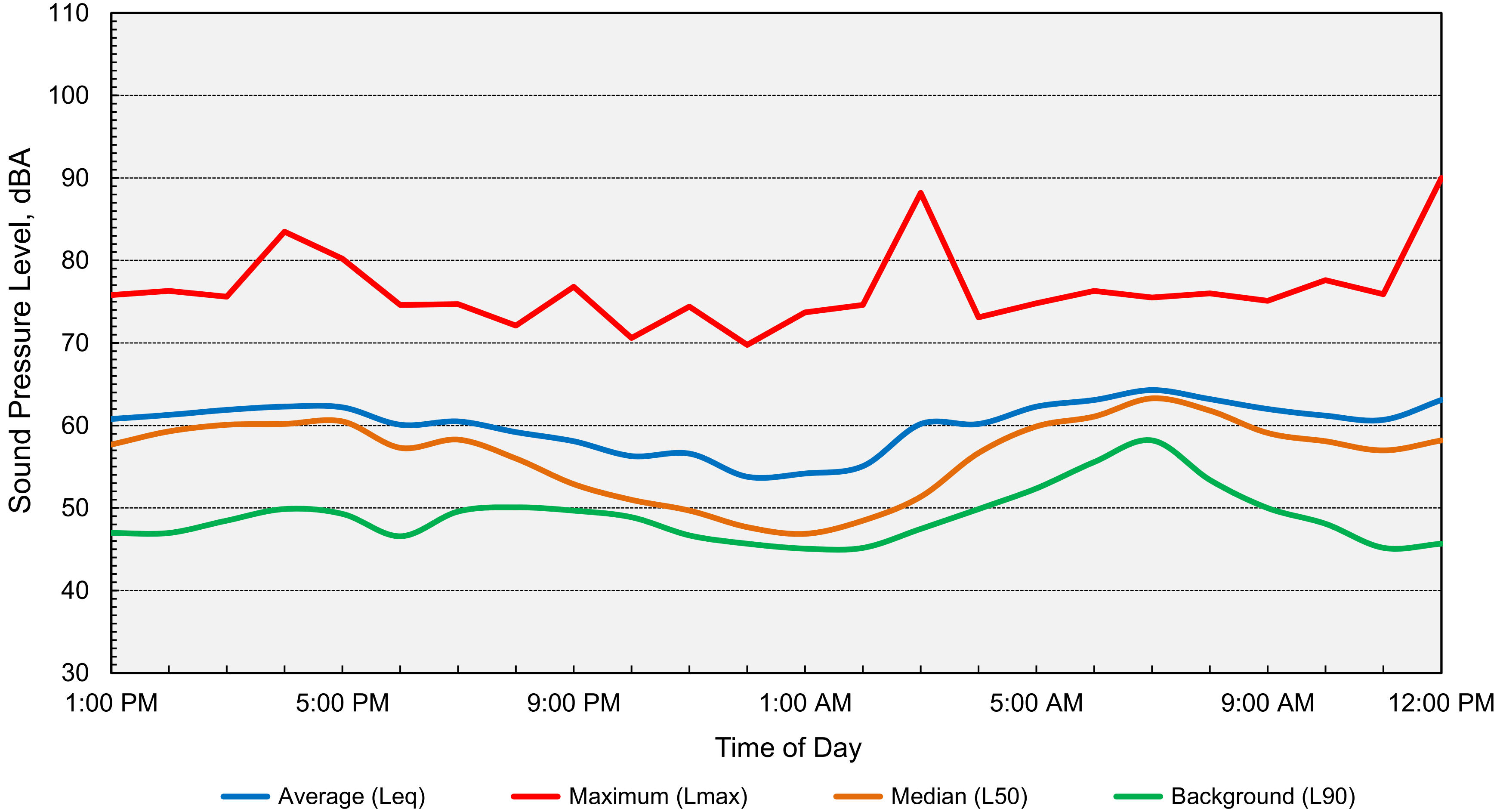
Appendix E-12
Ambient Noise Monitoring Results - Site 4
Iron Ridge Development I & II - Visalia, California
8/30/21 - 8/31/21



Computed DNL = 66 dB

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Appendix F-1
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number:	2021-133
Project Name:	Iron Ridge Development I & II
Roadway Name:	Road 88

Traffic Data:

Year:	Future (5-Year Horizon Plus Project)
Average Daily Traffic Volume (ADT):	1,830
Percent Daytime Traffic:	75
Percent Nighttime Traffic:	25
Percent Medium Trucks (2 axle):	2
Percent Heavy Trucks (3+ axle):	2
Assumed Vehicle Speed (mph):	40
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				DNL (dB)			
Location	**Receiver Description**	**Distance**	**Offset (dB)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**
1	Nearest backyards	70		56	48	53	59
2	Nearest first-floor building facades	80		55	48	52	58
3	Nearest upper-floor building facades	80	2	57	50	54	60

Traffic Noise Contours (No Calibration Offset):

DNL Contour (dB)	Distance from Centerline (feet)
75	6
70	12
65	26
60	56

Notes:

1. Future ADT volume for roadway was calculated by using traffic volume data provided in the project traffic impact study. Future traffic volume was conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions (5-Year Horizon Plus Project scenario).
2. Distances scaled from the centerline of roadway to said locations using provided site plans.
3. A +2 dB offset was applied to upper-floor facades to account for reduced ground absorption of sound at elevated locations.

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Appendix F-2
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number: 2021-133
Project Name: Iron Ridge Development I & II
Roadway Name: Road 92

Traffic Data:

Year: Future (5-Year Horizon Plus Project)
Average Daily Traffic Volume (ADT): 17,645
Percent Daytime Traffic: 75
Percent Nighttime Traffic: 25
Percent Medium Trucks (2 axle): 2
Percent Heavy Trucks (3+ axle): 2
Assumed Vehicle Speed (mph): 40
Intervening Ground Type (hard/soft): **Soft**

Traffic Noise Levels:

				DNL (dB)			
Location	**Receiver Description**	**Distance**	**Offset (dB)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**
1	Nearest backyards	70		66	58	63	68
2	Nearest first-floor building facades	80		65	57	62	67
3	Nearest upper-floor building facades	80	2	67	59	64	69

Traffic Noise Contours (No Calibration Offset):

DNL Contour (dB)	Distance from Centerline (feet)
75	25
70	54
65	117
60	252

Notes:

1. Future ADT volume for roadway was calculated by using traffic volume data provided in the project traffic impact study. Future traffic volume was conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions (5-Year Horizon Plus Project scenario).
2. Distances scaled from the centerline of roadway to said locations using provided site plans.
3. A +2 dB offset was applied to upper-floor facades to account for reduced ground absorption of sound at elevated locations.

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Appendix G-1
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2021-133
Project Name: Iron Ridge Development I & II
Roadway Name: Road 92

Noise Level Data:

Year: Future (5-Year Horizon Plus Project)
Auto DNL (dB): 66
Medium Truck DNL (dB): 58
Heavy Truck DNL (dB): 63

Site Geometry:

Receiver Description: Nearest backyards
Centerline to Barrier Distance (C_1): 60
Barrier to Receiver Distance (C_2): 10
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation: 5
Base of Barrier Elevation: 0
Starting Barrier Height: 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height (ft)	DNL (dB) Autos	DNL (dB) Medium Trucks	DNL (dB) Heavy Trucks	DNL (dB) Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
6	6	60	52	58	**62**	Yes	Yes	Yes
7	7	58	51	57	**61**	Yes	Yes	Yes
8	8	57	49	55	**59**	Yes	Yes	Yes
9	9	55	48	54	**58**	Yes	Yes	Yes
10	10	54	47	53	**57**	Yes	Yes	Yes
11	11	53	46	52	**56**	Yes	Yes	Yes
12	12	52	45	50	**55**	Yes	Yes	Yes
13	13	52	44	50	**54**	Yes	Yes	Yes
14	14	52	44	49	**54**	Yes	Yes	Yes

Notes:
1. Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).
2. Indicated barrier heights assume the difference in roadway and lot elevation is within +/- 2 feet. If a difference of more than +/- 2 feet between roadway and lot elevation would be present, an additional analysis would be required. Nonetheless, the indicated barrier heghts are relative to roadway or lot elevation, whichever is greater.

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

Project Information:

Job Number: 2021-133
Project Name: Iron Ridge Development I & II
Roadway Name: Road 92

Noise Level Data:

Year: Future (5-Year Horizon Plus Project)
Auto DNL (dB): 65
Medium Truck DNL (dB): 57
Heavy Truck DNL (dB): 62

Site Geometry:

Receiver Description: Nearest first-floor building facades
Centerline to Barrier Distance (C_1): 60
Barrier to Receiver Distance (C_2): 20
Automobile Elevation: 0
Medium Truck Elevation: 2
Heavy Truck Elevation: 8
Pad/Ground Elevation at Receiver: 0
Receiver Elevation: 5
Base of Barrier Elevation: 0
Starting Barrier Height: 6

Barrier Effectiveness:

		-------------------- DNL (dB) --------------------				Barrier Breaks Line of Sight to…		
Top of Barrier Elevation (ft)	**Barrier Height (ft)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**	**Autos?**	**Medium Trucks?**	**Heavy Trucks?**
6	6	59	52	57	**61**	Yes	Yes	Yes
7	7	58	50	57	**61**	Yes	Yes	Yes
8	8	56	49	56	**59**	Yes	Yes	Yes
9	9	55	48	55	**58**	Yes	Yes	Yes
10	10	55	47	53	**57**	Yes	Yes	Yes
11	11	54	46	52	**57**	Yes	Yes	Yes
12	12	53	45	52	**56**	Yes	Yes	Yes
13	13	52	45	51	**55**	Yes	Yes	Yes
14	14	51	44	50	**54**	Yes	Yes	Yes

Notes: 1. Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).
2. Indicated barrier heights assume the difference in roadway and lot elevation is within +/- 2 feet. If a difference of more than +/- 2 feet between roadway and lot elevation would be present, an additional analysis would be required. Nonetheless, the indicated barrier heghts are relative to roadway or lot elevation, whichever is greater.

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