NOISE IMPACT ASSESSMENT

FOR

ELITE TRUCK REPAIR FACILITY PROJECT

2041 RENE AVENUE

SACRAMENTO, CA

MAY 2023

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INTRODUCTION

This report was prepared for the purpose of documenting potential on-site health risks associated with the proposed Elite Truck Repair Project, located at 2041 Rene Avenue, APN: 238-0150-002. The project includes the development of a heavy-duty truck repair facility located adjacent to and north of Rene Avenue.

PROPOSED PROJECT SUMMARY

The owners of the parcel, Elite Truck Repair LLC, propose to construct a new truck service facility to provide minor truck service, truck parking, warehouse space, and administrative office space. The project is being designed to provide service to electric powered trucks. The proposed truck service building is approximately 20,850 square feet and includes: a pre-engineered metal building combined with an office standard metal frame; five service bays for minor repairs and service; a warehouse; truck driver and mechanic locker rooms, visiting trucker lounge and laundry; parts storage, storage area; administrative offices; and a dispatch office. The site would provide truck maintenance service, oil changes, brake service, alignments, and tire changes. Photovoltaic solar panels will be mounted on a "cool" roof. No emergency generators would be required for the facility. Maps depicting the project vicinity and project location are presented in Figure 1 and Figure 2, respectively. The proposed project site is depicted in Figure 3 and the proposed site plan is depicted in Figure 4.

The business would be operational 5 days a week, Monday through Friday from 6:00 a.m. to 5:00 p.m., and would employ the use of a forklift and an air compressor.

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration.

AMPLITUDE

Amplitude is the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic scale as discussed below. Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements have determined that a 10 dB increase in amplitude correlates with a perceived doubling of loudness and a 3 dB change in amplitude is the minimum audible difference perceptible to the average person.

FREQUENCY

Frequency is the number of fluctuations of the pressure wave per second. The unit of frequency is Hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to sound of different frequencies. Sound waves below 16 Hz or above 20,000 Hz cannot be heard at all, and the ear is more sensitive to sound in the higher portion of this range than in the lower. To approximate this sensitivity, environmental sound is usually measured in A-weighted decibels (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA.

ADDITION OF DECIBELS

Because decibels are logarithmic units, sound levels cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces a sound level of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB.

FIGURE 1.PROPOSED PROJECT VICINITY

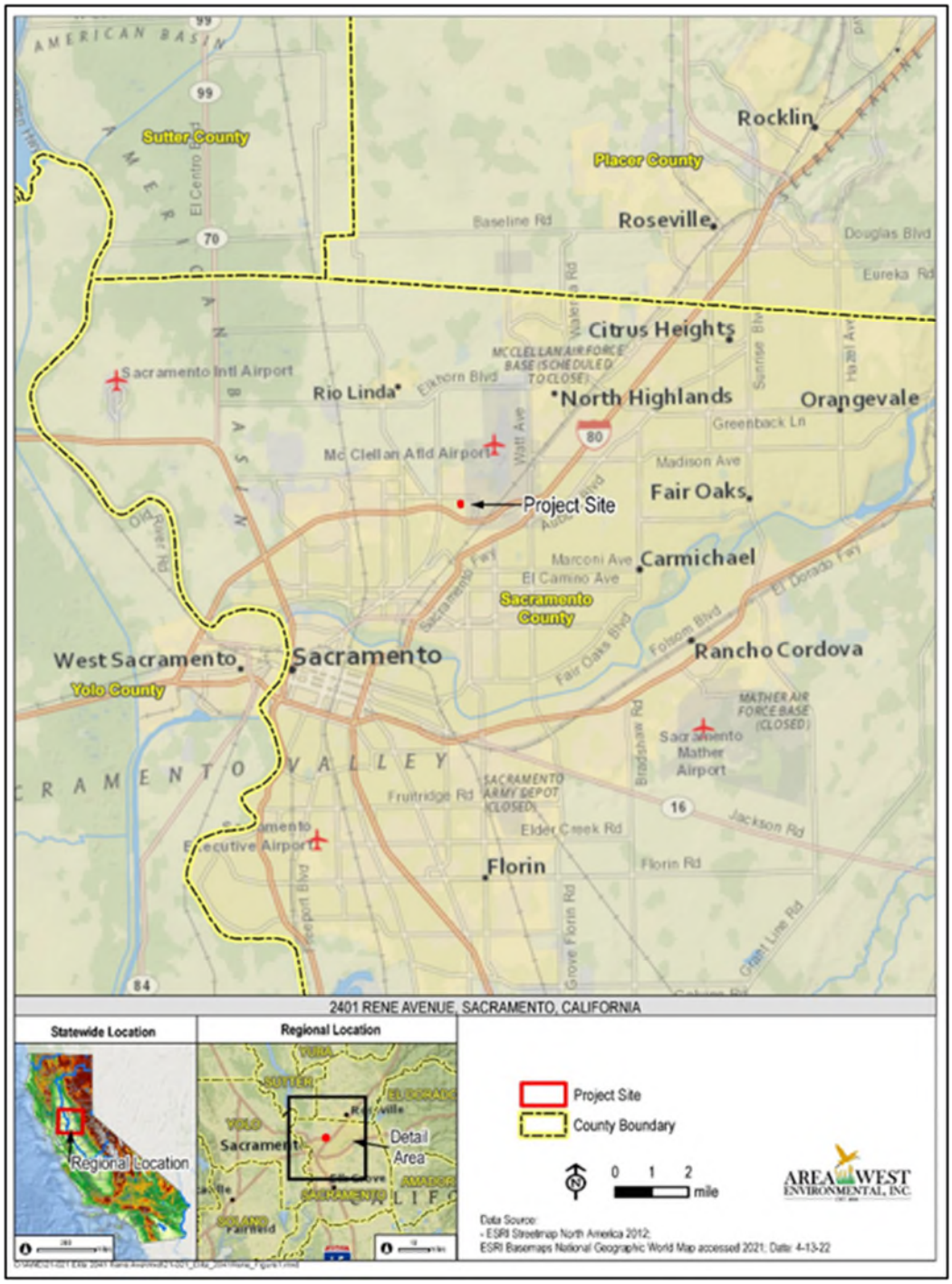
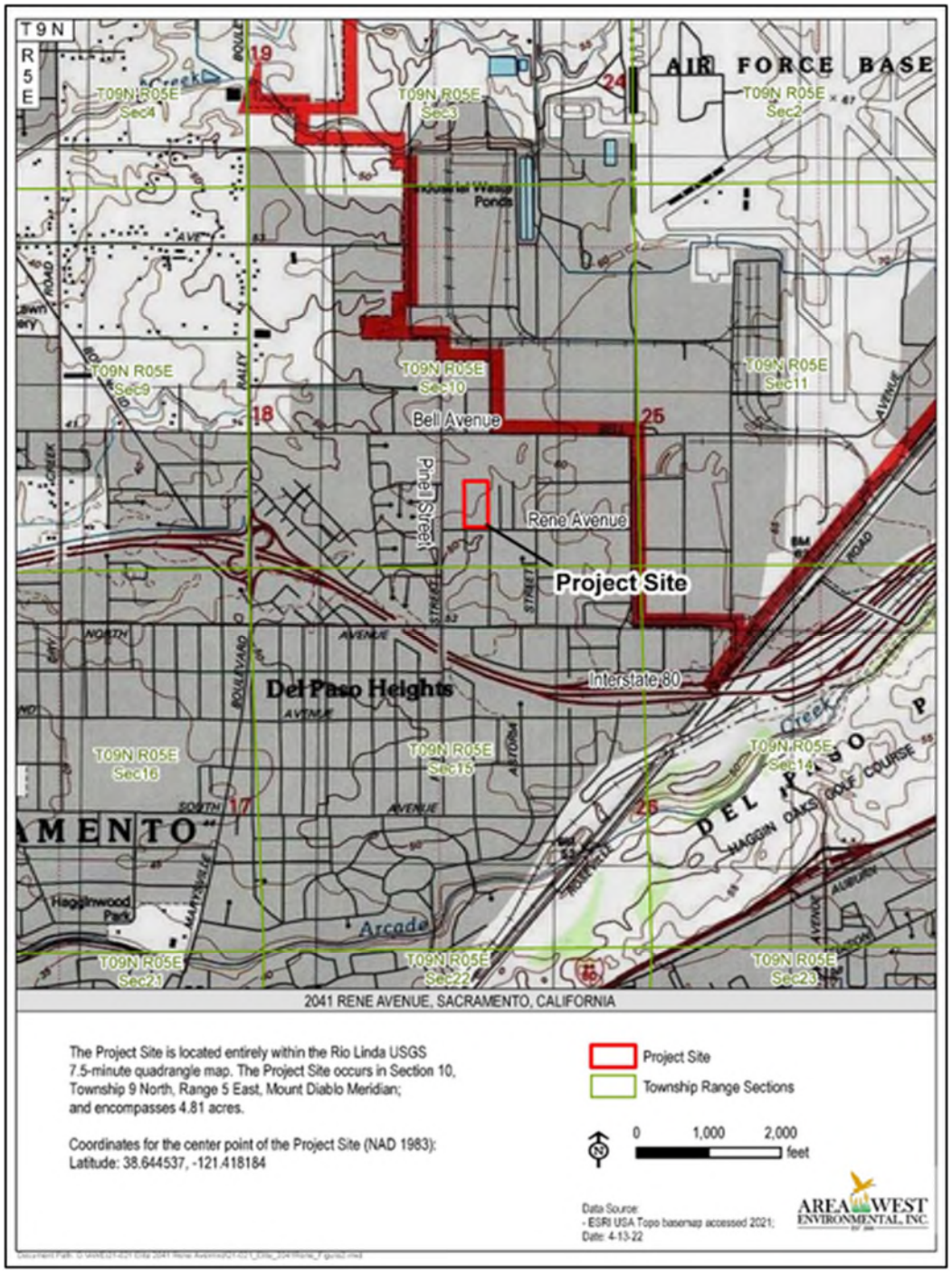


FIGURE 2. PROPOSED PROJECT LOCATION



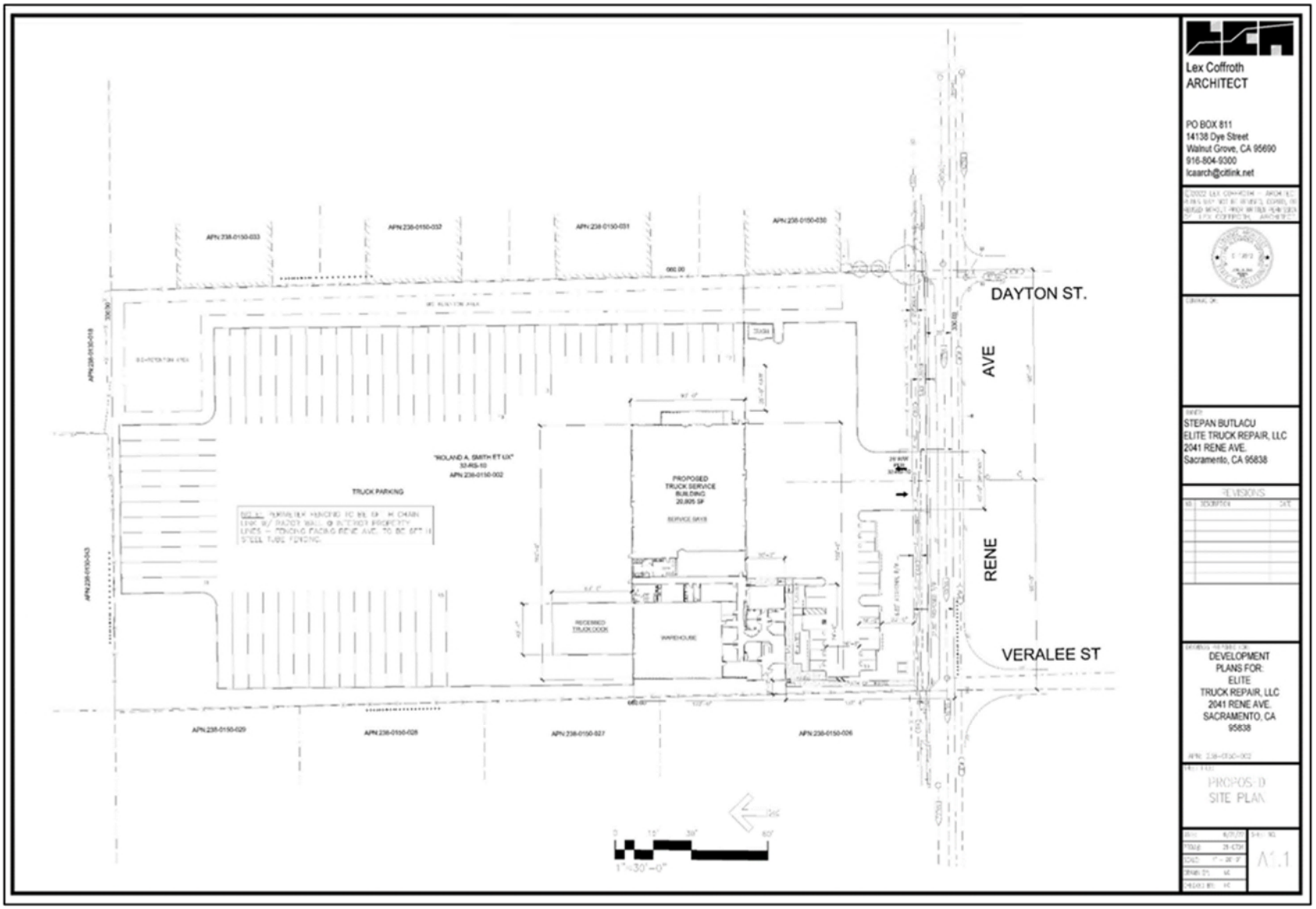
2041 RENE AVENUE, SACRAMENTO, CALIFORNIA

The Project Site is located entirely within the Rio Linda USGS 7.5-minute quadrangle map. The Project Site occurs in Section 10, Township 9 North, Range 5 East, Mount Diablo Meridian; and encompasses 4.81 acres.

Coordinates for the center point of the Project Site (NAD 1983):
Latitude: 38.644537, -121.418184

FIGURE 3. PROPOSED PROJECT SITE

FIGURE 4. PROPOSED SITE PLAN



SOUND PROPAGATION & ATTENUATION

Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, depending on ground surface characteristics. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water,), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between a line source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation for soft surfaces results in an overall attenuation rate of 4.5 dB per doubling of distance from a line source.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in an approximately 5 dB of noise reduction. Taller barriers provide increased noise reduction. Intervening buildings can reduce noise levels by as much as approximately 15 dB.

NOISE DESCRIPTORS

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the sound-pressure level in that range. In general, people are most sensitive to the frequency range of 1,000 to 8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies, which is referred to as the "A-weighted" sound level (expressed in units of dBA). The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments about the relative loudness or annoyance of a sound, their judgments correlate well with the A-weighted noise scale. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with environmental noise. In addition, the intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are typically used. Common noise descriptors used in this analysis are summarized in Table 1.

TABLE 1. COMMON ACOUSTICAL TERMS AND DESCRIPTORS

Descriptor	Definition
Decibel (dB)	A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to referenced sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Energy Equivalent Noise Level (L_{eq})	The energy mean (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value (in dBA) is calculated.
Maximum Noise Level (L_{max})	The maximum instantaneous noise level during a specific period of time.

REGULATORY FRAMEWORK

CITY OF SACRAMENTO NOISE ORDINANCE

The City of Sacramento has adopted noise ordinances that contain limitations intended to prevent noise that may create dangerous, injurious, noxious, or otherwise objectionable conditions. These standards are to be applied at any point on a residential or agricultural property, such as rear yards, that are intended to accommodate leisure or active use. The City's noise standards are summarized in Table 2. As depicted, average-hourly noise levels are limited to 55 dBA L_{eq} during the daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA L_{eq} during the nighttime hours (10:00 p.m. to 7:00 a.m.).

TABLE 2. CITY OF SACRAMENTO EXTERIOR NOISE STANDARDS

Noise Level Descriptor	Noise Level (dBA)	
	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Average-Hourly Noise Level (L_{eq})	55	50
Note: Each of the noise levels specified shall be lowered by five dB for simple tone noises, noises consisting primarily of speech, or music. *Source: City of Sacramento 2023*		

AMBIENT NOISE ENVIRONMENT

NOISE-SENSITIVE LAND USES

Noise-sensitive receptors in the project area consist predominantly of residential dwellings located to the east, west, and south of the project site. The nearest residential-use property line is located approximately 215 feet south of the proposed project, across Rene Avenue. In addition, Bell Avenue Elementary School is located northwest of the project site, at the intersection of Bell Avenue and Pinell Street. Nearby noise-sensitive land uses are depicted in Figure 3. Proposed Project Site.

NOISE IMPACT ASSESSMENT

METHODOLOGY

Operational noise levels associated with the proposed truck repair facility were calculated based on the noise levels associated with the operation of pneumatic tools and air compressors, which is the loudest equipment anticipated to be used onsite. Operational noise levels at nearby land uses were calculated using the SoundPlan, version 8.2, computer program and assuming an average operational noise level of 96 dBA L_{eq} at 10 feet (FHWA 2023). Predicted noise levels take into account intervening structures and terrain. Modeled receivers were placed at the nearest property lines of residential land uses.

PREDICTED NOISE LEVELS

Predicted operational noise levels and contours associated with the proposed project are summarized in Table 1Table 3 and are depicted in Figure 5. As depicted in Table 3, predicted operational noise levels at the property line of residential land uses would range from approximately 43 to 66 dBA L_{eq}. Predicted operational noise levels at nearby residential land uses (R2 and R4) would exceed the City's daytime noise standard of 55 dBA L_{eq}. Additionally, predicted operational noise levels at nearby residential land uses (R1, R2, R4, and R6) would exceed the City's nighttime noise standard of 45 dBA L_{eq}. Predicted daytime operational noise levels at Bell Avenue Elementary School would not exceed the City's daytime noise standard.

TABLE 3. PREDICTED EXTERIOR OPERATIONAL NOISE LEVELS AT NEARBY NOISE-SENSITIVE LAND USES WITHOUT RECOMMENDED MITIGATION MEASURES

Receiver	Land Use Type	Project Noise Level (dBA L_{eq})	Exceeds Noise Standard?	
			Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
R1	Residential	51.5	No	**Yes**
R2	Residential	56.3	**Yes**	**Yes**
R3	Residential	43.0	No	No
R4	Residential	66.0	**Yes**	**Yes**
R5	Residential	41.6	No	No
R6	Residential	54.6	No	**Yes**

Based on City of Sacramento daytime and nighttime noise standards of 55 and 50 dBA Leq, respectively (refer to Table 2).
Refer to Figure 5 for modeled receiver locations and predicted noise contours.

RECOMMENDED MITIGATION MEASURES

The following mitigation measures are recommended:

1. Truck service bay doors shall not be constructed along the southern building façade.
2. A 6-foot-tall noise barrier (PB1) shall be constructed along the western property line extending from the building façade northward to an approximate length of 180 feet. The barrier shall be constructed of masonry block or material of similar density and usage with no visible air gaps at the base of the barrier or between barrier construction materials (refer to Figure 6 for recommended noise barrier locations).
3. A 10-foot-tall noise barrier (PB2) shall be constructed along the eastern property line to an approximate length of 245 feet. The barrier shall be constructed of masonry block or material of similar density and usage with no visible air gaps at the base of the barrier or between barrier construction materials (refer to Figure 6 for recommended noise barrier locations).
4. Air compressors shall be fully enclosed (e.g., placed within an equipment storage room).
5. Operation of the truck repair facility shall be limited to the daytime hours of 7:00 a.m. and 10:00 p.m.

SIGNIFICANCE AFTER MITIGATION

Predicted noise levels, with recommended mitigation measures, are summarized in Table 4 and depicted in Figure 6. As depicted in Table 4, predicted operational noise levels at the property line of residential land uses would range from approximately 39 to 55 dBA L_{eq}. Predicted operational noise levels at nearby residential land uses would not exceed the City's daytime noise standard of 55 dBA L_{eq}. Implementation of Mitigation Measure 5 would limit truck bay operational activities to the daytime hours. With mitigation, predicted operational activities associated with the proposed truck repair facility would not exceed the City's daytime noise standard of 55 dBA L_{eq}.

TABLE 4. PREDICTED EXTERIOR OPERATIONAL NOISE LEVELS AT NEARBY NOISE-SENSITIVE LAND USES WITH RECOMMENDED MITIGATION MEASURES

Receiver	Land Use Type	Project Noise Level (dBA L_{eq})	Exceeds Daytime Noise Standard?
R1	Residential	48.9	No
R2	Residential	54.7	No
R3	Residential	42.9	No
R4	Residential	48.7	No
R5	Residential	38.7	No
R6	Residential	47.8	No

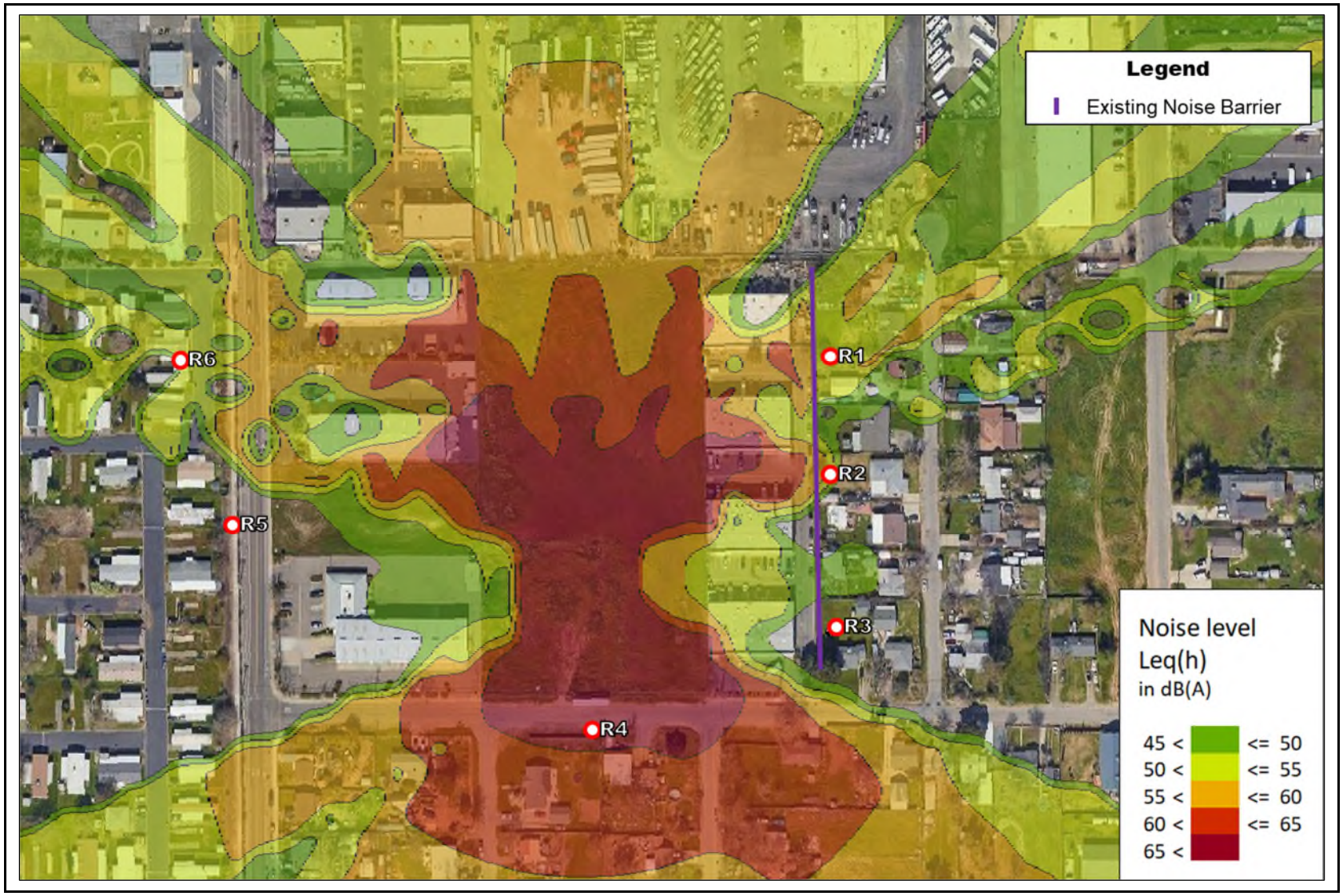
With recommended mitigation measures, operational activities would be limited to the daytime hours of 7:00 a.m. to 10:00 p.m.
Based on City of Sacramento daytime noise standard of 55 dBA Leq (refer to Table 2).
Refer to Figure 6 for modeled receiver locations and predicted noise contours.

SUMMARY OF FINDINGS & RECOMMENDATIONS

Based on the analysis conducted, operational noise levels would exceed the City's nighttime and daytime noise standards at nearby residential land uses. To minimize operational noise impacts to nearby land uses and to better ensure compliance with City noise standards, the following measures are recommended:

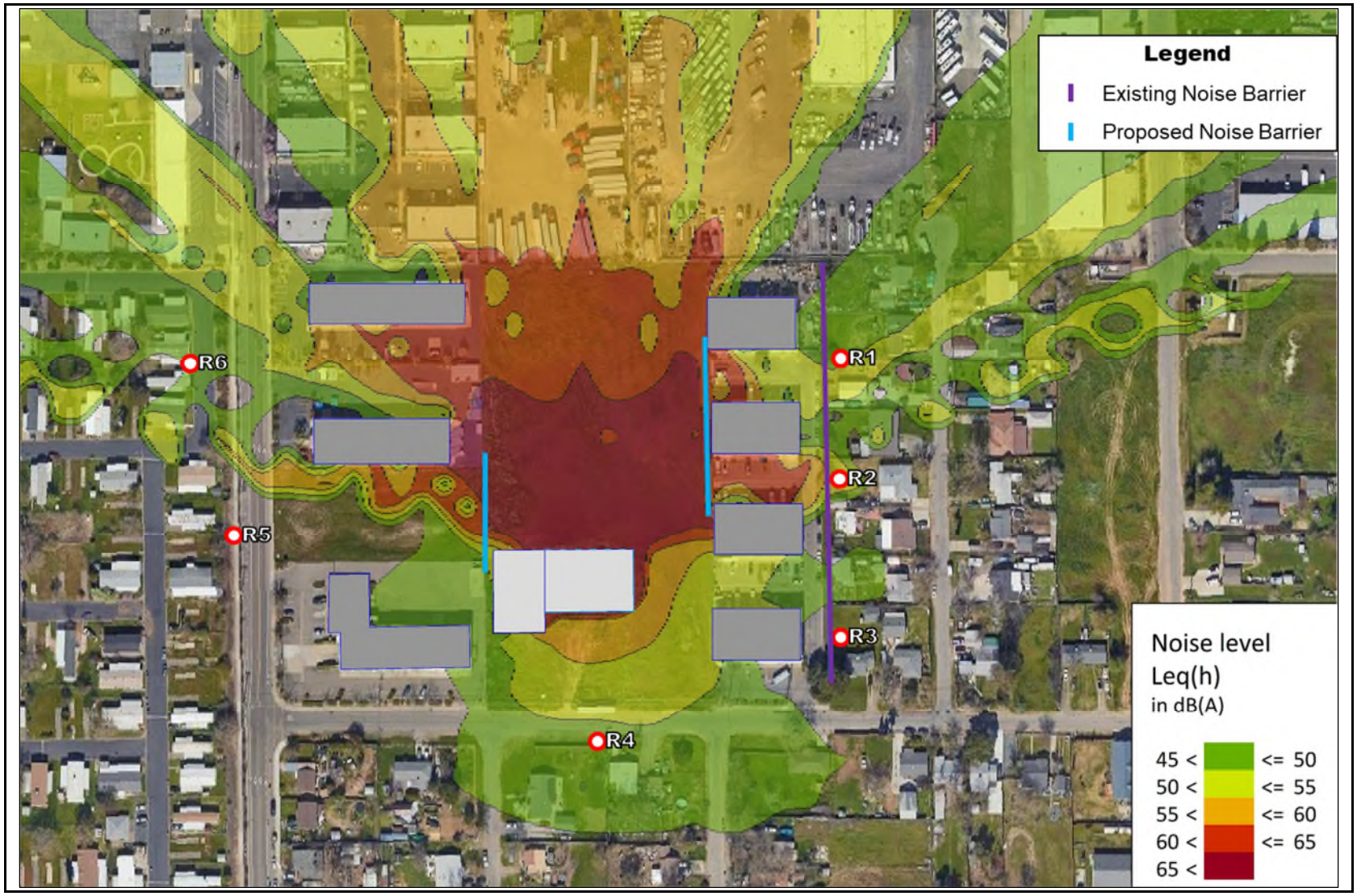
1. Truck service bay doors shall not be constructed along the southern building façade.
2. A 6-foot-tall noise barrier (PB1) shall be constructed along the western property line to an approximate length of 180 feet. The barrier shall be constructed of masonry block or material of similar density and usage with no visible air gaps at the base of the barrier or between barrier construction materials (refer to Figure 6 for recommended noise barrier locations).
3. A 10-foot-tall noise barrier (PB2) shall be constructed along the eastern property line to an approximate length of 245 feet. The barrier shall be constructed of masonry block or material of similar density and usage with no visible air gaps at the base of the barrier or between barrier construction materials (refer to Figure 6 for recommended noise barrier locations).
4. Air compressors shall be fully enclosed (e.g., placed within an equipment storage room).
5. Operation of the truck repair facility shall be limited to the daytime hours of 7:00 a.m. and 10:00 p.m.

FIGURE 5. PREDICTED OPERATIONAL NOISE LEVELS & NOISE CONTOURS WITHOUT RECOMMENDED MITIGATION MEASURES



Noise levels and contours were calculated using the SoundPlan computer program.

FIGURE 6. PREDICTED OPERATIONAL NOISE LEVELS & NOISE CONTOURS WITH RECOMMENDED MITIGATION MEASURES



Noise levels and contours were calculated using the SoundPlan computer program.

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