

Noise Impact Assessment for the Calvine Chevron Project

Sacramento County, California

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Attachment B – Federal Highway Administration Roadway Construction Noise Model Outputs – Project Construction

Attachment C – SoundPLAN Onsite Noise Generation

LIST OF ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
APN	Assessor's Parcel Number
Caltrans	California Department of Transportation
CNEL	Community Noise Equivalent Level
County	Sacramento County
dB	Decibel
dBA	Decibel is A-weighted
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FTA	Federal Transit Administration
Hz	Hertz
ITE	Institute of Transportation Engineers
L _{dn}	Day-night average sound level
L _{eq}	Measure of ambient noise
L _{max}	The maximum A-weighted noise level during the measurement period.
L _{min}	The minimum A-weighted noise level during the measurement period.
NIOSH	National Institute for Occupational Safety and Health
OPR	Office of Planning and Research
OSHA	Federal Occupational Safety and Health Administration
PPV	Peak particle velocity
Project	Calvine Chevron Project
RCNM	Roadway Construction Noise Model
RMS	Root mean square
SR	State Route
STC	Sound Transmission Class
VdB	Vibration Velocity Level

1.0 INTRODUCTION

This report documents the results of a Noise Impact Assessment completed for the Calvine Chevron Project (Project), which proposes the construction of a convenience store, drive-thru café, a restaurant/retail building, a 12-position gasoline dispensing facility, and carwash. This report was prepared as a comparison of predicted Project noise levels to noise standards promulgated by the Sacramento County (County) General Plan Noise Element and Municipal Code. The purpose of this report is to estimate Project-generated noise and to determine the level of impact the Project would have on the environment.

1.1 Project Location and Description

The Project Site is a 3.08-acre property located approximately 220 feet west of the Elk Grove Florin Road/Calvine Road intersection in the community of Vineyard in unincorporated Sacramento County. The Project Site encompasses the following Assessor's Parcel Number (APN): 115-0120-019-0000. The Project Site is roughly bounded by Calvine Road to the south, with commercial land uses beyond; a tire store and market to the west, with residential land uses beyond; an apartment complex to the northwest; land under construction to the north¹, with a carwash beyond; and a discount retail store and associated parking lot to the east, with a regional shopping center parking lot beyond (see Figure 1-1. Project Location).

The Project Site has a County of Sacramento General Plan land use designation of Commercial and Offices.

The Project proposes a mix of land uses as follows:

- 5,347-square foot convenience store
- 5,382 -square foot retail/restaurant building
- 1,316-square foot Drive-thru Cafe
- 1,550-square foot carwash
- 12-Position Gasoline Dispensing Facility
- 59-Space Parking Lot

The Project Site would be accessible via Calvine Road to the south of the Project Site (See Figure 1-2. Project Site Plan).

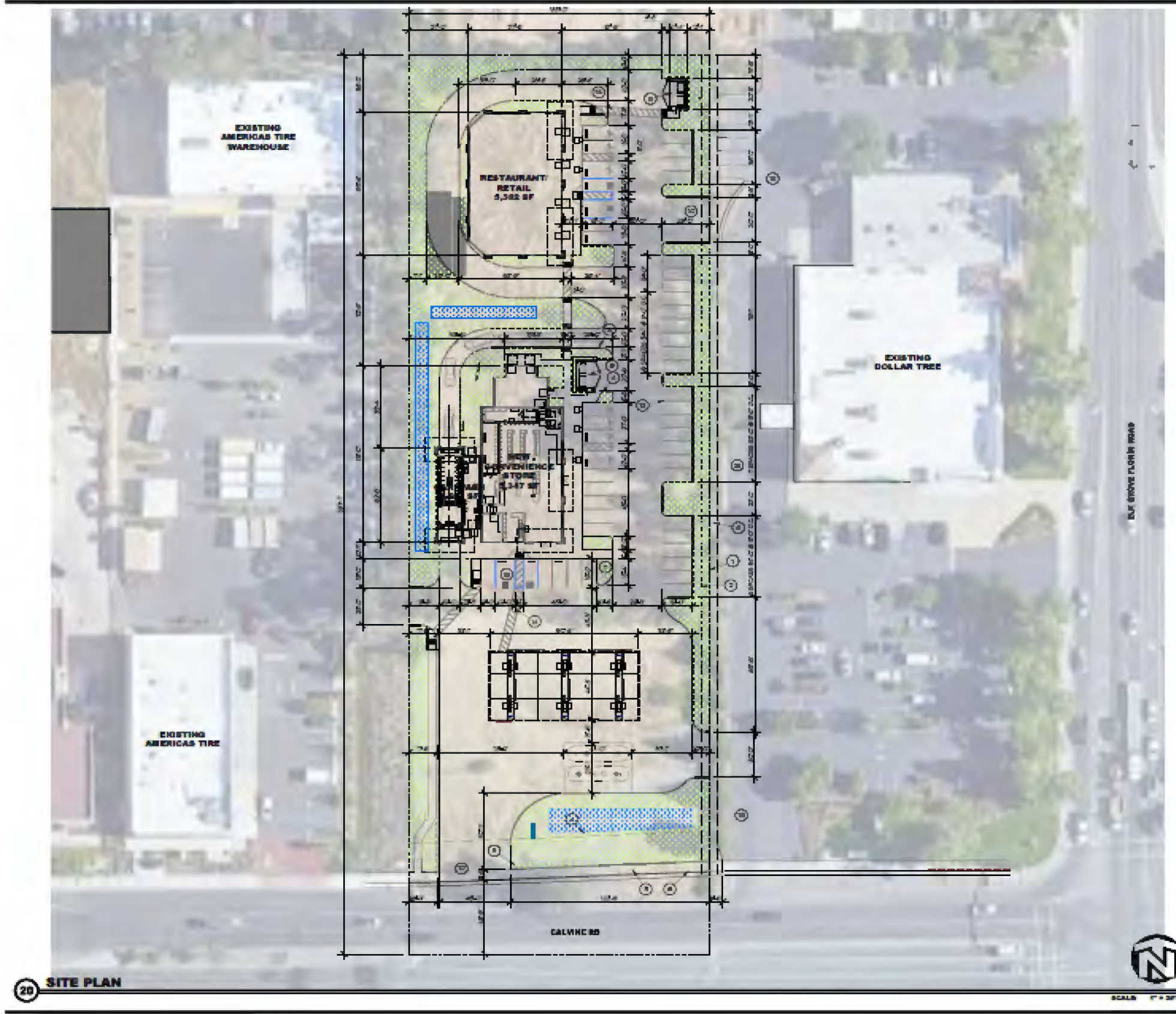
Construction activities would involve the removal of vegetation and paved areas; grading to finished design elevations; excavation to allow construction of building foundations, utilities, roadways, parking areas, sidewalks, and landscaping. Equipment used during construction may include, but is not limited to, crawler tractors, tractors, loaders, backhoes, excavators, graders, scrapers, cranes, forklifts, generator sets, welders, pavers, paving equipment, rollers, and air compressors.

¹ This land is designated Low Density Residential in the County of Sacramento General Plan.



Figure 1-1. Project Location

Location: N:\2016\2016-130 MedMen Cultivation\MAPS\Borders\MedMen Site Plan.mxd (AA)-mapping_quest 9/13/2016



20 SITE PLAN



SCALE 1" = 20'

PROJECT INFORMATION

ADDRESS (PARCEL NUMBER): 115415470000
 ZONING: LC LIGHT COMMERCIAL
 PROJECT SITE AREA (ACRES): (2.81 ACRES) 124,044 S.F.

BUILDING DATA

STRUCTURE	C.S.C. OCCUP	TYPE OF CONTE	AREA
CUSTOMER	AM	V.B	5,367 S.F.
BARBER	AM	V.B	1,714 S.F.
RESTAURANT/RETAIL	AM	V.B	5,880 S.F.
CAR WASH	B	V.B	1,559 S.F.

PARKING DATA

BUILDING AREA	PARKING REQUIREMENT	KEYS
CUSTOMER	14 (1,000 SF) = 20	
BARBER	14 (1,000 SF) = 5	
RESTAURANT/RETAIL (0.200 OF AREA)	14	
RETAIL	14 (1,000 SF) = 14	
CAR WASH (1.000 OF AREA)	14	
TOTAL REQUIRED PARKING	= 58	

PARKING PROVIDED

REGULAR SPACES	= 48
COMPACT SPACES	= 0
VAN ACCESSIBLE	= 0
REGULAR ADA SPACES	= 1
ELECTRIC VEHICLE CHARGING	= 1
TOTAL	= 50

KEYNOTES

- 1 PROPERTY LINE
- 2 DASHED LINE OF EXISTING DRIVE
- 3 ACCESSIBILITY BY ADA COMPLIANCE REQUIRED
- 4 EXISTING CURB CUTS
- 5 EXISTING WALK WAY OF EXISTING DRIVE
- 6 EXISTING CURB AND UTILITY SEE C&M DRAWINGS
- 7 SEE V&E LIST WITH CONCRETE BASE SHALL HAVE A 2% SLOPE TOWARD TRUCK, SEE ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION
- 8 LANDSCAPE SEE LANDSCAPE DRAWINGS
- 9 FINISH ENDOUR AND CONC APPROACH SHALL BE DETAILS SHOWN AND
- 10 NEW DRIVEWAY
- 11 NEW CONC WHEEL STOP
- 12 IF V&E NOT SHOWN, WHEEL WASH HOVED DRIVEWAY
- 13 ACCESSIBLE VAN PARKING STALL
- 14 IF V&E NOT SHOWN, WHEEL WASH HOVED DRIVEWAY
- 15 EXISTING ACCESS DRIVE



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BALJIT SINGH

3457 DEERVA Florida Rd
 Elk Grove, CA 95624

A101-10-24-21

Map Date: 3/20/2024
 Photo (or Base) Source: K12 Architects 2023



Figure 2-1. Project Site Plan

2024-015 Calvine Chevron Project

2.0 ENVIRONMENTAL NOISE AND GROUND BORNE VIBRATION ANALYSIS

2.1 Fundamentals of Noise and Environmental Sound

2.1.1 Addition of Decibels

The decibel (dB) scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted (dBA), an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be three dB higher than one source under the same conditions (Federal Transit Administration [FTA] 2018). For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by three dB). Under the decibel scale, three sources of equal loudness together would produce an increase of five dB.

Typical noise levels associated with common noise sources are depicted in Figure 2-1.

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
<u>Jet Fly-over at 300m (1000 ft)</u>	110	<u>Rock Band</u>
<u>Gas Lawn Mower at 1 m (3 ft)</u>	100	
<u>Diesel Truck at 15 m (50 ft), at 80 km (50 mph)</u>	90	<u>Food Blender at 1 m (3 ft)</u>
<u>Noisy Urban Area, Daytime</u>	80	<u>Garbage Disposal at 1 m (3 ft)</u>
<u>Gas Lawn Mower, 30 m (100 ft)</u>	70	<u>Vacuum Cleaner at 3 m (10 ft)</u>
<u>Commercial Area</u>		<u>Normal Speech at 1 m (3 ft)</u>
<u>Heavy Traffic at 90 m (300 ft)</u>	60	
<u>Quiet Urban Daytime</u>	50	<u>Large Business Office</u>
		<u>Dishwasher Next Room</u>
<u>Quiet Urban Nighttime</u>	40	<u>Theater, Large Conference Room (Background)</u>
<u>Quiet Suburban Nighttime</u>		
	30	<u>Library</u>
<u>Quiet Rural Nighttime</u>		<u>Bedroom at Night,</u>
	20	<u>Concert Hall (Background)</u>
		<u>Broadcast/Recording Studio</u>
	10	
<u>Lowest Threshold of Human Hearing</u>	0	<u>Lowest Threshold of Human Hearing</u>

Source: California Department of Transportation (Caltrans) 2020a

Figure 2-1. Common Noise Levels



2.1.2 Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB (dBA) for each doubling of distance from a stationary or point source (FHWA 2017). Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dBA for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2017). No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dBA per doubling of distance is normally assumed. For line sources, an overall attenuation rate of three dB per doubling of distance is assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures; generally, a single row of detached buildings between the receptor and the noise source reduces the noise level by about five dBA (FHWA 2006), while a solid wall or berm generally reduces noise levels by 10 to 20 dBA (FHWA 2011). However, noise barriers or enclosures specifically designed to reduce site-specific construction noise can provide a sound reduction 35 dBA or greater (Western Electro-Acoustic Laboratory, Inc. 2021). To achieve the most potent noise-reducing effect, a noise enclosure/barrier must physically fit in the available space, must completely break the "line of sight" between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers must be sizable enough to cover the entire noise source and extend lengthwise and vertically as far as feasibly possible to be most effective. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. In general, barriers contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver.

The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002). The exterior-to-interior reduction of newer residential units is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. [HMMH] 2006). Generally, in exterior noise environments ranging from 60 dBA Community Noise Equivalent Level (CNEL) to 65 dBA CNEL, interior noise levels can typically be maintained below 45 dBA, a typical residential interior noise standard, with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. (STC is an integer rating of how well a building partition attenuates airborne sound. In the U.S., it is widely used to rate interior partitions, ceilings, floors, doors, windows, and exterior wall configurations). In exterior noise environments of 65 dBA CNEL or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA CNEL with proper wall construction techniques following California Building Code methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

2.1.3 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. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise include the average hourly noise level (in L_{eq}) and the average daily noise levels/community noise equivalent level (in L_{dn} /CNEL). The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL are measures of community noise. Each is applicable to this analysis and defined as follows:

Equivalent Noise Level (L_{eq}) is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

Day-Night Average (L_{dn}) is a 24-hour average L_{eq} with a 10-dBA "weighting" added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn} .

Community Noise Equivalent Level (CNEL) is a 24-hour average L_{eq} with a 5-dBA weighting during the hours of 7:00 pm to 10:00 pm and a 10-dBA weighting added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the evening and nighttime, respectively.

Table 2-1 provides a list of other common acoustical descriptors.

Table 2-1. Common Acoustical Descriptors	
Descriptor	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels is measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
L_{max} , L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01} , L_{10} , L_{50} , L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	A 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn} .
Community Noise Equivalent Level, CNEL	A 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.

The A-weighted decibel sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about ± 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source. Close to the noise source, the models are accurate to within about ± 1 to 2 dBA.

2.1.4 Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL or L_{dn} is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels (dBA), the following relationships should be noted in understanding this analysis:

Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.

Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.

A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.

A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

2.1.5 Effects of Noise on People

2.1.5.1 Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

2.1.5.2 Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes of annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation between noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources.

2.2 Fundamentals of Environmental Groundborne Vibration

2.2.1 Vibration Sources and Characteristics

Sources of earthborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or manmade causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude). Because the average particle velocity over time is zero, the RMS amplitude is typically used to assess human response. The RMS value is the average of the amplitude squared over time, typically a 1- sec. period (FTA 2018).

Table 2-2 displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high-noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. For instance, heavy-duty trucks generally generate groundborne vibration velocity levels of 0.006 PPV at 50 feet under typical circumstances, which as identified in Table 2-2 is considered very unlikely to cause damage to buildings of any type. Common sources for groundborne vibration are planes, trains, and construction activities such as earthmoving which requires the use of heavy-duty earth moving equipment.

Table 2-2. Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels

Peak Particle Velocity (inches/second)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006–0.019	64–74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Threshold at which there is a risk of architectural damage to extremely fragile historic buildings, ruins, ancient monuments
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Threshold at which there is a risk of architectural damage to fragile buildings. Virtually no risk of architectural damage to normal buildings
0.25	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to historic and some old buildings
0.3	96	Vibrations may begin to feel severe to people in buildings	Threshold at which there is a risk of architectural damage to older residential structures
0.5	103	Vibrations considered unpleasant by people subjected to continuous vibrations	Threshold at which there is a risk of architectural damage to new residential structures and Modern industrial/commercial buildings

Source: Caltrans 2020b

3.0 EXISTING ENVIRONMENTAL NOISE SETTING

3.1 Noise Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as hospitals, historic sites, cemeteries, and certain recreation areas are considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses. The nearest sensitive receptors to the Project Site include the residential apartments located approximately 135 feet from its northwest corner. Additionally, the land immediately adjacent to the northern boundary of the Project Site is currently under construction. It is noted that this land is designated Low Density Residential in the County of Sacramento General Plan, and it is therefore likely that sensitive receptors will be present in the near future.

3.1.1 Existing Ambient Noise Environment

The County experiences typical urban and suburban noises, such as mobile noise sources from vehicles on roadways, railway and airport noise, intermittent construction noises, general outdoor noise activities. Major transportation noise sources within the County include the Sacramento Executive Airport and Sacramento International Airport, freeways such as State Route (SR) 99, SR 160, SR 80, and Interstate-5, and railroad lines. Within the Project Area, the most common and significant noise sources are associated with traffic on Calvine Road and Elk Grove Florin Road, commercial activities adjacent to the Site and in surrounding area, highway noise from SR 99, railroad noise, and other typical residential noises like dogs barking, radios, and landscaping equipment.

The American National Standards Institute (ANSI) Standard 12.9-2013/Part 3 "Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-Term Measurements with an Observer Present" provides a table of approximate background sound levels in CNEL, daytime L_{eq} , and nighttime L_{eq} , based on land use and population density. The ANSI standard estimation divides land uses into six distinct categories. Descriptions of these land use categories, along with the typical daytime and nighttime levels, are provided in Table 3-1. At times, one could reasonably expect the occurrence of periods that are both louder and quieter than the levels listed in the table. ANSI notes, "95% prediction interval [confidence interval] is on the order of +/- 10 dB." The majority of the area surrounding the Project Site is surrounded by noisy commercial land uses and heavily used roadways. Thus, the Project vicinity would be considered ambient noise Category 1 or 2 and generally experience noise levels of 62 to 67 dBA CNEL.

Table 3-1. ANSI Standard 12.9-2013/Part 3 A-weighted Sound Levels Corresponding to Land Use and Population Density

Category	Land Use	Description	People per Square Mile	Typical CNEL	Daytime Leq	Nighttime Leq
1	Noisy Commercial & Industrial Areas and Very Noisy Residential Areas	Very heavy traffic conditions, such as in busy, downtown commercial areas; at intersections for mass transportation or for other vehicles, including elevated trains, heavy motor trucks, and other heavy traffic; and at street corners where many motor buses and heavy trucks accelerate.	63,840	67 dBA	66 dBA	58 dBA
2	Moderate Commercial & Industrial Areas and Noisy Residential Areas	Heavy traffic areas with conditions similar to Category 1, but with somewhat less traffic; routes of relatively heavy or fast automobile traffic, but where heavy truck traffic is not extremely dense.	20,000	62 dBA	61 dBA	54 dBA
3	Quiet Commercial, Industrial Areas and Normal Urban & Noisy Suburban Residential Areas	Light traffic conditions where no mass transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at moderate speeds; residential areas and commercial streets, and intersections, with little traffic compose this category.	6,384	57 dBA	55 dBA	49 dBA
4	Quiet Urban & Normal Suburban Residential Areas	These areas are similar to Category 3, but for this group, the background is either distant traffic or is unidentifiable; typically, the population density is one-third the density of Category 3.	2,000	52 dBA	50 dBA	44 dBA
5	Quiet Residential Areas	These areas are isolated, far from significant sources of sound, and may be situated in shielded areas, such as a small wooded valley.	638	47 dBA	45 dBA	39 dBA
6	Very Quiet Sparse Suburban or rural Residential Areas	These areas are similar to Category 4 but are usually in sparse suburban or rural areas; and, for this group, there are few if any nearby sources of sound.	200	42 dBA	40 dBA	34 dBA

Source: The American National Standards Institute (ANSI) 2013

3.1.2 Existing Roadway Noise Levels

Existing roadway noise levels were calculated for the roadway segments in the Project vicinity. This task was accomplished using the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108) (see Attachment A) and traffic volumes and intersection data from Fehr and Peers (2024). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by Caltrans. The Caltrans data shows that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. The average daily noise levels along these roadway segments are presented in Table 3-2.

Table 3-2. Existing Roadway Noise Levels		
Roadway Segment	Surrounding Uses	L_{dn} at 100 feet from Centerline of Roadway
Calvine Road		
West of Bains Driveway	Commercial and Residential	67.1
Between Bains Driveway and Walgreens Driveway	Commercial	67.1
Between Walgreens Driveway and Elk Grove Florin Road	Commercial	67.1
East of Elk Grove Florin Road	Commercial and Residential	66.5
Elk Grove Florin Road		
North of Calvine Road	Commercial and Residential	62.8
South of Calvine Road	Commercial and Residential	62.4

Source: Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the trip generation rates and intersection data identified by Fehr and Peers (2024). The most relevant roadway segments were chosen by Fehr and Peers (2024). Refer to Attachment A for traffic noise modeling assumptions and results.

As shown, the existing traffic-generated noise level on Project-vicinity roadways currently ranges from 62.4 to 67.2 dBA L_{dn} at a distance of 100 feet from the centerline. As previously described, A 24-hour average L_{eq} with a 10 dBA “weighting” added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime.

4.0 REGULATORY FRAMEWORK

4.1 Federal

4.1.1 *Occupational Safety and Health Act of 1970*

OSHA regulates onsite noise levels and protects workers from occupational noise exposure. To protect hearing, worker noise exposure is limited to 90 decibels with A-weighting (dBA) over an eight-hour work shift (29 Code of Regulations 1910.95). Employers are required to develop a hearing conservation program when employees are exposed to noise levels exceeding 85 dBA. These programs include provision of hearing protection devices and testing employees for hearing loss on a periodic basis.

4.1.2 *National Institute of Occupational Safety and Health*

A division of the US Department of Health and Human Services, the National Institute for Occupational Safety and Health (NIOSH) has established a construction-related noise level threshold as identified in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998. NIOSH identifies a noise level threshold based on the duration of exposure to the source. The NIOSH construction-related noise level threshold starts at 85 dBA for more than 8 hours per day; for every 3-dBA increase, the exposure time is cut in half. This reduction results in noise level thresholds of 88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. The intention of these thresholds is to protect people from hearing losses resulting from occupational noise exposure.

4.1.3 *Federal Interagency Committee on Noise (FICON)*

The FICON thresholds of significance assist in the evaluation of increased traffic noise. The 2000 FICON findings provide guidance as to the significance of changes in ambient noise levels due to transportation noise sources. FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing and future noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA CNEL and the project creates a readily perceptible 5 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards, or
- If the existing noise levels range from 60 to 65 dBA CNEL and the project creates a barely perceptible 3 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards, or
- If the existing noise levels already exceed 65 dBA CNEL and the project creates a community noise level increase of greater than 1.5 dBA CNEL.

4.2 State

4.2.1 State of California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The State of California General Plan Guidelines (State of California 2003), published by the Governor's Office of Planning and Research (OPR), also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

4.2.2 State Office of Planning and Research Noise Element Guidelines

The State OPR *Noise Element Guidelines* include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a Land Use Compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL.

4.2.3 California Department of Transportation

In 2020, the California Department of Transportation (Caltrans) published the Transportation and Construction Vibration Manual (Caltrans 2020b). The manual provides general guidance on vibration issues associated with the construction and operation of projects concerning human perception and structural damage. Table 2-2 above presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

4.3 Local

4.3.1 County of Sacramento General Plan Noise Element

The Noise Element of the General Plan provides policy direction for minimizing excessive noise within the community and aims to protect residents, visitors, and noise-sensitive land uses from health impacts and excessive noise. The General Plan's Noise Element identifies noise-sensitive land uses and establishes noise level standards for land uses affected by transportation and non-transportation noise. The result of these policies and standards is that effective land use planning and mitigation can alleviate the majority of noise problems. The following policies have been identified to be applicable to the Proposed Project:

Traffic and Railroad Noise Sources:

NO-1: The noise level standards for noise-sensitive areas of new uses affected by traffic or railroad noise sources in Sacramento County are shown by [Table 4-1]. Where the noise level standards of [Table 4-1] are predicted to be exceeded at new uses proposed within Sacramento County which are affected by traffic or

railroad noise, appropriate noise mitigation measures shall be included in the project design to reduce projected noise levels to a state of compliance with the [Table 4-1] standards.

Table 4-1. Sacramento County Traffic and Railroad Noise Standards		
Land Use Categories	Exterior Noise (L_{dn} dBA)	Interior Noise (L_{dn} dBA)
All Residential ⁵	65	45
Transient Lodging ^{3,5}	65	45
Hospitals and Nursing Homes ^{3,4,5}	65	45
Theaters and Auditoriums ³	--	35
Church, Meeting Halls ³	65	40
Schools, Libraries, etc. ³	65	40
Office Buildings ³	65	45
Commercial Buildings ³	65	50
Playgrounds and Parks, etc. ³	70	--
Industry ³	65	50

Source: Sacramento County General Plan Noise Element, amended 2022.

Notes:

1. Sensitive areas are defined as "the primary outdoor activity area associated with any given land use at which noise-sensitivity exists and the location at which the County's exterior noise level standards are applied".
2. Interior noise standards are applied to noise-sensitive areas of the various land uses, with closed windows and doors.
3. Where there are no sensitive exterior spaces proposed for these uses, only the interior noise level standard shall apply.
4. Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
5. If this use is affected by railroad noise, a maximum (L_{max}) noise level standard of 70 dB shall be applied to all sleeping rooms to reduce the potential for sleep disturbance during nighttime train passages.

NO-5: The interior and exterior noise level standards for noise-sensitive areas of new uses affected by existing non-transportation noise sources in Sacramento County are shown by [Table 4-2]. Where the noise level standards of [Table 4-2] are predicted to be exceeded at a proposed noise-sensitive area due to existing non-transportation noise sources, appropriate noise mitigation measures shall be included in the project design to reduce projected noise levels to a state of compliance with the [Table 4-2] standards within sensitive areas.

Table 4-2. Sacramento County Non-Transportation Noise Standards		
Land Use Categories	Exterior Daytime/Nighttime L_{eq} (dBA)	Interior Daytime/Nighttime L_{eq} (dBA)
All Residential	55/50	55/35
Transient Lodging ⁴	55/-	55/35
Hospitals and Nursing Homes ^{5,6}	55/-	55/35
Theaters and Auditoriums ⁶	55/-	50/30
Church, Meeting Halls ⁶	55/-	60/35
Schools, Libraries, etc. ⁶	55/-	60/35
Office Buildings ⁶	60/-	65/45
Commercial Buildings ⁶	55/-	45/65
Playgrounds and Parks, etc. ⁶	65/-	--
Industry ⁶	60/-	70/50

Source: Sacramento County General Plan Noise Element, amended 2022.

Notes:

1. The standards shall be reduced by 5 dB for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards, then the noise level standards shall be increased at 5 dB increments to encompass the ambient
2. Sensitive areas are defined as “the primary outdoor activity area associated with any given land use at which noise-sensitivity exists and the location at which the County’s exterior noise level standards are applied”.
3. Interior noise level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.
4. Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.
5. Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
6. The outdoor activity areas of these uses (if any), are not typically utilized during nighttime hours

NO-6: Where a project would consist of or include non-transportation noise sources, the noise generation of those sources shall be mitigated so as not exceed the interior and exterior noise level standards of [Table 4-2] at existing noise-sensitive areas in the project vicinity.

NO-7: The “last use there” shall be responsible for noise mitigation. However, if a noise generating use is proposed adjacent to lands zoned for uses which may have sensitivity to noise, then the noise generating use shall be responsible for mitigating its noise generation to a state of compliance with the [Table 4-2] standards at the property line of the generating use in anticipation of the future neighboring development.

Construction Noise:

NO-8: Noise associated with construction activities shall adhere to the County Code requirements. Specifically, Section 6.68.090(e) addresses construction noise within the County.

General Noise Policy:

NO-13: Where noise mitigation measures are required to satisfy the noise level standards of this Noise Element, emphasis shall be placed on the use of setbacks and site design to the extent feasible, prior to consideration of the use of noise barriers.

NO-15: The County shall have the flexibility to consider the application of 5 dB less restrictive exterior noise standards than those prescribed in Tables [4-1] and [4-2] in cases where it is impractical or infeasible to reduce exterior noise levels within infill projects to a state of compliance with the Table [4-1] and [4-2] standards. In such cases, the rationale for such consideration shall be clearly presented and disclosure statements and noise easements should be included as conditions of project approval. The interior noise level standards of Tables [4-1] and [4-2] would still apply. The maximum allowable long-term noise exposure permissible for non-industrial uses is 75 dB.

The Noise Element contains noise standards for traffic and railroad noise (shown in Table 4-1) and non-transportation noise (shown in Table 4-2).

4.3.2 County of Sacramento Municipal Code

The County of Sacramento regulations with respect to noise are included in Chapter 6.68 of the Municipal Code. The Noise Regulations provide noise standards and restrictions within the County. Section 6.68.90 exempts noise associated with construction, repair, remodeling, demolition, paving, or grading, provided that the activities do not take place between the hours of 8:00 p.m. to 6:00 a.m., Monday through Saturday and 8:00 p.m. to 7:00 a.m. on weekends. Furthermore, the Municipal Code notes that when an unforeseen or unavoidable condition occurs during a construction project and the nature of the project necessitates that work in process be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after 8:00 p.m. and are permitted to operate machinery and equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner.

5.0 Impact Assessment

5.1 Thresholds of Significance

The impact analysis provided below is based on the following California Environmental Quality Act Guidelines Appendix G thresholds of significance. The Project would result in a significant noise-related impact if it would result in the:

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

For the purposes of this analysis, Project construction noise is compared to the allowable hours of construction mandated by the County as well as the NIOSH standard of 85 dBA for more than 8 hours per day, since construction work for the Proposed Project is anticipated to span a typical workday of 8 hours daily. The County does not regulate vibrations associated with construction; however, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, the Caltrans (2020b) recommended construction vibration standard of 0.5 inch per second PPV with prevention of damage to new residential structures and modern industrial/commercial buildings. The Project would not be a source of groundborne vibration during operations. The increase in transportation-related noise is compared against the County's transportation noise standards limits identified in Table 4-1. Onsite noise generated as a result of Project operations is compared to County's non-transportation noise standards (see Table 4-2).

5.2 Methodology

This analysis of the existing and future noise environments is based on empirical observations and noise prediction modeling. Predicted construction noise levels were calculated utilizing the FHWA's Roadway Construction Noise Model (2006). Groundborne vibration levels associated with construction-related activities for the Project have been evaluated utilizing typical groundborne vibration levels associated with construction equipment. Potential groundborne vibration impacts related to structural damage and human annoyance were evaluated, taking into account the distance from construction activities to nearby structures and typically applied criteria for structural damage and human annoyance.

Transportation-source noise levels associated with the Project were calculated using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) with trip generation rates from the Fehr and Peers (2024). Onsite stationary source noise levels associated with the Project have been calculated with the SoundPLAN 3D noise model, which predicts noise propagation from a noise source based on the location, noise level, and frequency spectra of the noise sources as well as the geometry and reflective properties of the local terrain,

buildings and barriers. SoundPLAN allows computer simulations of noise situations, and creates noise contours maps using reference noise levels, topography, point and area noise sources, mobile noise sources, and intervening structures. Modeled noise levels are based on reference noise levels. Noise levels are collected from field noise measurements and other published sources from similar types of activities and are then used to estimate noise levels expected with the Project's non-transportation noise sources. The reference noise levels are used to represent a worst-case noise environment as noise levels from area and point sources (e.g., parking lot activity, drive-thru speaker, carwash air dryers, vacuums) can vary throughout the day.

5.3 Impact Analysis

5.3.1 ***Would the Project Result in Short-Term Construction-Generated Noise in Excess of County Standards?***

Onsite Construction Noise

Construction noise associated with the Proposed Project would be temporary and would vary depending on the specific nature of the activities being performed. Noise generated would primarily be associated with the operation of off-road equipment for onsite construction activities as well as construction vehicle traffic on area roadways. Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., site preparation, excavation, paving). Noise generated by construction equipment, including earth movers, pile drivers, and portable generators, can reach high levels. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance would be random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). During construction, exterior noise levels could negatively affect sensitive land uses in the vicinity of the construction site.

The nearest existing sensitive receptors to the Project Site include the residential apartments located approximately 135 feet from its northwest corner. Additionally, the land immediately adjacent to the northern boundary of the Project Site is currently under construction. It is noted that this land is designated Low Density Residential in the County of Sacramento General Plan, and it is therefore likely that sensitive receptors will be present in the near future. As previously mentioned, the Municipal Code's Section 6.68.90 exempts noise associated with construction, repair, remodeling, demolition, paving, or grading, provided that the activities do not take place between the hours of 8:00 p.m. to 6:00 a.m., Monday through Saturday and 8:00 p.m. to 7:00 a.m. on weekends. In order to remain compliant with the County's regulations, the Proposed Project would be required to follow these construction guidelines because as shown in Table 5-1 below, construction involving heavy duty equipment during the nonexempted hours would exceed County noise standards identified in Table 4-2 above. The County does not promulgate a numeric threshold pertaining to the noise associated with construction. This is due to the fact that construction noise is temporary, short term, intermittent in nature, and would cease on completion of the Project.

To estimate the worst-case onsite construction noise levels that may occur at the nearest noise-sensitive receptor and in order to evaluate the potential health-related effects (physical damage to the ear) from

construction noise, the construction equipment noise levels were calculated using the Roadway Noise Construction Model and compared against the construction-related noise level threshold established in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998 by National Institute for Occupational Safety and Health (NIOSH). A division of the US Department of Health and Human Services, NIOSH identifies a noise level threshold based on the duration of exposure to the source. The NIOSH construction-related noise level threshold starts at 85 dBA for more than 8 hours per day; for every 3-dBA increase, the exposure time is cut in half. This reduction results in noise level thresholds of 88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. For the purposes of this analysis, the lowest, more conservative threshold of 85 dBA L_{eq} is used as an acceptable threshold for construction noise at the nearby sensitive receptors.

It is acknowledged that the majority of construction equipment is not situated at any one location during construction activities, but rather spread throughout the Project Site and at various distances from sensitive receptors. Therefore, this analysis employs FTA guidance for calculating construction noise, which recommends measuring construction noise produced by all construction equipment simultaneously from the center of the Project Site (FTA 2018), which in this case is approximately 279 feet from the parcel to the north of the Project Site that currently under construction and is likely to be low density residential units upon completion. The anticipated short-term construction noise levels generated for the necessary equipment for each phase of construction are presented in Table 5-1.

Construction Phase	Exterior Construction Noise Level @ Closest Noise Sensitive Receptor (dBA L_{eq})	Construction Noise Standard (dBA L_{eq})	Exceeds Standards?
Demolition	71.5	85	No
Site Preparation	72.7	85	No
Grading	72.3	85	No
Building Construction	73.2	85	No
Paving	72.7	85	No
Painting	58.8	85	No

Source: Construction noise levels were calculated by ECORP Consulting using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Attachment B for Model Data Outputs.

Notes: Construction equipment used during construction derived from the California Emissions Estimator Model (CalEEMod). CalEEMod is designed to calculate air pollutant emissions from construction activity and contains default construction equipment and usage parameters for typical construction projects based on several construction surveys conducted in order to identify such parameters. Consistent with FTA recommendations for calculating construction noise, construction noise was measured from the center of the Project Site (FTA 2018), which is 279 feet from the nearest future sensitive receptor.

L_{eq} = The equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

As shown in Table 5-1, the Project's contribution of construction noise would not exceed the 85 dBA NIOSH construction noise threshold during any phase of construction at the nearby noise-sensitive receptors. It is noted that construction noise was modeled on a worst-case basis. It is very unlikely that all pieces of construction equipment would be operating at the same time for the various phases of Project construction as well as at the point closest to residences.

Offsite Construction Worker Trips

Project construction would result in additional traffic on adjacent roadways over the period that construction occurs. According to the California Emissions Estimator Model, which is used to predict the number of construction-related automotive trips, the maximum number of Project construction trips traveling to and from the Project Site during a single construction phase would not be expected to exceed 29 daily trips in total. According to Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (2013), a doubling of traffic on a roadway is required to result in an increase of 3 dB (outside of the laboratory, a 3-dBA change is considered a just-perceivable difference). The Project Site would be accessible via Calvine Road during construction. According to Traffic Intersection Analysis provided by Fehr and Peers (2024), Calvine Road between Bains Driveway and Dollar Tree Driveway, where the Project Site is located, currently accommodates a daily traffic volume of approximately 27,603 vehicles. Therefore, the Project's construction trips would not result in a doubling of traffic on the local transportation network, and therefore its contribution to existing traffic noise would not be perceptible. Additionally, it is noted that construction is temporary, and these trips would cease upon completion of the Project.

5.3.2 Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of County Standards During Operations?

As previously described, noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise-sensitive and may warrant unique measures for protection from intruding noise. The nearest existing sensitive receptors to the Project Site include the residential apartments located approximately 135 feet from its northwest corner. Additionally, the parcel immediately adjacent to the northern boundary of the Project Site which is currently under construction is likely to be sensitive receptors in the near future.

Operational Offsite Traffic Noise

Future traffic noise levels throughout the Project vicinity for the Proposed Project were modeled based on the traffic volumes identified by Fehr and Peers (2024) to determine the noise levels along Project vicinity roadways. Table 5-2 shows the calculated offsite roadway noise levels with traffic levels during existing levels and the projected levels of project buildout. The County's General Plan Noise Element has established noise standards associated with transportation sources, shown in Table 4-1. However, because existing traffic noise levels already exceed the County's standards for transportation sources, FICON thresholds are coupled with the County traffic noise standards to determine if the Project's traffic will significantly impact the surrounding environment.

- If the existing ambient noise levels at existing and future noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA CNEL and the project creates a readily perceptible 5 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards in Table 4-1;
or
- If the existing noise levels range from 60 to 65 dBA CNEL and the project creates a barely perceptible 3 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards in Table 4-1;
or
- If the existing noise levels already exceed 65 dBA CNEL and the project creates a community noise level increase of greater than 1.5 dBA CNEL

Table 5-2. Proposed Project Predicted Traffic Noise Levels							
Roadway Segment	Surrounding Uses	L_{dn} at 100 feet from Centerline of Roadway		Change	FICON	Applicable Exterior Noise Limit	Exceed Both Standards?
		Existing	Existing + Project				
Calvine Road							
West of Bains Driveway	Commercial and Residential	67.1	67.2	+0.1	>1.5	65 dBA	No
Between Bains Driveway and Walgreens Driveway	Commercial	67.1	67.3	+0.2	>1.5	65 dBA	No
Between Walgreens Driveway and Elk Grove Florin Road	Commercial	67.1	67.3	+0.2	>1.5	65 dBA	No
East of Elk Grove Florin Road	Commercial and Residential	66.5	66.6	+0.1	>1.5	65 dBA	No
Elk Grove Florin Road							
North of Calvine Road	Commercial and Residential	62.8	63.0	+0.2	>3	65 dBA	No
South of Calvine Road	Commercial and Residential	62.4	62.4	+0.0	>3	65 dBA	No

Source: Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the intersection analysis data identified by Fehr and Peers (2024). The most relevant roadway segments were chosen by Fehr and Peers. Refer to Attachment A for traffic noise modeling assumptions and results.

As shown in Table 5-2, none of the Project vicinity roadway segments would experience both an incremental increase of traffic noise in excess of the FICON standards and a resultant noise level over the County traffic noise standards.

Operational Onsite Noise

The Project is proposing which proposes the construction of a convenience store, drive-thru café, a restaurant/retail building, a 12-position gasoline dispensing facility, carwash, and parking lot. On-site noise associated with the Proposed Project has been calculated using the SoundPLAN 3D noise model using Project Site Plans provided by the Project proponent. SoundPLAN 3D noise model generates computer

simulations of noise situations based on the site’s features. Further, SoundPLAN creates noise contour maps using reference noise levels, topography, point and area noise source, mobile noise sources, and intervening structures. The Proposed Project’s modeling scenario includes features such as the drive-through speaker, parking lots, carwash, and the proposed buildings. Reference noise measurements at existing, operating parking lots, gasoline stations, drive-through speakers, drive-through queues, and carwash dryers were previously taken by ECORP Consulting Inc. and used to inform the SoundPLAN 3D noise model.

The County has established exterior noise thresholds for non-transportation noise sources, shown in Table 4-2 above. The County limits daytime noise to 55 dBA and nighttime noise to 50 dBA for residential receptors and 55 dBA daytime noise for commercial properties. Table 5-3 shows the predicted Project noise levels at six noise-sensitive locations in the Project vicinity, including the future residences to the north, apartments to the northwest, residences to the west, and the commercial properties directly adjacent to the eastern and western sides of the Project Site, as predicted by SoundPLAN. Additionally, a noise contour graphic for each scenario (see Figure 5-1) has been prepared to provide a visual depiction of the predicted noise levels in the Project vicinity from Project operations.

#	Location	Daytime/Nighttime Noise Attributed to the Project (dBA L _{eq})	Daytime/Nighttime Exterior Noise Standards (dBA L _{eq})	Exceed Daytime or Nighttime Exterior Standard?
1	Future Residences North of Project Site	46.3	55/50	No
2	Dollar Tree East of Project Site	48.0	55/-	No
3	Tire Shop West of Project Site	48.8	55/-	No
4	Apartments Northwest of Project Site	41.2	55/50	No
5	Residence northwest of Project Site	38.8	55/50	No
6	Residence southwest of Project Site	40.4	55/50	No

Source: SoundPLAN v 9.0. Refer to Attachment C for Model Data Outputs.

As shown in Table 5-2, Project operational noise would not exceed the County’s non-transportation exterior noise standards for daytime or nighttime at any location.

As previously discussed, the primary noise source in the area is due to vehicle noise on busy roadways, such as Calvine Road. To estimate the existing noise environment at the Project Site, data taken from the Traffic Intersection Analysis provided by Fehr and Peers (2024) was utilized with the FHWA Roadway Noise Prediction Model. The existing noise generated from the portion of Calvine Road adjacent the Project Site is approximately 67.1 dBA L_{dn} within 100 feet of the centerline. Due to the fact that the traffic noise is the primary source of noise in the vicinity, this noise level is generally representative of the existing noise environment. As shown above in Table 5-2, the Proposed Project would contribute noise levels of approximately 40.4 to 48.8 dBA L_{eq} to the existing ambient environment during the daytime and nighttime.

This level of Project noise would not noticeably contribute to the existing ambient noise environment since it is more than 18 dBA quieter than current conditions. As previously described, addition of the dB scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by three dB). Furthermore, when combining two separate sources where one of the noise sources is 10 dB or more greater than the other noise source, the noise contribution of the quieter source is completely obscured by the louder source, as is the case with typical onsite Project operations and the existing ambient noise environment dominated by traffic noise on Calvine Road.



Figure 5-1: Calvin Chevron Operational Noise Generation

Signs and symbols

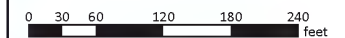
- Noise Receptors
- Building
- Area source
- ◆ Point source
- Drive Through Line

**Level scale in dB(A)
Leq,d**

	<= 46
	46 - 49
	49 - 52
	52 - 55
	55 - 58
	58 - 61
	61 - 64
	64 - 67
	67 - 70
	> 70



Scale 1:161



5.3.3 Would the Project Expose Structures to Substantial Groundborne Vibration During Construction?

Excessive groundborne vibration impacts result from continuously occurring vibration levels. Increases in groundborne vibration levels attributable to the Project would be primarily associated with short-term construction-related activities. Construction on the Project Site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance.

Construction-related ground vibration is normally associated with impact equipment such as pile drivers, jackhammers, and the operation of some heavy-duty construction equipment, such as dozers and trucks. Vibration decreases rapidly with distance, and it is acknowledged that construction activities would occur throughout the Project Site and would not be concentrated at the point closest to sensitive receptors. Groundborne vibration levels associated with construction equipment are summarized in Table 5-4.

Table 5-4. Representative Vibration Source Levels for Construction Equipment	
Equipment Type	Peak Particle Velocity at 25 Feet (inches per second)
Large Bulldozer	0.089
Pile Driver	0.170
Loaded Trucks	0.076
Hoe Ram	0.089
Jackhammer	0.035
Small Bulldozer/Tractor	0.003
Vibratory Roller	0.210

Source: FTA 2018; Caltrans 2020b

The County does not regulate or have a numeric threshold associated with construction vibrations. However, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, the Caltrans (2020b) recommended standard of 0.5 inches per second PPV with respect to the prevention of damage to new residential structures and modern industrial/commercial buildings. Consistent with FTA recommendations for calculating construction vibration, construction vibration was measured from the center of the Project Site (FTA 2018). The nearest sensitive receptors to construction vibration are the commercial businesses located to the east and west of the Project Site, with the closest commercial building located approximately 157 feet away.

Based on the representative vibration levels presented for various construction equipment types in Table 5-4 and the construction vibration assessment methodology published by the FTA (2018), it is possible to estimate the potential project construction vibration levels. The FTA provides the following equation:

$$[PPV_{\text{equip}} = PPV_{\text{ref}} \times (25/D)^{1.5}]$$

Table 5-5 presents the expected Project related vibration levels at a distance of 157 feet.

Table 5-5 Construction Vibration Levels at 157 Feet							
Receiver PPV Levels (in/sec) ¹					Peak Vibration	Threshold	Exceed Threshold?
Large Bulldozer, Caisson Drilling, & Hoe Ram	Loaded Trucks	Jackhammer	Pile Driver	Vibratory Roller			
0.0057	0.0048	0.0022	0.0110	0.0133	0.0133	0.5	No

Notes: ¹Based on the Vibration Source Levels of Construction Equipment included on Table 5-3 (FTA 2018). Distance to the nearest structure of concern is approximately 157 feet measured from Project Site center.

As shown in Table 5-5, vibration as a result of onsite construction activities on the Project Site would not exceed 0.5 PPV at the nearest structure. Thus, onsite Project construction would not exceed the recommended threshold.

5.3.4 Would the Project Expose Structures to Substantial Groundborne Vibration During Operations?

Project operations would not include the use of any stationary equipment that would result in excessive vibration levels. While the Project would accommodate heavy-duty trucks, these vehicles would not generate groundborne vibrations that would result in excessive vibration levels. Therefore, the Project would not result in negligible groundborne vibration impacts during operations.

5.3.5 Would the Project Expose People Residing or Working in the Project Area to Excessive Airport Noise?

The Project Site is located approximately 7.74 miles southeast of the Sacramento Executive Airport. The Project site is not located within any noise contours of the Sacramento Executive Airport (Sacramento County Airport System). Therefore, the Proposed Project would not expose those visiting or working on the Project Site to excessive airport noise.

6.0 REFERENCES

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LIST OF ATTACHMENTS

Attachment A - Federal Highway Noise Prediction Model (FHWA-RD-77-108) Outputs – Project Traffic Noise

Attachment B – Federal Highway Administration Roadway Construction Noise Model Outputs – Project Construction

Attachment C – SoundPLAN Onsite Noise Generation

Federal Highway Noise Prediction Model (FHWA-RD-77-108) Outputs – Project Traffic Noise

TRAFFIC NOISE LEVELS

Project Number: 2024-015
 Project Name: Calvine Chevron

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
 Analysis Scenario(s): **Existing**
 Source of Traffic Volumes: Fehr and Peers
 Community Noise Descriptor: L_{dn} : x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix		Peak Ho	24-Hour
										Medium Trucks	Heavy Trucks	dB(A) L_{eq}	dB(A) Ldn
Calvine Road													
West of Bains Driveway	Commercial and Residential	5	0	3066	27,594	45	100	0.5	0	1.8%	0.7%	68.7	67.1
Between Bains Driveway and Walgreens Driveway	Commercial	5	0	3067	27,603	45	100	0.5	0	1.8%	0.7%	68.8	67.1
Between Walgreens Driveway and Elk Grove Florin Road	Commercial	5	0	3060	27,540	45	100	0.5	0	1.8%	0.7%	68.7	67.1
East of Elk Grove Florin Road	Commercial and Residential	4	0	2720	24,480	45	100	0.5	0	1.8%	0.7%	68.1	66.5
Elk Grove Florin Road													
North of Calvine Road	Commercial and Residential	5	0	2867	25,803	30	100	0.5	0	1.8%	0.7%	64.4	62.8
South of Calvine Road	Commercial and Residential	4	0	2653	23,877	30	100	0.5	0	1.8%	0.7%	64.0	62.4

TRAFFIC NOISE LEVELS

Project Number: 2024-015
 Project Name: Calvine Chevron

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
 Analysis Scenario(s): **Existing + Project**
 Source of Traffic Volumes: Fehr and Peers
 Community Noise Descriptor: L_{dn} : x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix		Peak Ho	24-Hour
										Medium Trucks	Heavy Trucks	Leq dB(A)	Ldn dB(A)
Calvine Road													
West of Bains Driveway	Commercial and Residential	5	0	3104	27,936	45	100	0.5	0	1.8%	0.7%	68.8	67.2
Between Bains Driveway and Walgreens Driveway	Commercial	5	0	3202	28,818	45	100	0.5	0	1.8%	0.7%	68.9	67.3
Between Walgreens Driveway and Elk Grove Florin	Commercial	5	0	3220	28,980	45	100	0.5	0	1.8%	0.7%	69.0	67.3
East of Elk Grove Florin Road	Commercial and Residential	4	0	2754	24,786	45	100	0.5	0	1.8%	0.7%	68.2	66.6
Elk Grove Florin Road													
North of Calvine Road	Commercial and Residential	5	0	2944	26,496	30	100	0.5	0	1.8%	0.7%	64.5	63.0
South of Calvine Road	Commercial and Residential	4	0	2666	23,994	30	100	0.5	0	1.8%	0.7%	64.0	62.4

Federal Highway Administration Roadway Construction Noise Model Outputs – Project
Construction

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 4/11/2024
Case Description: Demolition

Description **Land Use**
 Demolition Residential

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
Dozer	No	40		81.7	279
Dozer	No	40		81.7	279
Concrete Saw	No	20		89.6	279
Excavator	No	40		80.7	279
Excavator	No	40		80.7	279
Excavator	No	40		80.7	279

Results

Calculated (dBA)

Equipment	*Lmax	Leq
Dozer	66.7	62.8
Dozer	66.7	62.8
Concrete Saw	74.6	67.7
Excavator	65.8	61.8
Excavator	65.8	61.8
Excavator	65.8	61.8
Total	74.6	71.5

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 4/11/2024
Case Description: Site Preparation

Description **Land Use**
 Site Preparation Residential

Description	Impact		Equipment		Receptor Distance (feet)
	Device	Usage(%)	Spec	Actual	
			Lmax (dBA)	Lmax (dBA)	
Dozer	No	40		81.7	279
Dozer	No	40		81.7	279
Dozer	No	40		81.7	279
Tractor	No	40	84		279
Tractor	No	40	84		279
Tractor	No	40	84		279
Tractor	No	40	84		279

Calculated (dBA)

Equipment	*Lmax	Leq
Dozer	66.7	62.8
Dozer	66.7	62.8
Dozer	66.7	62.8
Tractor	69.1	65.1
Tractor	69.1	65.1
Tractor	69.1	65.1
Tractor	69.1	65.1
Total	69.1	72.7

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 4/11/2024

Case Description: Grading

Description
Grading

Land Use
Residential

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
Grader	No	40	85		279
Excavator	No	40		80.7	279
Tractor	No	40	84		279
Tractor	No	40	84		279
Tractor	No	40	84		279
Dozer	No	40		81.7	279

Calculated (dBA)

Equipment	*Lmax	Leq
Grader	70.1	66.1
Excavator	65.8	61.8
Tractor	69.1	65.1
Tractor	69.1	65.1
Tractor	69.1	65.1
Dozer	66.7	62.8
Total	70.1	72.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 4/11/2024

Case Description: Construction

Description **Land Use**
Construction Residential

Description	Impact		Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
			Device	Usage(%)	
Crane	No	16		80.6	279
Gradall	No	40		83.4	279
Gradall	No	40		83.4	279
Gradall	No	40		83.4	279
Generator	No	50		80.6	279
Welder / Torch	No	40		74	279
Tractor	No	40	84		279
Tractor	No	40	84		279
Tractor	No	40	84		279

Calculated (dBA)

Equipment	*Lmax	Leq
Crane	65.6	57.7
Gradall	68.5	64.5
Gradall	68.5	64.5
Gradall	68.5	64.5
Generator	65.7	62.7
Welder / Torch	59.1	55.1
Tractor	69.1	65.1
Tractor	69.1	65.1
Tractor	69.1	65.1
Total	69.1	73.2

*Calculated Lmax is the Loudest value.

Report date: 4/11/2024

Case Description: Paving

Description **Land Use**
Paving Residential

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
Tractor	No	40	84		279
Concrete Mixer Truck	No	40		78.8	279
Concrete Mixer Truck	No	40		78.8	279
Paver	No	50		77.2	279
Pavement Scarafier	No	20		89.5	279
Pavement Scarafier	No	20		89.5	279
Roller	No	20		80	279
Roller	No	20		80	279

Calculated (dBA)

Equipment	*Lmax	Leq
Tractor	69.1	65.1
Concrete Mixer Truck	63.9	59.9
Concrete Mixer Truck	63.9	59.9
Paver	62.3	59.3
Pavement Scarafier	74.6	67.6
Pavement Scarafier	74.6	67.6
Roller	65.1	58.1
Roller	65.1	58.1
Total	74.6	72.7

*Calculated Lmax is the Loudest value.

Report date: 4/11/2024
Case Description: Painting

Description **Land Use**
 Painting Residential

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)
			Spec Lmax (dBA)	Actual Lmax (dBA)	
Compressor (air)	No	40		77.7	279

Calculated (dBA)

Equipment	*Lmax	Leq
Compressor (air)	62.7	58.8
Total	62.7	58.8

*Calculated Lmax is the Loudest value.

ATTACHMENT C

SoundPLAN Onsite Noise Generation

SoundPLAN
Output Source Information

Calvine Chevron SoundPLAN Outputs

Number	Receiver Name	Floor	Level at Receiver
1	Future Residences North of Project Site	Ground Floor	46.3 dBA
2	Dollar Tree East of Project Site	Ground Floor	48.0 dBA
3	Tire Shop West of Project Site	Ground Floor	48.8 dBA
4	Apartments Northwest of Project Site	Ground Floor	41.2 dBA
5	Residence northwest of Project Site	Ground Floor	38.8 dBA
6	Residence southwest of Project Site	Ground Floor	40.4 dBA

Number	Noise Source Information	Citation	Level at Source
1	Average Gasoline Station	ECORP Consulting Reference Measurement	62.2 dBA
2	Average Drive Through Speaker	ECORP Consulting Reference Measurement	74.4 dBA
3	Non-busy Parking lot	ECORP Consulting Reference Measurement	51.0 dBA
4	Drive Through (not-speaker)	ECORP Consulting Reference Measurement	64.4 dBA
5	Dryer at Carwash	ECORP Consulting Reference Measurement	86.3 dBA