

Environmental Noise Assessment

Hayden Commercial Center Car Wash

City of Roseville, California

March 2, 2026

Project #250207

Prepared for:

Hayden Park LLC
2423 Azure Place
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INTRODUCTION

The Hayden Commercial Center Car Wash project is located at the southwest corner of the intersection of Blue Oaks Boulevard and Hayden Parkway in the City of Roseville, California. Nearby sensitive uses include single family residential uses located west and east of the project site, as well as multifamily residential uses to the south of the proposed project. The existing noise environment in the project vicinity is primarily driven by Blue Oaks Boulevard and Hayden Parkway. The primary noise sources associated with operation of the proposed project include car wash blowers, a cannister vacuum, an air compressor, HVAC equipment, and on-site vehicle circulation. The primary noise sources associated with the quick service restaurant (QSR) are cars idling in the drive-thru lanes and speaker boxes.

Figure 1 shows the project site plan. **Figure 2** shows an aerial photo of the project site and noise measurement locations.

ENVIRONMENTAL SETTING

BACKGROUND INFORMATION ON NOISE

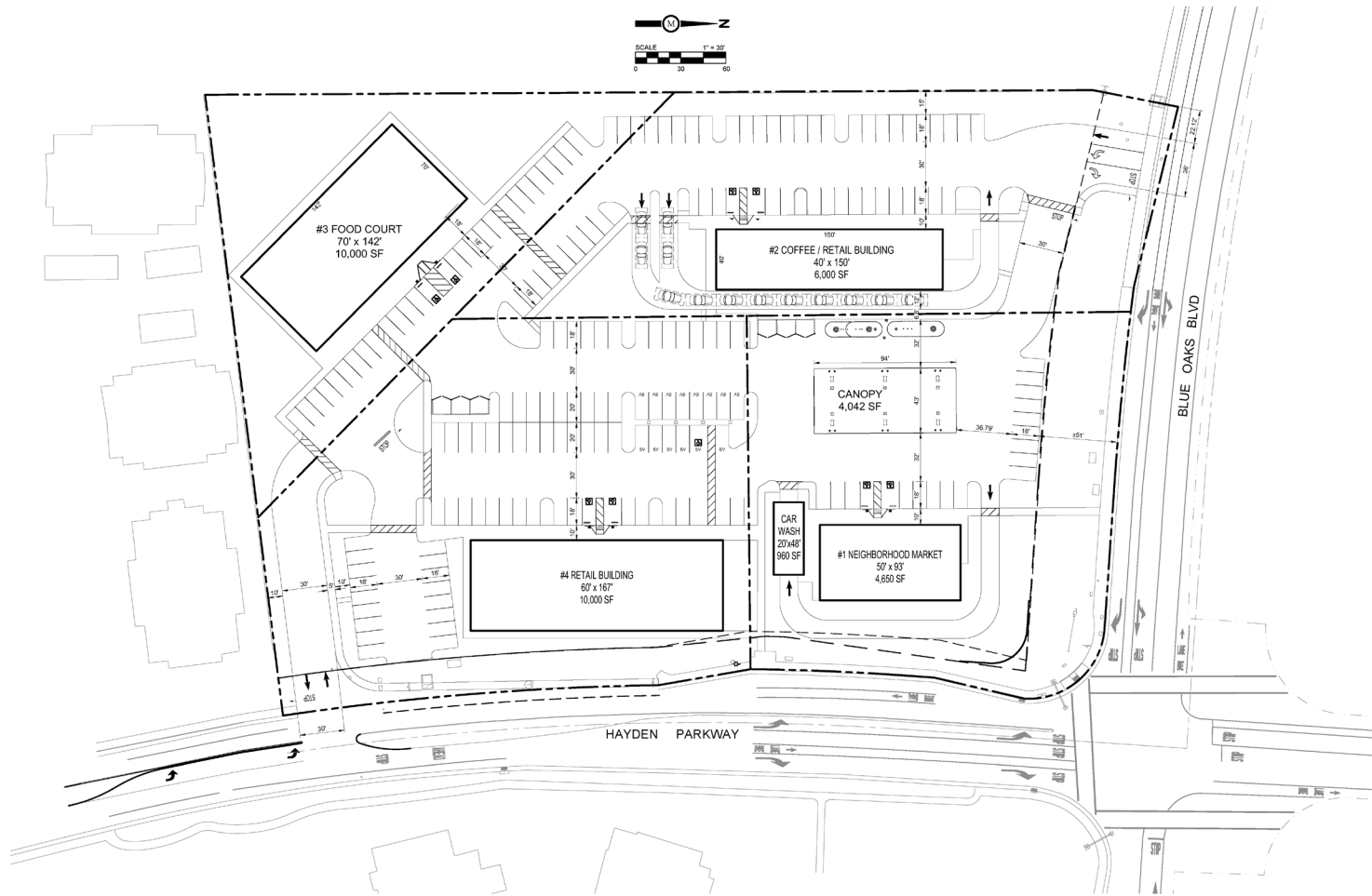
Fundamentals of Acoustics

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

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

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

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



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HAYDEN COMMERCIAL CENTER
 2551 HAYDEN PARKWAY, ROSEVILLE

**SITE
 PLAN**

2

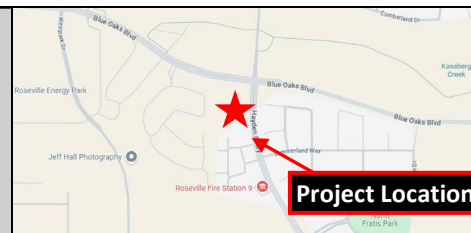
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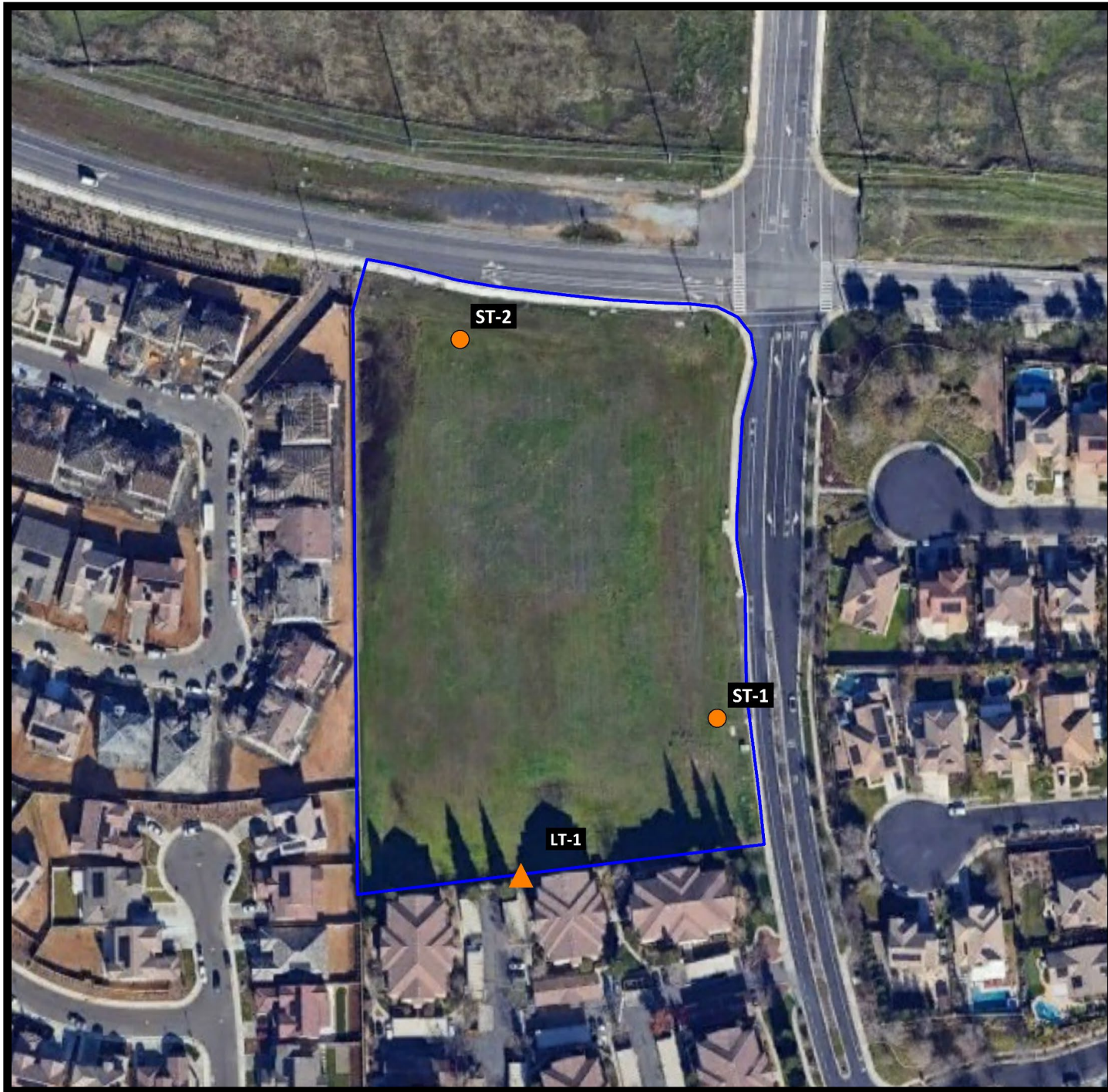
Hayden Commercial Center Car Wash

City of Roseville, California

Figure 1

Project Site Plan





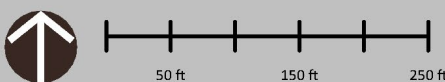
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Figure 2
Noise Measurement Sites

Legend

- Project Site
- Noise Measurement - Short Term
- ▲ Noise Measurement Site - Long Term



Projection: UTM Zone 10 / WGS84 / meters
Rev. Date: 02/28/2025



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

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

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

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

TABLE 1: TYPICAL NOISE LEVELS

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

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

Effects of Noise on People

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

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

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

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

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

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

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

EXISTING AMBIENT NOISE LEVELS

The existing ambient noise environment in the project vicinity is primarily defined by traffic on Blue Oaks Boulevard and Hayden Parkway. To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted a continuous (24-hr.) noise level measurement at one location on the project site and short-term noise level measurements at two locations. Noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey results is provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

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

Larson Davis Laboratories (LDL) model 820 and 831 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with a CAL 200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

Location	Date	L_{dn}	Daytime L_{eq}	Daytime L_{50}	Daytime L_{max}	Nighttime L_{eq}	Nighttime L_{50}	Nighttime L_{max}
LT-1: 180 ft. to CL of Hayden Pkwy	2/27/25	60	60	51	73	49	46	60
ST-1: 60 ft. to CL of Hayden Pkwy	2/26/25	N/A	55	46	70	N/A	N/A	N/A
ST-2: 110 ft. to CL of Blue Oaks Blvd	2/26/25	N/A	59	46	72	N/A	N/A	N/A

Notes:

- All values shown in dBA
- Daytime hours: 7:00 a.m. to 10:00 p.m.
- Nighttime Hours: 10:00 p.m. to 7:00 a.m.
- Source: Saxelby Acoustics 2025

REGULATORY CONTEXT

FEDERAL

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

STATE

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

LOCAL

City of Roseville General Plan

The City of Roseville General Plan Noise Element Table 1X-3 (**Table 3**) establishes an acceptable exterior noise level of 50 dBA L_{eq} for daytime (7:00 a.m. to 10:00 p.m.) for stationary noise sources.

TABLE 3: CITY OF ROSEVILLE STATIONARY NOISE LEVEL STANDARDS

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

Source : City of Roseville General Plan Noise Element 2035, Table 1X-3

¹For municipal power plants consisting primarily of broadband, steady state noise sources, the hourly (L_{eq}) noise standard may be increased up to 10 dB(A), but not exceed 55 dB(A) Hourly L_{eq} dB.

Each of the noise levels specified above should be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of noise complaints. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g. caretaker dwellings).

No standards have been included for interior noise levels. Standard construction practices, should, with exterior noise level identified, result in acceptable interior noise levels.

EVALUATION OF CAR WASH NOISE AT RESIDENTIAL RECEPTORS

METHODOLOGY

The primary noise sources associated with operation of the proposed car wash are the air blowers and vehicle circulation. The primary noise sources associated with the quick service restaurant (QSR) are cars idling in the drive-thru lanes and speaker boxes. It was also assumed that the gas station would provide a cannister vacuum and an air compressor as amenities. The following is a list of assumptions used for the noise modeling. The data used is based upon a combination of manufacturer's provided data and Saxelby Acoustics data from similar car wash operations.

Car Wash Blowers:	The proposed dryer system is predicted to produce a noise level of 73 dBA L_{eq} at approximately 30 feet from car wash exit and 70 dBA L_{eq} at approximately 30 feet outside the entrance. Maximum (L_{max}) noise levels are approximately equal to continuous average (L_{eq}) noise levels for steady state operation. Manufacturer's data.
Cannister Vacuum:	64 dBA L_{eq} measured at 25 feet operating for 15 minutes per hour. Maximum (L_{max}) noise levels are approximately equal to continuous average (L_{eq}) noise levels for steady state operation. Saxelby Acoustics data.
Air Compressor:	64 dBA L_{eq} measured at 25 feet operating for 15 minutes per hour. Maximum (L_{max}) noise levels are approximately equal to continuous average (L_{eq}) noise levels for steady state operation. Saxelby Acoustics data.
Rooftop HVAC:	One ten-ton packaged unit per 500 square feet of building space operating continuously during the daytime. Maximum (L_{max}) noise levels are approximately equal to continuous average (L_{eq}) noise levels for steady state operation. Manufacturer's data.
Vehicle Circulation:	Saxelby Acoustics assumed that the car wash would attract a maximum of 100 peak hour trips in the daytime (7:00 a.m. to 10:00 p.m.) @ 71 dBA SEL at 50 feet. The model also included two semi-truck deliveries or trash pickups in the peak hour at 85 dBA SEL at 50 feet. Maximum noise levels are approximately 10 dBA higher than average (L_{eq}) noise levels. Saxelby Acoustics data.
Drive Thru Speakers:	Two speakers producing 68 dBA L_{eq} and 78 dBA L_{max} at 3 feet during both daytime and nighttime hours. A 5 dBA penalty was applied for "noise consisting of speech." Saxelby Acoustics data.
Drive Thru Lanes:	The QSR lanes were modeled as continuously filled with idling cars during both daytime and nighttime hours. Idling automobile queues were measured to produce 51 dBA L_{eq} at 10 feet. Saxelby Acoustics data.

Saxelby Acoustics used the SoundPLAN noise prediction model. Inputs to the model included sound power levels for the proposed car wash and QSR, existing and proposed buildings, terrain type, and locations of sensitive receptors. These predictions are made in accordance with International Organization for Standardization (ISO) standard 9613-2:1996 (Acoustics – Attenuation of sound during propagation outdoors). ISO 9613 is the most commonly used method for calculating exterior noise propagation.

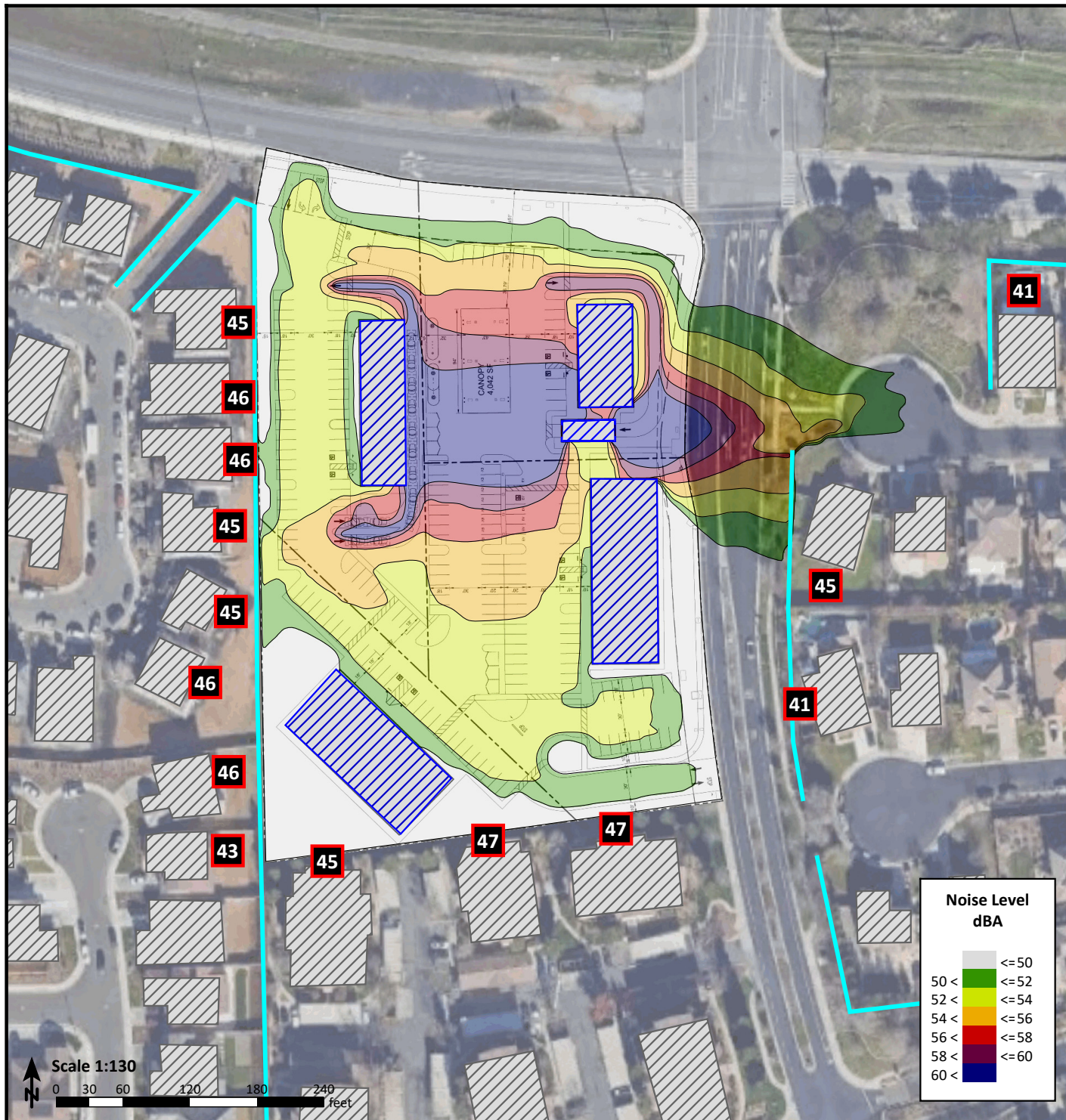
Figure 3 and **Figure 4** show the predicted noise levels for the proposed project for daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours, respectively.

Hayden Commercial Center

City of Roseville, California

Figure 3

Daytime Project-Generated Noise Levels
(Daytime Leq, dBA)



Legend

-  Project Building
-  Existing Building
-  Existing Sound Wall

Noise Level dBA

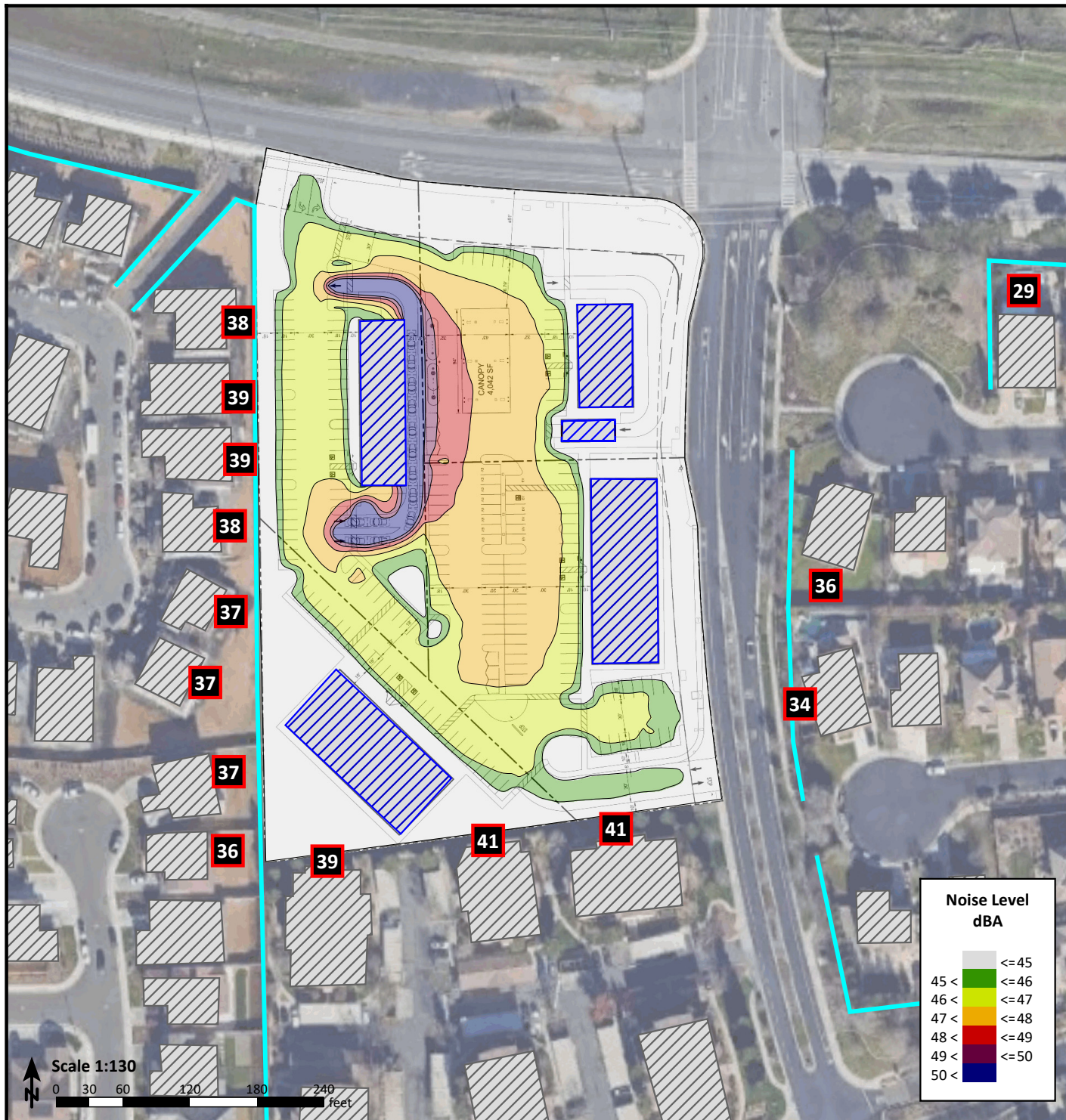
	≤ 50
	50 < ≤ 52
	52 < ≤ 54
	54 < ≤ 56
	56 < ≤ 58
	58 < ≤ 60
	60 <

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Figure 4

Nighttime Project-Generated Noise Levels
(Nighttime Leq, dBA)



RESULTS AND ANALYSIS

Figure 3 shows the predicted daytime (7:00 a.m. to 10:00 p.m.) project noise level contours in terms of the average (L_{eq}) noise descriptor. As shown on the figure, the project is predicted to generate up to 47 dBA L_{eq} at the nearby residences. This would comply with the City of Roseville daytime noise level standard of 50 dBA L_{eq} .

Figure 4 shows the predicted nighttime (10:00 p.m. to 7:00 a.m.) project noise level contours. As shown in the figure, nighttime noise levels emanating from the project would be 41 dBA, or less. This includes a 5 dBA penalty applied to the drive thru speakers for noises consisting of speech. This complies with the City of Roseville nighttime noise level standard of 45 dBA L_{eq} .

It should be noted that the noise-generating uses associated with the proposed project are not predicted to generate maximum noise levels more than 20 dBA above the average (L_{eq}) noise levels. The City of Roseville maximum noise level standards for both daytime and nighttime hours are 20 dBA above the average noise level standards. Therefore, where the average project-generated noise levels comply with the City's standards, project-generated maximum noise levels will also comply.

CONCLUSIONS

The noise analysis indicates that property line noise levels at the nearest sensitive receptors would be less than 50 dBA L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) and 45 dBA L_{eq} during nighttime (10:00 p.m. to 7:00 a.m.) hours. This would comply with the City of Roseville exterior noise level standards. Therefore, no additional noise control measures are recommended. These conclusions are based on the following assumptions:

- The car wash dryer system used for the project should not exceed 73 dBA L_{eq} at 30 feet from the exit of the car wash and 70 dBA L_{eq} at 30 feet from the entrance of the car wash.
- The car wash should operate only during daytime (7:00 am to 10:00 pm) hours.

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Appendix A: Acoustical Terminology

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

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



Appendix B1: Continuous Noise Monitoring Results

Site: LT-1

Project: Hayden Commercial Center Car Wash

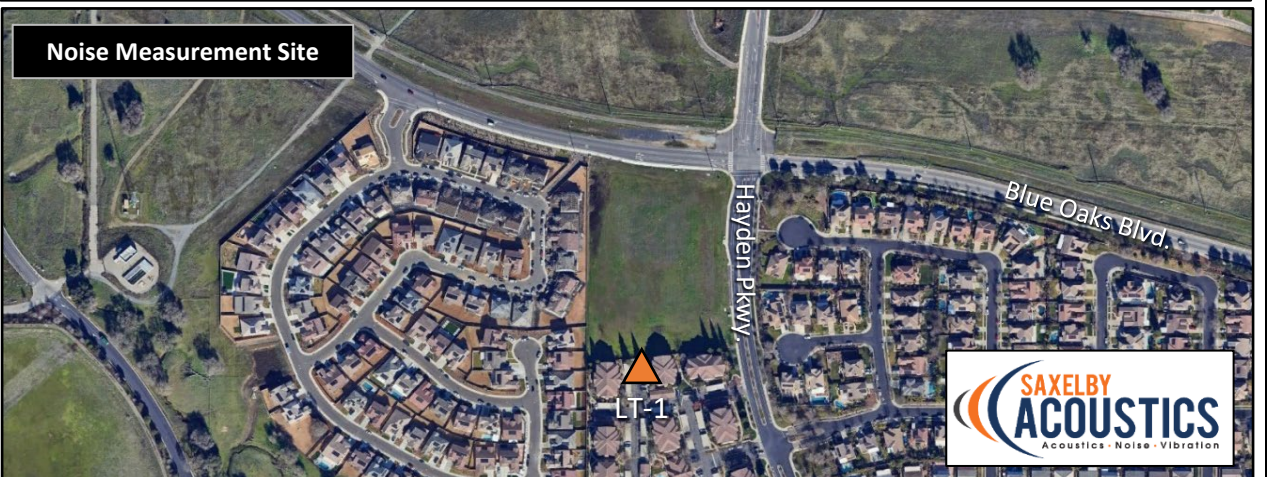
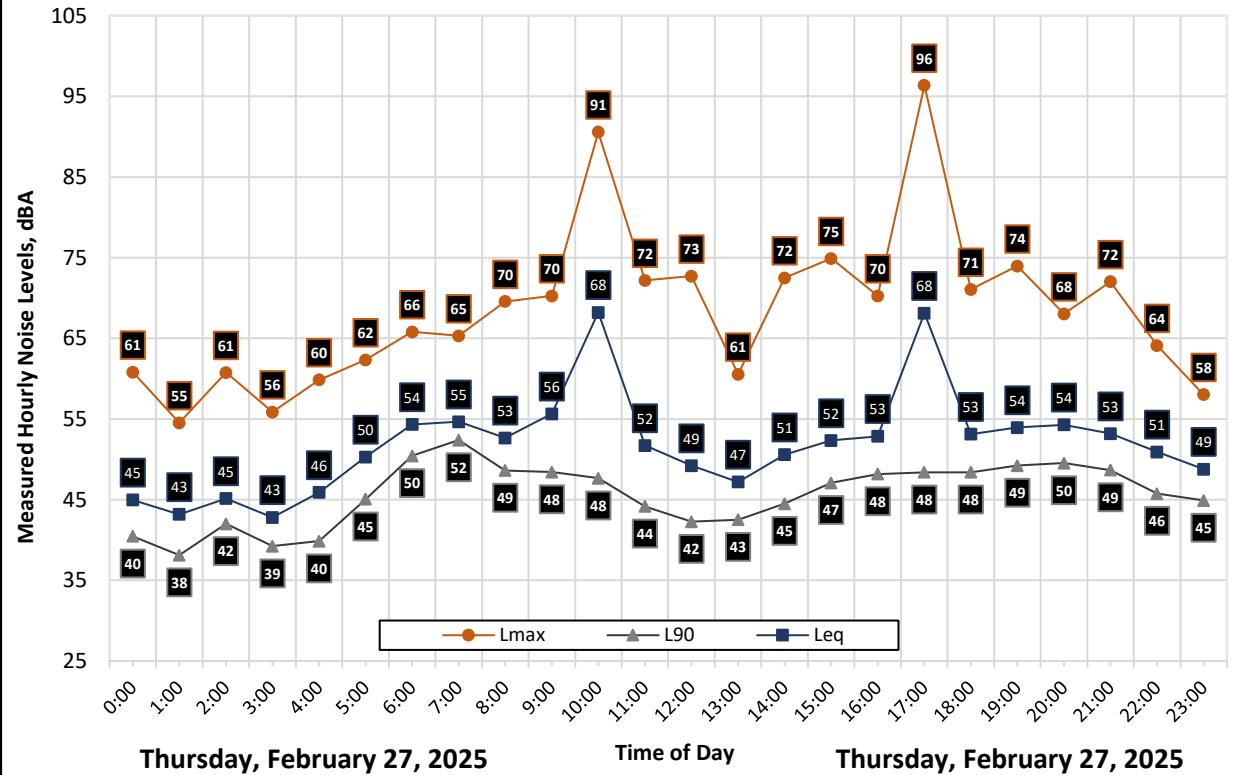
Meter: LDL 820-5

Location: Southwestern Project Boundary

Calibrator: CAL200

Coordinates: (38.7911706, -121.3730291)

Measured Ambient Noise Levels vs. Time of Day



Date	Time	Measured Level, dBA			
		L _{eq}	L _{max}	L ₅₀	L ₉₀
Thursday, February 27, 2025	0:00	45	61	43	40
Thursday, February 27, 2025	1:00	43	55	42	38
Thursday, February 27, 2025	2:00	45	61	44	42
Thursday, February 27, 2025	3:00	43	56	42	39
Thursday, February 27, 2025	4:00	46	60	43	40
Thursday, February 27, 2025	5:00	50	62	49	45
Thursday, February 27, 2025	6:00	54	66	54	50
Thursday, February 27, 2025	7:00	55	65	54	52
Thursday, February 27, 2025	8:00	53	70	52	49
Thursday, February 27, 2025	9:00	56	70	52	48
Thursday, February 27, 2025	10:00	68	91	51	48
Thursday, February 27, 2025	11:00	52	72	49	44
Thursday, February 27, 2025	12:00	49	73	46	42
Thursday, February 27, 2025	13:00	47	61	46	43
Thursday, February 27, 2025	14:00	51	72	48	45
Thursday, February 27, 2025	15:00	52	75	51	47
Thursday, February 27, 2025	16:00	53	70	52	48
Thursday, February 27, 2025	17:00	68	96	52	48
Thursday, February 27, 2025	18:00	53	71	52	48
Thursday, February 27, 2025	19:00	54	74	52	49
Thursday, February 27, 2025	20:00	54	68	53	50
Thursday, February 27, 2025	21:00	53	72	52	49
Thursday, February 27, 2025	22:00	51	64	50	46
Thursday, February 27, 2025	23:00	49	58	48	45
Statistics		L _{eq}	L _{max}	L ₅₀	L ₉₀
Day Average		60	73	51	47
Night Average		49	60	46	43
Day Low		47	61	46	42
Day High		68	96	54	52
Night Low		43	55	42	38
Night High		54	66	54	50
Ldn		60	Day %		96
CNEL		60	Night %		4

Appendix B2 : Short Term Noise Monitoring Results

Site: ST-1

Project: Hayden Commercial Center Car Wash

Meter: LDL 831-3

Location: Southeast Boundary of Project Site

Calibrator: CAL200

Coordinates: (38.7915953, -121.3723243)

Start: 2025-02-26 12:19:59

Stop: 2025-02-26 12:29:59

SLM: 2.403

Serial: Model 831

Measurement Results, dBA

Duration: 0:10

L_{eq} : 55

L_{max} : 70

L_{min} : 41

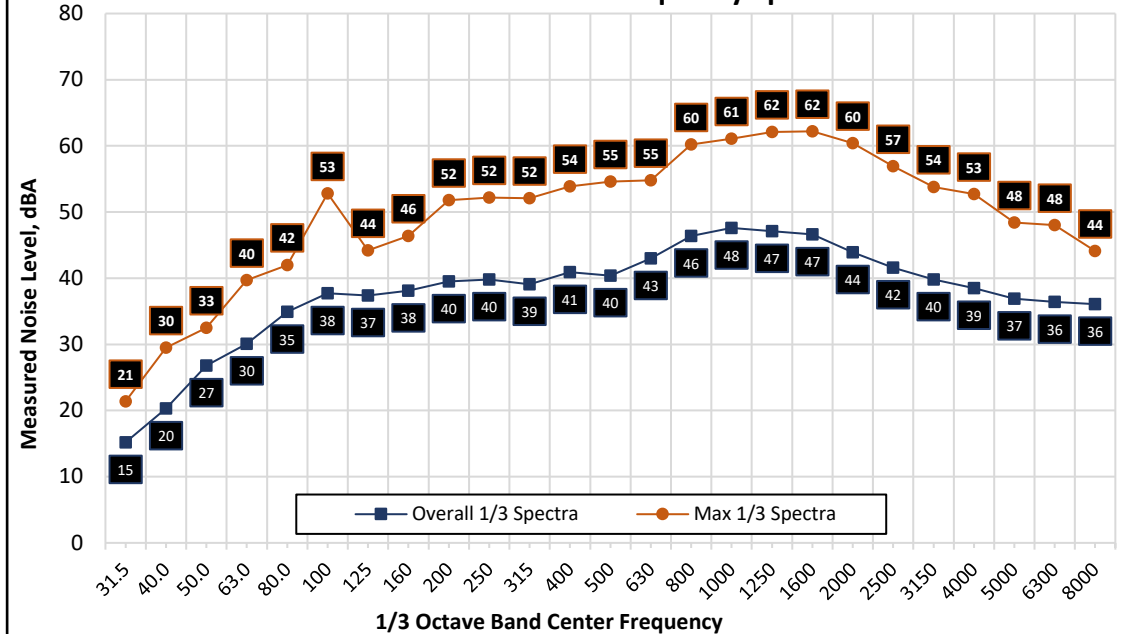
L_{50} : 46

L_{90} : 44

Notes

Primary noise source was traffic noise from Hayden Pkwy and pedestrians. Secondary noise sources include traffic on Blue Oaks Blvd.

Measured Ambient Noise Frequency Spectrum



Noise Measurement Site



Appendix B3 : Short Term Noise Monitoring Results

Site: ST-2

Project: Hayden Commercial Center Car Wash

Meter: LDL 831-3

Location: Northern Boundary of Project Site

Calibrator: CAL200

Coordinates: (38.7926575, -121.3732111)

Start: 2025-02-26 12:50:35

Stop: 2025-02-26 13:00:35

SLM: 2.403

Serial: Model 831

Measurement Results, dBA

Duration: 0:10

L_{eq} : 59

L_{max} : 72

L_{min} : 44

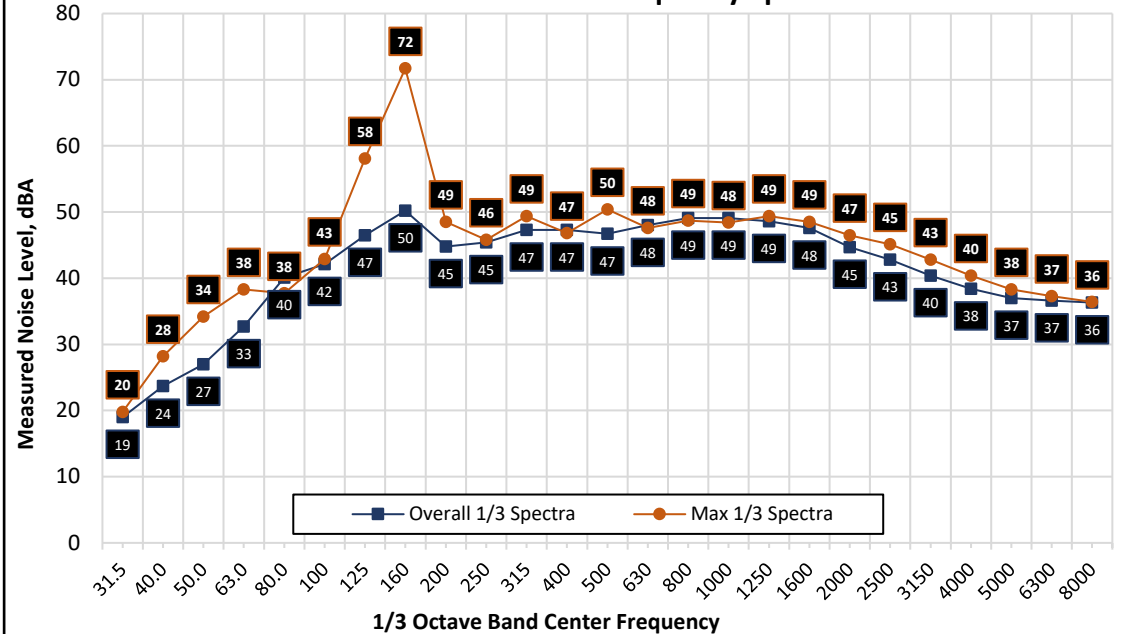
L_{50} : 46

L_{90} : 44

Notes

Primary noise source was traffic noise from Blue Oaks Blvd.
Secondary noise sources include traffic on Hayden Pkwy and plane overhead.

Measured Ambient Noise Frequency Spectrum



Noise Measurement Site

