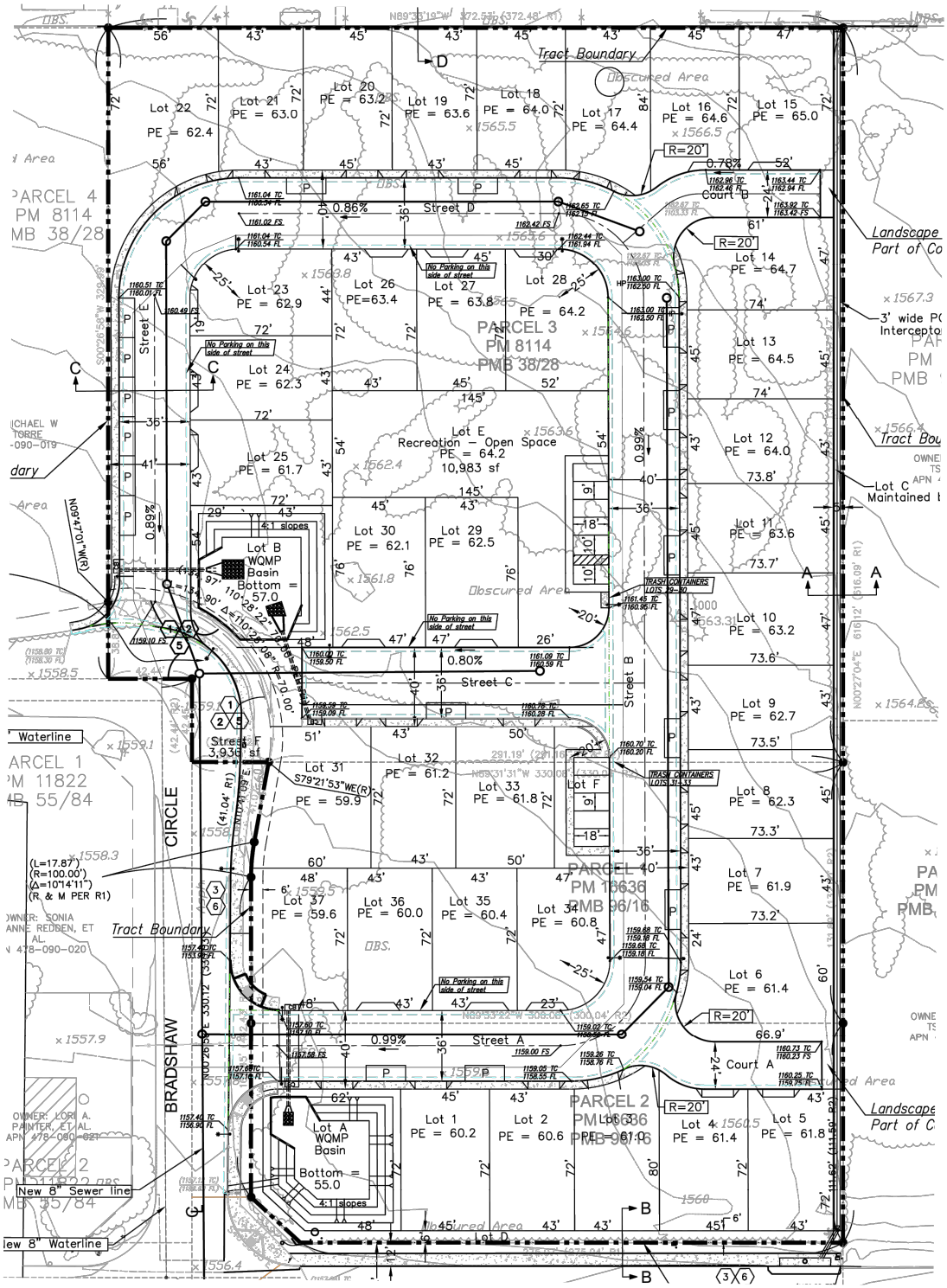
BRADSHAW COLLECTION (TTM 37858)
SINGLE FAMILY RESIDENTIAL PROJECT
NOISE IMPACT STUDY
City of Moreno Valley, CA



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NOISE IMPACT STUDY
Moreno Valley, California

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this noise impact study is to evaluate the potential noise impacts from the proposed TTM 37858 Single Family Residential Project (hereinafter referred to as "project") and provide recommendations, if necessary, to minimize any project noise impacts.

The assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000, et seq.) and the standards and methodology follow the City of Moreno Valley Municipal Code and General Plan requirements.

The following is provided in this report:

- A description of the study area and the proposed project;
- Information regarding the fundamentals of noise;
- Identification of the regulatory setting and applicable noise standards;
- Establishment of the existing ambient noise environment at the project site;
- Analysis of the project's construction and operational noise impact to adjacent receptors;
- Analysis of the project's noise/land use compatibility and preliminary interior noise levels; and
- Summary of recommended project design features to reduce noise level impacts.

1.2 Site Location

The proposed project is located at the northeast corner of Cactus Avenue and Bradshaw Circle, in the City of Moreno Valley. The 4.81-acre site is currently vacant.

The project site is bounded by residential land uses to the north, vacant land to the east, vacant land and Bradshaw Circle to the west, and Cactus Avenue to the south.

The nearest noise-sensitive receptors to the project site include the following:

Northern Receptors Existing residential land uses located along the northern boundary of the project site, approximately 663 feet north of the centerline of Cactus Avenue.

Eastern Receptors Existing residential land uses located approximately 661 feet (~202 meters) east of the project site's eastern boundary, approximately 54 feet north of the centerline of Cactus Avenue.

Southern Receptors Existing residential land uses located approximately 90 feet (~27 meters) south of the project site's southern boundary, approximately 58 feet south of the centerline of Cactus Avenue.

Western Receptors Existing residential land uses located approximately 50 feet (~16 meters) west of the project site's western boundary, approximately 44 feet north of the centerline of Cactus Avenue.

A project site location map, including sensitive receptor locations, is provided in Exhibit A.

1.3 Project Description

The proposed project consists of constructing thirty-seven (37) single-family detached homes with a density of 7.90 dwelling units per acre. Access to the project is proposed via two (2) unsignalized driveways located along Bradshaw Circle.

The proposed project will include a six-to-eight-foot concrete masonry unit (CMU) wall along the northern, southern, eastern, and western boundaries of the project site.

Construction activities are expected to consist of site preparation, grading, building construction, paving, and architectural coating. No demolition is expected to be required during construction. The project will require the export of approximately 8,000 cubic yards of earthwork material for grading purposes.

The site plan used for this analysis, provided by RC HOBBS COMPANY, INC., is illustrated in Exhibit B.

1.4 Summary of Findings

Table 1 provides a summary of the noise analysis results, per the CEQA impact criteria checklist.

Table 1
CEQA Noise Impact Criteria

Noise Impact Criteria	Potentially Significant	Potentially Significant Unless Mitigated	Less Than Significant Impact	No Impact
Would the project result in?				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			**X**	
b) Generation of excessive groundborne vibration or groundborne noise levels?			**X**	
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?			**X**	

1.5 Recommended Project Design Features (DF)

The following recommended project design features include standard rules and requirements, best practices, and recognized design guidelines for reducing noise levels. Project design features are typically included as part of the conditions of approval for the project but are not considered mitigation under CEQA.

Operational Design Features

DF-1 A minimum six-foot high CMU block wall will be constructed along the south and east property line of the site shielding residential homes from roadway noise along Cactus Avenue.

DF-2 The project should incorporate building construction techniques and insulation that is consistent with California Title 24 Building Standards to achieve the minimum interior noise standard of 45 dBA CNEL for all residential units.

DF-3 A "windows closed" condition and upgraded windows and sliding glass doors are expected to be required for all residential units facing Cactus Avenue in order to

meet the interior noise standard. See Section 6.3.2, Table 16, for details regarding window STC requirements.

DF-4 For proper acoustical performance, all exterior windows, doors, and sliding glass doors should have a positive seal and leaks/cracks must be kept to a minimum. Attic vents and opening should be oriented away from the adjacent roadways.

Construction Design Features

DF-5 The project shall comply with City of Moreno Valley Municipal Code requirements. No construction will occur between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a national holiday.

DF-6 Provide public notifications and signage in readily visible locations along the perimeter of construction sites that indicate the dates and duration of construction activities, as well as provide a telephone number where neighbors can enquire about the construction process and register complaints to a designated construction noise disturbance coordinator.

DF-7 All construction equipment should be equipped with mufflers and other suitable noise attenuation devices (e.g., engine shields).

DF-8 Locate staging area, generators, and stationary construction equipment as far from the adjacent residential homes as feasible.

DF-9 Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.

2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

2.1 Sound, Noise, and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases, as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa).One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels and abbreviated dB.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds of equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud[1]. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway), would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels. Following are the most commonly used noise descriptors along with brief definitions.

A-Weighted Sound Level

The sound pressure level in decibels as measured on a sound level meter using the A-weighted 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 response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level

The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL)

The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB)

[1] Source: U.S. DOT Federal Highway Administration. Dec. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

A unit for measuring the amplitude of a 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, which is 20 micro-pascals.

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room

Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n)

The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 is the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise

Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area

Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways,

greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter

An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL)

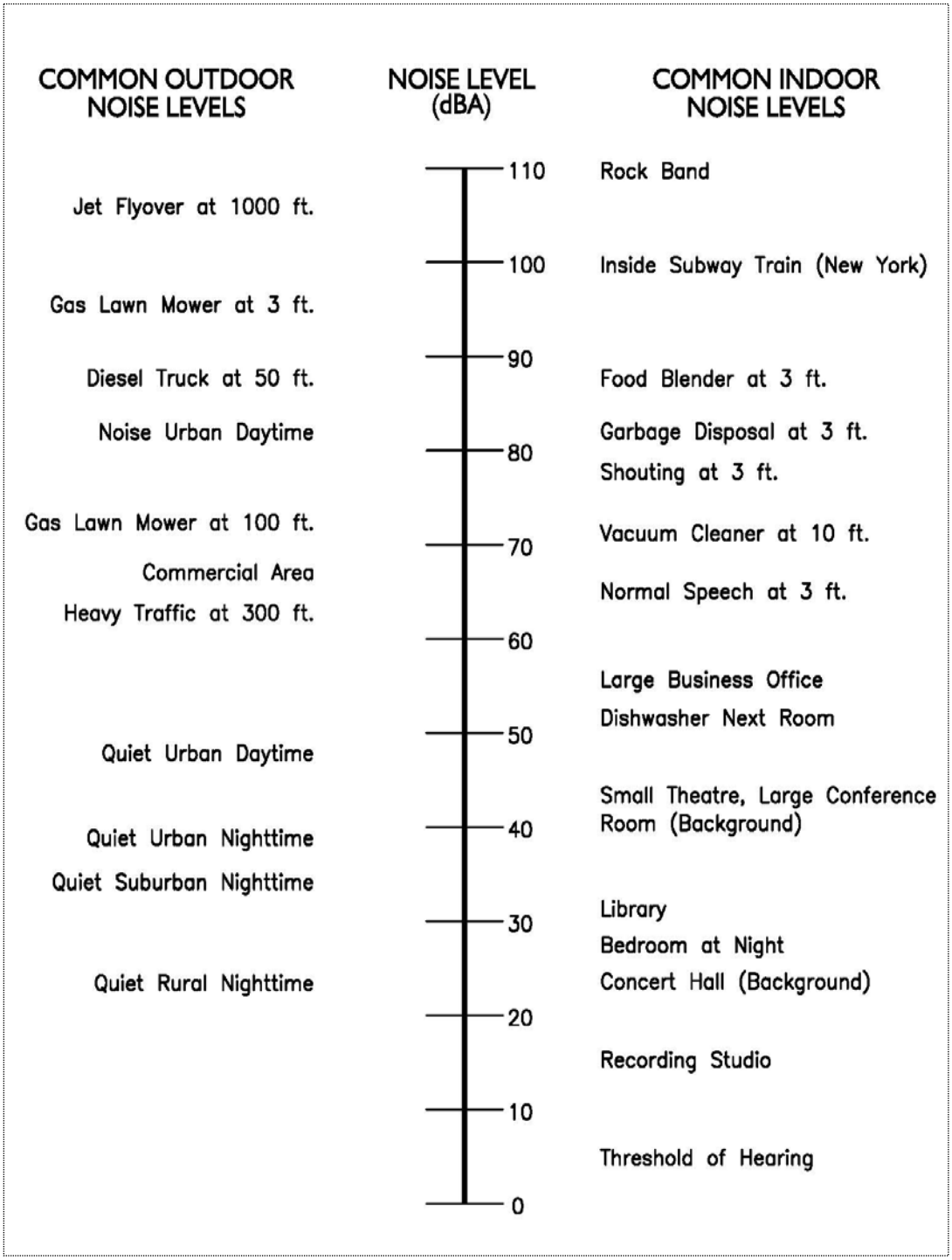
The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at an additional rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 3 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Figure 1
Typical Sound Levels from Indoor and Outdoor Noise Sources[2]



[2] Source: AASHSTO. 1993. Guide on Evaluation and Abatement of Traffic Noise

2.8 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration that only exists indoors since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV

Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS

Known as the root mean squared (RMS) can be used to denote vibration amplitude.

VdB

A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

2.9 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts.

2.10 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along

an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes in order to identify potential vibration impacts that may need to be studied through actual field tests.

2.11 Construction-Related Vibration Level Prediction[3]

Operational activities are separated into two different categories. The vibration can be transient or continuous in nature. Each category can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the project area site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. The thresholds from Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, in the table below provide general guidelines as to the maximum vibration limits for when vibration becomes potentially annoying.

[3] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020

Table 2
Vibration Annoyance Potential Criteria

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

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

The Caltrans Transportation and Construction Vibration Guidance Manual, April 2020 provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts. The table below provides general vibration damage potential thresholds:

Table 3
Vibration Damage Potential Threshold Criteria

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

Soil conditions have an impact on how vibration propagates through the ground. The Caltrans Transportation and Construction Vibration Guidance Manual, April 2020 provides suggested "n" values based on soil class. The table below outlines the manual's suggested values and description.

Table 4
Suggested "n" Values Based on Soil Classes

Soil Class	Description of Soil Material	Suggested Value of "n"
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand.	1.4
II	Most sands, sandy clays, silty clays, gravel, silts, and weathered rock.	1.3
III	Hard soils: densely compacted sand, dry consolidated clay, consolidated glacial till, and some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

3.0 Regulatory Setting

The proposed project is located in the City of Moreno Valley, and the agencies responsible for regulating noise are discussed below.

3.1 State Regulations

The State of California has established noise insulation standards as outlined in Title 24 of the Building Standards Code which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold.

Noise insulation design standards for residential dwellings are established in the 2022 California Building Code, Title 24, Part 2, Volume 1, Section 1206 Sound Transmission. The City is required by the State Housing Law to adopt these State codes as minimum performance standards. The City may enact stricter noise standards throughout the city or on a case-by-case basis if deemed necessary. In brief, the Title 24 noise standards require the following for allowable interior noise levels:

1. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

2. Penetrations or openings in sound rated assemblies must be treated to maintain required ratings.

3.2 City of Moreno Valley Noise Regulations

The proposed project is located in the City of Moreno Valley and is subject to the standards and regulations established by the City of Moreno Valley General Plan Noise Element and Municipal Code Chapter 11.80 – Noise Regulation, as discussed below.

A copy of the City of Moreno Valley General Plan noise standards and Municipal Code Chapter 11.80 are provided in Appendix A.

3.2.1 General Plan Noise Standards

The City of Moreno Valley General Plan establishes planning criteria for determining a development's noise/land use compatibility based on the community noise equivalent level (CNEL). CNEL noise levels are typically used to evaluate mobile noise source impacts such as those from roadways.

Table 5 shows the City of Moreno noise/land use compatibility standards for the land uses on and adjacent to the proposed project site, as prescribed in the General Plan. For the purposes of this analysis, the noise levels listed in Table 5 are used to evaluate the project's noise/land use compatibility.

Table 5
City of Moreno Valley Noise/Land Use Compatibility Standards[1]

Land Use Category	Community Noise Exposure (dBA CNEL)[2]			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low density single family, duplex, mobile homes	65 and below	65 – 70	70 – 75	75 and above

[1] Source: City of Moreno Valley General Plan Noise Element, Table N-1: Community Noise Compatibility Matrix.

[2] Notes:

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

3.2.2 Municipal Code Noise Standards

Maximum Noise Level Standards

Table 6 shows the City of Moreno Valley maximum noise level thresholds for residential land uses. Per the City's Municipal Code, no person shall maintain, create, operate, or cause to be operated on private property any source of sound in such a manner as to create any nonimpulsive sound which exceeds the limits set forth for the source land use category when measured at a distance of 200 feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space, or other publicly owned property.

For the purposes of this analysis, the noise levels listed in Table 6 are used to evaluate the project's consistency with established plans, policies, and programs for noise control within the City.

Table 6
City of Moreno Valley Stationary Noise Standards - Residential[1]

Land Use	Noise Level Threshold (dBA Lmax)	
	Daytime (8:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 8:00 a.m.)
Residential	60.0	55.0

[1] Source: City of Moreno Valley Municipal Code Chapter 11.80 – Noise Regulation, Table 11.80.030-2: Maximum Sound Levels (in dBA) for Source Land Uses.

Construction Noise Standards

The City of Moreno Valley places the following provisions on noise generated by construction activity within the City:

> *"No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee. This section shall not apply to the use of power tools as provided in subsection (D)(9) of this section."*

4.0 Study Method and Procedures

The following section describes the noise measurement procedures and locations, noise modeling procedures, and assumptions used in this analysis.

4.1 Noise Measurement Procedures and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses;
- Locations that are acoustically representative and equivalent to the area of concern;
- Human land usage; and
- Sites clear of major obstruction and contamination.

RK conducted the sound level measurements in accordance with Caltrans technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (ANSI S1.4: Specification for Sound Level Meter, 1983)

Piccolo-II Type 2 integrating-averaging level meters were used to conduct noise measurements at the project site and property boundaries.

The Leq, Lmin, Lmax, L2, L8, L25, and L50 statistical data were recorded over the measurement time intervals and the information was utilized to define the noise characteristics for the project. The following gives a brief description of the procedures for sound level measurements:

- Microphones for sound level meters were placed five (5) feet above the ground for long-term noise measurements;
- Sound level meters were calibrated before each measurement;
- Following the calibration of equipment, a windscreen was placed over the microphone;
- Frequency weighting was set on "A" and slow response; and
- Temperature and sky conditions were observed and documented.

Appendix B includes photos, field sheets, and measured noise data.

4.2 Stationary Noise Source Modeling

Stationary noise generated by the project was modeled using a computer program that replicates the FHWA Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at a predicted noise level through a series of adjustments to the reference energy noise level. For stationary

sources, the following noise levels were applied to the model. The model outputs the projected noise level based on the following key parameters:

- Referenced noise level (i.e., how loud a source is at a specific distance);
- Vertical and horizontal distances of sensitive receptor from the noise source;
- Vertical and horizontal distances of noise barriers from the noise source and receptor;
- Typical noise source spectra; and
- Topography.

Table 7 indicates the referenced noise levels used in this analysis.

Table 7
Referenced Stationary Noise Levels

Noise Source	Distance from Source (feet)	Noise Level (dBA Lmax)
HVAC[1]	5	77.4

[1] Noise level is representative of a single unit.

4.3 Traffic Noise Modeling

Traffic noise from vehicular traffic was projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the key input parameters. The following outlines the key adjustments made to the computer model for the roadway inputs:

- Roadway classification – (e.g., freeway, major arterial, arterial, secondary, collector, etc.);
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway);
- Average Daily Traffic (ADT) Volumes, Travel Speeds, Percentages of automobiles, medium trucks, and heavy trucks;
- Roadway grade and angle of view;
- Site Conditions (e.g., soft vs. hard); and
- Percentage of total ADT which flows each hour throughout a 24-hour period.

The following outlines key adjustments to the computer model for the project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source);
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor);
- Traffic noise source spectra; and

- Topography.

Table 8 shows the roadway parameters and traffic volume data utilized for this study. Existing Without Project and Future Year (2040) Without Project volumes are referenced from the *City of Moreno Valley Final Environmental Impact Report for the MoVal 2040: Moreno Valley Comprehensive Plan Update, Housing Element Update, and Climate Action Plan* (EIR), dated May 2021. Project-generated traffic volumes are referenced from the *TTM 37858 Single-Family Residential Project Trip Generation and VMT Screening Analysis, City of Moreno Valley*, prepared by RK in March 2024.

Table 8

Roadway Parameters[1]

Roadway	Segment	Posted Speed	Distance from Centerline to Nearest Residential Receptor (feet)	Project ADT	Existing Without Project ADT	Existing With Project ADT	Future Year (2040) Without Project ADT	Future Year (2040) With Project ADT
1. Cactus Avenue	Moreno Beach Drive to Redlands Boulevard	50	45	349	40,600	40,949	59,100	59,449

[1] Existing Without Project ad Future Year (2040) Without Project Volumes are referenced from the *City of Moreno Valley Final Environmental Impact Report for the MoVal 2040: Moreno Valley Comprhensive Plan Update, Housing Elemet Update, and Climate Action Plan* (EIR), dated May 2021. Project-generated traffic volumes are referenced from the *TTM 37858 Single Family Residential Project Trip Generation and VMT Screening Analysis, City of Moreno Valley,* prepared by RK in March 2024.

Table 9 shows the vehicle distribution and truck mix utilized for Cactus Avenue. Vehicle distribution percentages are referenced from the *City of Moreno Valley Final Environmental Impact Report for the MoVal 2040: Moreno Valley Comprehensive Plan Update, Housing Element Update, and Climate Action Plan* (EIR), dated May 2021.

Table 9
Vehicle Distribution (Truck Mix)

Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	78.00	4.00	18.00	96.03
Medium Trucks	78.00	4.00	18.00	1.66
Heavy Trucks	78.00	4.00	18.00	2.31

4.4 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's façade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows closed". The interior noise level is estimated by subtracting the building shell design from the estimated exterior noise level.

The interior noise analysis is based on industry standards for building noise reduction established by the Federal Highway Administration (FHWA), the 2013 Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (TeNS), the California Office of Noise Control Catalog of STC and IIC Ratings for Wall and Floor/Ceiling Assemblies, and the California Building Standards Code, Title 24.

The TeNS manual shows that the noise reduction due to building exteriors with ordinary sash windows (windows closed) is at least 20 decibels. By providing upgraded STC rated windows, the project design is considered adequate to meet interior noise standards. The building's exterior walls will be constructed per the latest building code insulation requirements and provide occupants with the most protection from exterior noise. Insulated exterior walls, designed per the latest California Building Standards, would provide a minimum of STC 35-40. Windows, on the other hand, are one of the acoustically weakest parts of the structure. Therefore, for a conservative estimate of preliminary interior noise, the building's noise reduction potential is limited to the STC of the windows.

4.5 Construction Noise Modeling

The construction noise vibration assessment is based on the General Assessment methodology set forth by the FTA's Transit Noise and Vibration Impact Assessment Manual, Section 7 – Noise and Vibration during Construction. This analysis utilizes SoundPLAN™ modeling software, together with several key construction parameters, to estimate future construction noise levels during each phase of construction. Consistent with the FTA General Assessment methodology, the following assumptions have been utilized in the construction noise model:

- Noise emission level ($L_{emission}$) – Determine the emission level at 50 feet according to noise from typical construction equipment.
- Usage factor (Adj_{Usage}) – Assume a usage factor of one (1). This assumes a time period of one-hour with full power operation.
- Distance (D) – Assume that all equipment operates at the center of the project, or centerline for guideway or highway construction projects.
- Ground effect (G) – G equals zero (0) assuming free-field conditions and ignoring ground effects.
- The $L_{eq.equip}$ is determined only for the two noisiest pieces of equipment expected to be used in each phase of construction. The equipment noise levels are summed for each phase of construction using decibel addition.

Noise levels were projected from the center of the project site to the adjacent sensitive receptor property lines. Although some construction activity may occur closer to the adjacent receptors than the center of the project site, noise levels are based on an average distance from the center of the site per FTA General Assessment recommendations.

4.6 Construction Vibration Modeling

The construction vibration assessment is based on the methodology set forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. The vibration impacts from bulldozers, heavy truck loading, vibratory rollers and compactors, and caisson drilling activity are analyzed. All vibratory activity is analyzed as a continuous and/or frequent event and is required to comply with the applicable guidance threshold criteria. It is expected that vibration levels will be highest during the paving phase. No impact pile driving is expected as part of this project.

Vibratory impacts were calculated from the nearest expected location of on-site construction to the nearest sensitive receptors and structures using the reference vibration levels, soil conditions, and the reference equation *PPV= PPV ref (25/D)^n (in/sec)* (from Caltrans Manual) where:

PPV = reference measurement at 25 feet from vibration source
D = distance from equipment to property line

n= vibration attenuation rate through ground (n=1.0 was utilized for this study)

5.0 Existing Noise Environment

The existing noise environment for the project site and surrounding areas has been established based on noise measurement data collected by RK. The project setting is residential, and the primary environmental noise impacting the project site is roadway noise from Cactus Avenue.

5.1 Noise Measurement Results

To determine the existing noise level environment, RK conducted two (2) 24-hour noise measurements at the project site and adjacent residential noise receptors.

Noise levels were measured on March 26, 2024, using Piccolo-II Type 2 integrating-averaging sound level meters. The information was utilized to establish the noise characteristics of the existing ambient environment.

The noise monitoring locations were selected based on the proximity and location of adjacent sensitive receptors. Exhibit C graphically illustrates the location of the noise measurements.

- Noise Monitoring Location 1 (L-1) was taken at the western boundary of the project site, approximately 276 feet north of the centerline of Cactus Avenue.

- Noise Monitoring Location 2 (L-2) was taken near the northeast corner of the project site, approximately 645 feet north of the centerline of Cactus Avenue.

Noise measurements were conducted at the above-selected locations to determine the existing ambient noise environment at the project site and nearby sensitive receptors. The primary sources of ambient noise during the measurement period consisted of roadway noise from adjacent streets, bird/nature sounds, and general residential activity.

Results of the long-term ambient noise measurements are shown in Tables 10 and 11. Appendix B includes photographs, field sheets, and measured noise data.

Table 10
24-Hour Noise Measurement Results – L-1[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	43.8	12:00 PM	50.8
1:00 AM	43.3	1:00 PM	54.0
2:00 AM	42.1	2:00 PM	55.7
3:00 AM	45.8	3:00 PM	55.5
4:00 AM	48.4	4:00 PM	59.1
5:00 AM	51.6	5:00 PM	56.4
6:00 AM	54.3	6:00 PM	54.1
7:00 AM	56.4	7:00 PM	53.0
8:00 AM	51.6	8:00 PM	52.2
9:00 AM	53.5	9:00 PM	49.7
10:00 AM	50.6	10:00 PM	48.9
11:00 AM	51.1	11:00 PM	47.9
24-Hour CNEL			**57.1**

[1] L-1 was measured on March 26, 2024.

Table 11
24-Hour Noise Measurement Results – L-2[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	44.9	12:00 PM	57.7
1:00 AM	38.3	1:00 PM	50.6
2:00 AM	39.2	2:00 PM	55.6
3:00 AM	41.6	3:00 PM	50.0
4:00 AM	43.5	4:00 PM	53.5
5:00 AM	44.5	5:00 PM	53.0
6:00 AM	48.0	6:00 PM	51.1
7:00 AM	46.7	7:00 PM	50.4
8:00 AM	47.9	8:00 PM	49.9
9:00 AM	49.8	9:00 PM	49.2
10:00 AM	52.2	10:00 PM	50.6
11:00 AM	44.9	11:00 PM	48.6
24-Hour CNEL			**53.8**

[1] L-2 was measured on March 26, 2024.

As shown in Tables 10 and 11, the existing ambient noise levels at the project site range from 53.8 dBA CNEL to 57.1 dBA CNEL.

6.0 Operational Noise Impacts

A noise impact analysis has been performed to determine whether the proposed project would result in a substantial increase in ambient noise levels in the vicinity of the site. Additionally, the noise analysis examines whether the project can meet the City of Moreno Valley and State of California requirements for residential exterior and interior noise exposure.

6.1 Stationary Source Noise Impacts

The proposed project consists of constructing and operating 37 single family homes. Project operation will not include significant sources of stationary noise. The main sources of potential on-site noise would include motor vehicle activity and HVAC equipment.

These types of on-site stationary noises would not typically be categorized as loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness. In particular, social activities and vehicle-related noise in residential communities is generally substantially less during the noise sensitive nighttime hours.

To help ensure on-site noise levels do not exceed the City of Moreno Valley noise standards, the following stationary noise impact analysis has been performed.

The City of Moreno Valley Municipal Code establishes maximum noise level thresholds of 60.0 dBA Lmax during daytime hours (8:00 a.m. to 10:00 p.m.) and 55.0 dBA Lmax during nighttime hours (10:01 p.m. to 7:59 a.m.), as measured at a distance of 200 feet or more from the real property line of the source of the sound. Therefore, for a conservative analysis, this study assesses noise impacts at a distance of 200 feet from the noise source location.

The analysis considers continuous operation of HVAC units during both daytime hours (8:00 a.m. to 10:00 p.m.) and nighttime hours (10:01 p.m. to 7:59 a.m.). The result is a worst-case assessment of impacts, as HVAC units would likely operate only intermittently throughout the day. The analysis also takes into account the noise attenuation effects of the six-to-eight-foot-tall property line wall along the northern boundary of the proposed project site.

Table 12 below shows the expected noise level of HVAC unit operation at the nearest adjacent receptors located along the northern boundary of the proposed project site. Stationary noise calculation worksheets are provided in Appendix C.

Table 12
Stationary Noise Source Impacts

Source	Equipment Noise Level at 200 Feet From Noise Source (dBA Lmax)	
	Daytime (8:00 a.m. to 10:00 p.m.)	**Nighttime (10:00 p.m. to 8:00 a.m.)**
HVAC Unit	44.8	44.8
Municipal Code Noise Level Thresholds	60.0	55.0
Exceeds Threshold?	**No**	**No**

As shown in Table 12, onsite HVAC units are expected to create a noise level of approximately 44.8 dBA Lmax at a distance of 200 feet from the noise source, which does not exceed the City's daytime and nighttime noise level thresholds of 60.0 dBA Lmax and 55.0 dBA Lmax, respectively. **Therefore, the impact from project-related stationary noise will be less than significant.**

6.2 Traffic Noise Impacts

A roadway noise impact analysis has been prepared to determine whether the project would cause a substantial permanent increase in ambient noise levels at each sensitive receptor location due to changes increased traffic volumes.

Per the City of Moreno Valley General Plan, noise levels up to 65.0 dBA CNEL are considered Normally Acceptable for single-family residential land uses. To help determine whether the project would generate a significant permanent increase in ambient noise levels in the vicinity of the project, the following quantifiable thresholds significance have been used in this analysis. A significant impact would occur if:

- Without project noise levels are 65.0 dBA CNEL or lower, and the project causes noise levels to increase above 65.0 dBA CNEL; or
- Without project noise levels are above 65.0 dBA CNEL and the project results in an increase of 3.0 dBA or more above Without Project conditions.

A change of 3 dBA is considered barely perceptible by the average health human ear[4], and is a commonly used threshold of significance assessing potentially significant increases in community noise exposure.

Table 13 shows the roadway noise levels for Existing Without Project and Existing With Project conditions. Table 14 shows the roadway noise levels for Future Year (2040) Without Project and Future Year (2040) With Project conditions.

Operational roadway noise calculation sheets are provided in Appendix D.

Table 13
Roadway Noise Impacts – Existing Conditions[1, 2]

Roadway	Segment	Roadway Noise Levels at Nearest Receptors to Centerline (dBA CNEL)			Significant Impact (?)[3]
		Existing Without Project Conditions	Existing With Project Conditions	Increase as a result of Project	
1. Cactus Avenue	Moreno Beach Drive to Redlands Boulevard	76.5	76.5	0.0	No

[1] Roadway noise is projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108).

[2] Existing Without Project volumes are referenced from the City of Moreno Valley Final Environmental Impact Report for the MoVal 2040: Moreno Valley Comprehensive Plan Update, Housing Element Update, and Climate Action Plan (EIR), dated May 2021. Project-generated traffic volumes are referenced from the TTM 37858 Single-Family Residential Project Trip Generation and VMT Screening Analysis, City of Moreno Valley, prepared by RK in March 2024.

[3] A significant impact would occur if Without Project noise levels are 65.0 dBA CNEL or lower, and the project causes noise levels to increase above 65.0 dBA CNEL, OR Without Project noise levels are above 65.0 dBA CNEL and the project results in an increase of 3.0 dBA or more above Without Project conditions.

[4] Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (Tens Manual). September 2013. Section 2.2.1.1 Human Response to Changes in Noise Levels.

Table 14
Roadway Noise Impacts – Future Year (2040) Conditions[1, 2]

Roadway	Segment	Roadway Noise Levels at Nearest Receptors to Centerline (dBA CNEL)			Significant Impact (?)[3]
		Future Year (2040) Without Project Conditions	Future Year (2040) With Project Conditions	Increase as a result of Project	
1. Cactus Avenue	Moreno Beach Drive to Redlands Boulevard	78.1	78.1	0.0	No

[1] Roadway noise is projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108).

[2] Future Year (2040) Without Project volumes are referenced from the City of Moreno Valley Final Environmental Impact Report for the MoVal 2040: Moreno Valley Comprehensive Plan Update, Housing Element Update, and Climate Action Plan (EIR), dated May 2021. Project-generated traffic volumes are referenced from the TTM 37858 Single-Family Residential Project Trip Generation and VMT Screening Analysis, City of Moreno Valley, prepared by RK in March 2024.

[3] A significant impact would occur if Without Project noise levels are 65.0 dBA CNEL or lower, and the project causes noise levels to increase above 65.0 dBA CNEL, OR Without Project noise levels are above 65.0 dBA CNEL and the project results in an increase of 3.0 dBA or more above Without Project conditions.

As shown in Tables 13 and 14, the proposed project will not result in a significant permanent increase in roadway noise levels along adjacent roadways. Hence, **the impact from increased roadway activity as a result of the project will be less than significant.**

6.3 Noise/Land Use Compatibility

The project proposes to site new single family homes near the northeast corner of Cactus Avenue and Bradshaw Circle. Traffic noise from Cactus Avenue will be the primary source of noise impacting the project site and may expose future residents to noise levels above the City of Moreno Valley exterior noise thresholds for residential uses.

6.3.1 Exterior Noise/Land Use Compatibility

A noise/land use compatibility assessment has been prepared to help determine whether existing exterior noise levels affecting the project site exceed the City's noise/land use compatibility threshold for residential land uses. Exterior ambient noise levels are assessed habitable backyard areas at the first-row dwelling units along Cactus Avenue.

Table 15 shows the anticipated exterior noise levels at the habitable backyard areas of the first-row dwelling units along Cactus Avenue. The noise levels shown in Table X are based on Future

Year (2040) With Project traffic volumes and take into account the noise attenuation effects from the proposed six-foot property line wall along the southern boundary of the project site.

Exterior noise/land use compatibility calculation worksheets are provided in Appendix E.

Table 15
Exterior Noise/Land Use Compatibility (dBA CNEL)[1]

Receptor Location	Distance from Centerline (feet)	Future Backyard Exterior Noise Levels[2]	Noise/Land Use Compatibility[3]
Habitable backyards of first-row dwellings along Cactus Avenue	60	70.2	Normally Unacceptable

[1] Future exterior noise levels are based on traffic volumes under Future Year (2040) With Project conditions.
[2] Backyard noise levels include the attenuation effects of the proposed 6-foot high property line block wall.
[3] Source: City of Moreno Valley General Plan Noise Element, Table N-1: Community Noise Compatibility Matrix.

As shown in Table 15, future exterior ambient noise levels are expected to be approximately 70.2 dBA CNEL and fall within the Normally Unacceptable noise/land use compatibility category.

Per the City of Moreno Valley General Plan, construction or development of Normally Unacceptable land uses should only proceed after a detailed analysis of the noise reduction requirements are made and needed noise insulation features included in the design.

In order to ensure that interior noise levels comply with City and State standards, the following preliminary interior noise analysis is provided.

6.3.2 Interior Noise/Land Use Compatibility

The project must show that interior noise levels at the project site will not exceed the City of Moreno Valley and State of California noise/land use compatibility threshold for residential land uses. A preliminary interior noise analysis has been performed for the first row of habitable dwellings facing the adjacent roadways using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level.

Table 16 indicates the future interior noise levels along the adjacent roadways.

Table 16
Future Interior Noise Levels (dBA CNEL)

Exterior Façade Study Location	Projected Exterior Noise Level (dBA CNEL)[1]	Interior Noise Standard (dBA CNEL)	Required Building Shell Noise Reduction (dBA CNEL)	Interior Noise Level w/ Standard Windows (STC ~ 25)		Required STC Rating
				"Windows Open" [2]	"Windows Closed" [3]	
First-row habitable dwellings facing Cactus Avenue (First Floor)	70.2	45.0	25.2	58.2	50.2	31
First-row habitable dwellings facing Cactus Avenue (Second Floor Floor)	75.9	45.0	30.9	63.9	55.9	34

[1] Worst-case future exterior noise levels are based on traffic volumes under Future Year (2040) With Project conditions. First floor noise levels take into account the noise attenuation effects of the property wall along the southern boundary of the project site, while second floor noise levels assume no noise barrier shielding.

[3] A minimum of 12 dBA noise reduction is assumed with the "windows open" condition.

[4] A minimum of 20 dBA noise reduction is assumed with the "windows closed" condition.

The project is expected to require a "windows closed" condition and upgraded STC rated windows for all residential units facing Cactus Avenue in order to meet the City of Moreno Valley land use compatibility threshold for residential interior noise. To accommodate windows closed conditions, all residential units facing the adjacent roadways shall be equipped with adequate fresh air ventilation.

Exterior walls, designed per the latest California Building Standards are typically rated between STC 35-40. In order to ensure adequate noise attenuation is provided from the building shell, exterior walls should be designed to meet the required sound attenuation targets. Attic vents and other openings should be baffled and oriented away from facing the adjacent roadways.

Prior to issuance of building permits, the project proponent should demonstrate to the City Building Department that the proposed building shell and window assemblies will achieve exterior to interior noise reduction necessary to meet the State of California and City of Moreno Valley requirements.

Furthermore, the project shall comply with California Title 24 insulation building requirements for multi-family dwelling units for common separating assemblies (e.g., floor/ceiling assemblies and demising walls).

6.4 Airport Noise Compatibility

The March Air Force Reserve Base (MARB), located in the County of Riverside, is the nearest airport to the proposed project site at a distance of approximately 4.5 miles. Based on the March Air Reserve Base / Inland Port Airport Land Use Compatibility Plan map, the project site is located outside of the MARB airport influence area.

Furthermore, as described above, the proposed project is not expected to expose people residing or working in the project area to excessive noise levels. Therefore, **the project's noise impact on airport-adjacent land uses will be less than significant.**

A copy of the March Air Reserve Base / Inland Port Airport Land Use Compatibility Plan map is provided in Exhibit D.

6.5 Project Design Features

The following recommendations are provided to help ensure the proposed project meets the City of Moreno Valley and State of California noise level requirements:

Operational Design Features

DF-1 A minimum six-foot high CMU block wall will be constructed along the south and east property line of the site shielding residential homes from roadway noise along Cactus Avenue.

DF-2 The project should incorporate building construction techniques and insulation that is consistent with California Title 24 Building Standards to achieve the minimum interior noise standard of 45 dBA CNEL for all residential units.

DF-3 A "windows closed" condition and upgraded windows and sliding glass doors are expected to be required for all residential units facing Cactus Avenue in order to meet the interior noise standard. See Section 6.3.2, Table 16, for details regarding window STC requirements.

DF-4 For proper acoustical performance, all exterior windows, doors, and sliding glass doors should have a positive seal and leaks/cracks must be kept to a minimum. Attic vents and opening should be oriented away from the adjacent roadways.

7.0 Construction Noise and Vibration Impacts

Temporary construction noise and vibration impacts have been assessed from the project site to the surrounding adjacent land uses. The degree of construction noise and vibration will vary depending on the type of construction activity taking place and the location of the activity relative to the surrounding properties.

During the construction period, the contractors will be required to comply with the City of Moreno Valley Municipal Code Chapter 11.80 – Noise Regulation, which places the following provisions on noise generated by construction activity within the City:

> *"No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee. This section shall not apply to the use of power tools as provided in subsection (D)(9) of this section."*

No project-related construction will occur between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a national holiday. The City of Moreno Valley does not establish specific noise level thresholds for construction activity during approved hours. Therefore, for purposes of this analysis, the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2006) criteria will be used.

The FTA provides reasonable criteria for evaluating construction noise impacts based on the likelihood of adverse community response. This analysis uses the FTA's General Assessment Methodology, which applies a daytime noise threshold of 90 dBA Leq over a 1-hour period. However, to ensure a conservative assessment, this analysis uses the FTA's more stringent construction noise threshold of 80 dBA Leq. In accordance with the City's Municipal Code, it is assumed that construction will not take place during noise-sensitive nighttime hours.

Construction phasing and equipment usage assumptions are referenced from the *TTM 37858 Single Family Residential Project Air Quality, Greenhouse Gas, and Energy Impact Study, City of Moreno Valley,* performed by RK.

7.1 Typical Construction Noise Levels

Table 17 shows typical construction noise levels compiled by the Environmental Protection Agency (EPA) for common-type construction equipment. Typical construction noise levels are used to estimate potential project construction noise levels at the adjacent sensitive receptors.

Table 17
Typical Construction Noise Levels[1]

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86
Impact Equipment	
Pneumatic Wrenches	82 - 87
Jack Hammers, Rock Drills	80 - 99
Pile Drivers (Peak)	95-105
Other	
Vibrators	68 - 82
Saws	71 - 82

[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

7.2 Construction Noise Impact Analysis

This assessment analyzes potential noise impacts of the two noisiest pieces of equipment during all expected phases of construction, including site preparation, grading, building construction, paving, and architectural coating. Noise levels are calculated based on an average distance of equipment over a 1-hour period to the nearest adjacent property. The project's estimated construction noise levels have been calculated using the Federal Highway Administration Roadway Construction Noise Model Version 1.1. Table 18 shows the noise level impacts from the center of the project site to the nearest sensitive receptor property line.

Construction noise calculation worksheets are provided in Appendix F.

Table 18
Project Construction Noise Levels – at 192 Feet

Phase	Equipment	Quantity	Equipment Noise Level at 192 ft (dBA Leq)	Combined Noise Level (dBA Leq)
Site Preparation	Tractors/Loaders/Backhoes	2	72.3	75.3
Grading	Graders	1	73.3	75.9
	Tractors/Loaders/Backhoes	1	72.3	
Building Construction	Tractors/Loaders/Backhoes	2	72.3	75.3
Paving	Tractors/Loaders/Backhoes	1	72.3	73.8
	Rollers	1	68.3	
Architectural Coating	Air Compressors	1	66.0	66.0
Worst Case Construction Phase Noise Level (dBA Leq)				75.9
FTA Daytime General Assessment Construction Noise Criteria (dBA Leq)[1]				**80.0**
Noise level exceeds FTA criteria?				No

[1] Source: *Transit Noise and Vibration Impact Assessment Manual, Section 7 Noise and Vibration during Construction*, by the Federal Transit Administration.

As shown in the table above, the project is expected to generate a maximum noise level of 75.9 dBA. Hence, the project's construction-related noise levels will not exceed the FTA General Assessment Construction Noise Criteria threshold. As a result, **the project's impact from construction-related noise will be less than significant.**

7.3 Construction Vibration

To determine the vibratory impacts during construction, reference construction equipment vibration levels were utilized and then extrapolated to the façade of the nearest adjacent structures. The nearest adjacent structures to the project site are the Northern Receptors, located along the northern boundary of the project site. The nearest structures will be located approximately 34 feet from the nearest expected area of bulldozer and truck activity and approximately 95 feet from the nearest expected area of vibratory roller activity. All structures surrounding the project site are "new structures". No historical or fragile buildings are known to be located within the vicinity of the site.

The construction of the proposed project is not expected to require the use of substantial vibration-inducing equipment or activities, such as pile drivers or blasting. The main sources of

vibration impacts during the construction of the project would be the operation of equipment such as bulldozer activity during site preparation and loading trucks during grading and excavation.

The construction vibration assessment utilizes the referenced vibration levels and methodology set forth within the Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, September 2018. Table 19 shows the FTA-referenced vibration levels.

Table 19
Typical Construction Vibration Levels[1]

Equipment	Peak Particle Velocity (PPV) (inches/second) at 25 feet	Approximate Vibration Level (LV) at 25 feet
Piledriver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Piledriver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

Table 20 shows the project's construction-related vibration analysis at the nearest structures to the project construction area. Construction impacts are assessed at 34 feet from the nearest expected location of bulldozer and truck activity and at 95 feet from the nearest expected location of vibratory roller activity. Construction vibration calculation worksheets are provided in Appendix F.

Table 20
Construction Vibration Impact Analysis

Construction Activity	Distance to Nearest Structure (ft)	Duration	Calculated Vibration Level - PPV (in/sec)	Damage Potential Level
Large Bulldozer	34	Continuous/Frequent	0.063	None
Loaded Trucks	34	Continuous/Frequent	0.054	None
Vibratory Rollers	95	Continuous/Frequent	0.048	None

Based on the table above, project-related construction activity is not expected to cause any potential damage to the nearest structures. Hence, **the impact from construction-related vibration will be less than significant.**

The following construction related project design features will be implemented to help ensure noise level impacts during construction remain less than significant.

Construction Design Features

DF-5 The project shall comply with City of Moreno Valley Municipal Code requirements. No construction will occur between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a national holiday.

DF-6 Provide public notifications and signage in readily visible locations along the perimeter of construction sites that indicate the dates and duration of construction activities, as well as provide a telephone number where neighbors can enquire about the construction process and register complaints to a designated construction noise disturbance coordinator.

DF-7 All construction equipment should be equipped with mufflers and other suitable noise attenuation devices (e.g., engine shields).

DF-8 Locate staging area, generators, and stationary construction equipment as far from the adjacent residential homes as feasible.

DF-9 Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.

Exhibits

Exhibit A

Location Map

Legend:

= Project Site Boundary

= Project Site

N

1742-2024-02

TTM 37858 SINGLE FAMILY RESIDENTIAL PROJECT NOISE IMPACT STUDY, City of Moreno Valley, CA

RK engineering group, inc.

Exhibit B

Site Plan

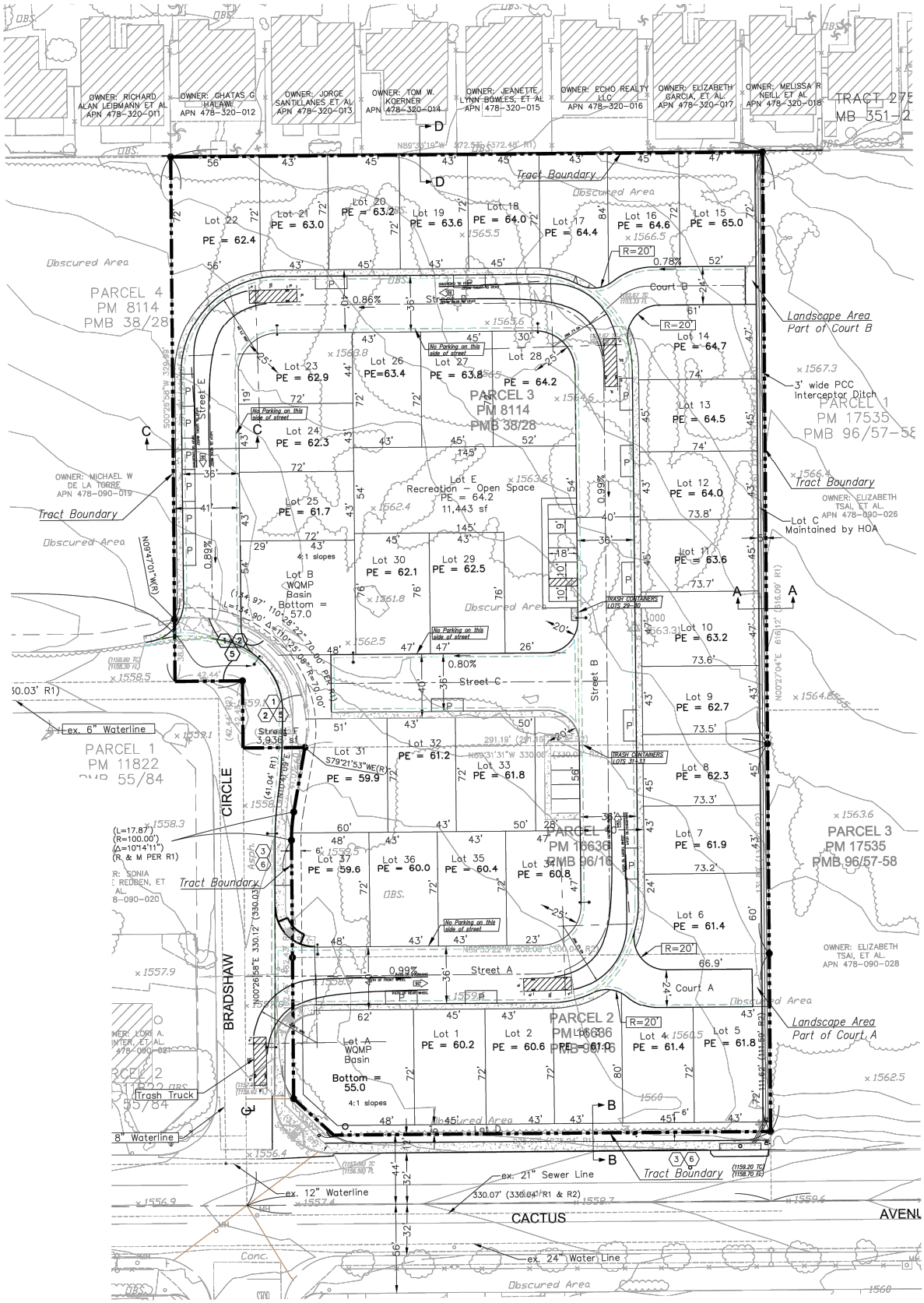
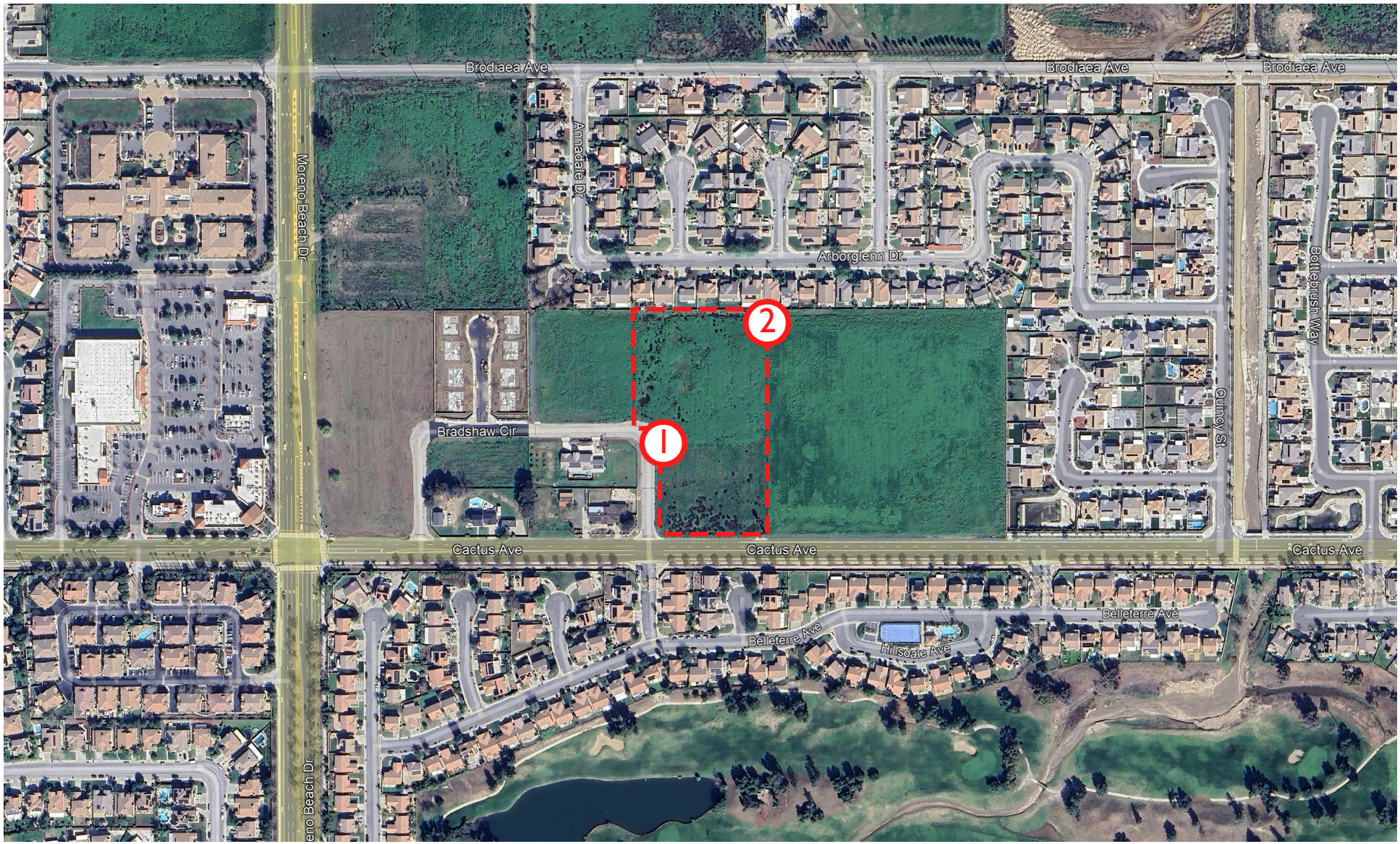


Exhibit C

Noise Monitoring Locations



Legend:

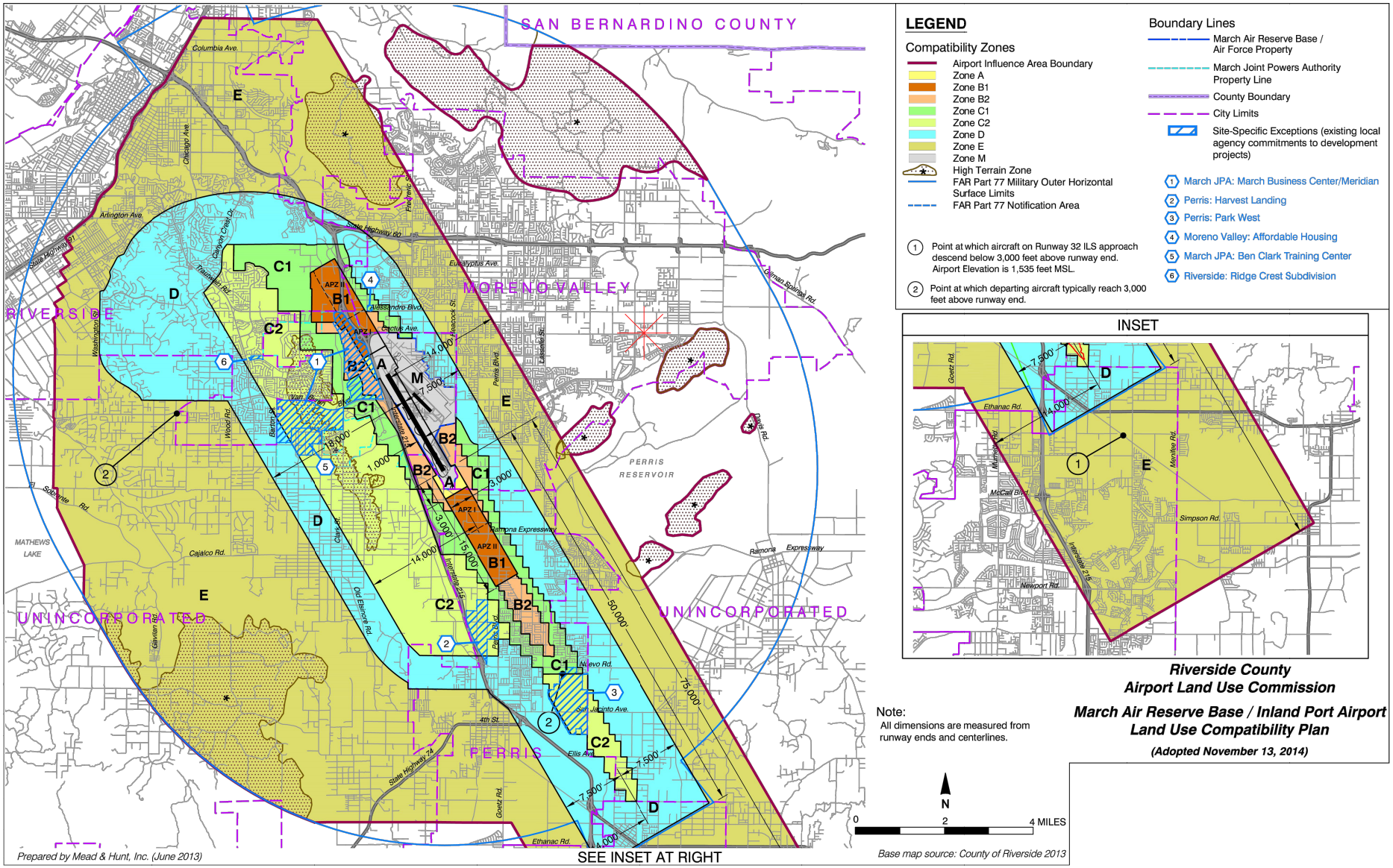
= Project Site Boundary

= Noise Monitoring Location

N

Exhibit D

March Air Reserve Base / Inland Port Airport Land Use Compatibility Plan Map



Legend:

= Project Site

N

Appendices

Appendix A

City of Moreno Valley General Plan Noise Element and
Municipal Code Chapter 11.80 – Noise Regulation

7 Noise

Sound shapes the way we experience the places where we live, work, and play. A pleasant, healthy noise environment can reduce stress, improve health, and enhance quality of life in the community. In an urban environment, noise is a part of everyday life, but thoughtful planning and design can minimize unwanted noise and create welcoming neighborhoods that residents are proud to call home.

The goals, policies, and actions in this chapter seek to proactively address sources of noise in Moreno Valley, protect against excessive noise, and support the social and economic vitality of the community. This chapter satisfies the statutory requirements for the General Plan Noise Element. Airport land use compatibility is also addressed in the Land Use and Community Character and Safety Elements, while goods movement is addressed in the Transportation Element.

Background

Unwanted noise can be defined as a sound or series of sounds that are intrusive, irritating, objectionable and/or disruptive to daily life. Background noise is primarily the product of many distant noise sources, which constitute a relatively stable noise background exposure, with individual contributors unidentifiable. Noise levels are also affected by short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual. The known effects of noise on humans include hearing loss, communication interference, sleep interference, physiological responses, and annoyance.

People in residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, natural areas, parks and outdoor recreation areas are generally more sensitive to noise than are people at commercial and industrial establishments. Consequently, noise standards for sensitive land uses are more stringent than for those at less sensitive uses. To protect various human activities in sensitive areas, lower noise levels are generally required.

Typically, when noise levels are reported, they are expressed as a measurement over time in order to account for variations in noise exposure. Levels also account for varying degrees of sensitivity to noise during daytime and nighttime hours. The Community Noise Equivalent Level (CNEL) and Day-Night Noise Level (Ldn) both reflect noise exposure over an average day with weighting to reflect this sensitivity.

Existing Noise Sources and Levels

EXISTING NOISE LEVELS

Moreno Valley is subject to typical urban noises such as noise generated by cars on local roadways, noise from intermittent construction activities, and day-to-day outdoor activities. There are also several transportation-related noise sources that operate at the periphery of the city, including Interstate 215 (I-215), the March Air Reserve Base (MARB), and the railway line, as well as State Route 60 (SR 60), which passes through the northern part of the city. Other sources of noise within the city include commercial and industrial centers and property maintenance activities.

Ambient noise monitoring was conducted to assess current noise levels in Moreno Valley at a variety of land uses proximate to major noise sources. Short-term daytime noise measurements were taken adjacent to major noise sources in the city. These measured noise levels included major noise sources (traffic and/or train passbys) in addition to non-traffic noise sources Map N-1 reflects the existing noise level contours for 60, 65, and 70 dBA.

Freeway and Internal Roadways

Roadways are the principal noise source in Moreno Valley. Most of Moreno Valley is located between the I-215 and SR-60 highways. I-215 runs north-south towards the western boundary, while SR-60 runs approximately east-west in the northern part of the city. Roadway noise is expected to remain the principal source of noise in the future. Noise from these sources can be a significant environmental concern for noise sensitive uses, such as residential development where buffers (e.g., buildings, landscaping, etc.) are inadequate or where there is minimal distance from the roadways to sensitive uses.

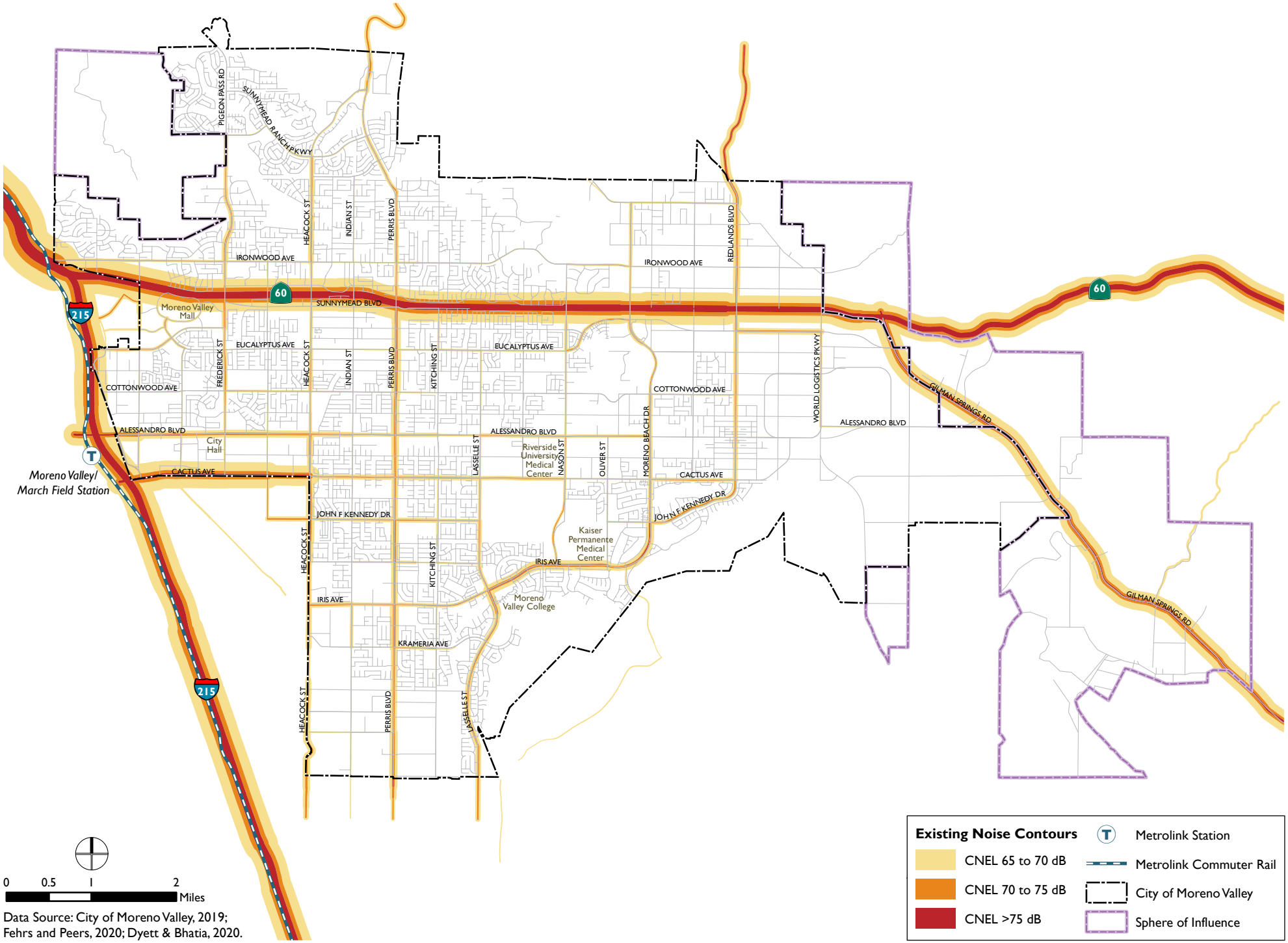
Airport Noise

Noise levels due to air traffic from the joint-use airport at MARB depend on aircraft characteristics, the number, path, elevation and duration of flights as well as the time of day that flights take place. Since 1997, MARB has also been home to the March Inland Port, a civilian air cargo facility. As demand for cargo shipping increases, operations at MARB are projected to increase. Map N-2 shows the existing noise contours surrounding MARB. Though most of the city is located outside the MARB 60-CNEL noise contours, noise from aircraft is audible in the western portion of the city and contributes to the ambient noise environment.

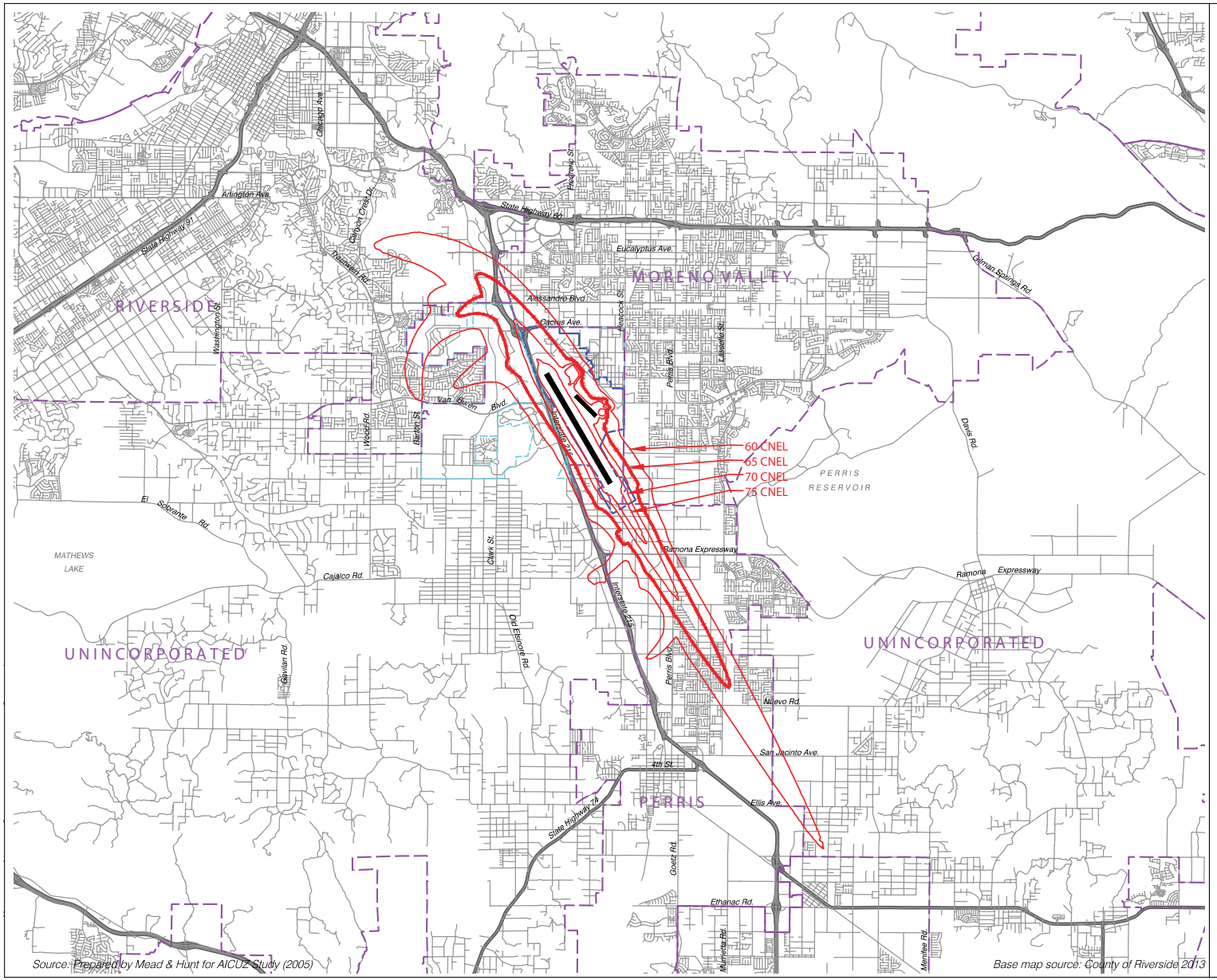
Railroad Noise

Train noise, however intermittent, is a major source of noise due to its magnitude. The San Jacinto Branch Line follows the I-215 corridor closely, bordering the western edge of the city. Both the Metrolink Commuter Rail and freight trains travel along the corridor. The Metrolink commuter rail 91/Perris Valley Line stops at the Moreno Valley/March Air Field Station, located between Eucalyptus and Cactus Avenues in proximity to the western border of the city. Commuter trains stop several times a day in the morning and evening, and freight trains pass through about twice a day.

Map N-1: Existing Noise Contour



Map N-2: MARB Noise Contour



LEGEND

Noise Contours

- 60 dB CNEL
- 65 dB CNEL
- 70 dB CNEL
- 75 dB CNEL

Projected Activity Level (75,104 operations)

Boundary Lines

- March Air Reserve Base / Inland Port Airport
- March Joint Powers Authority Property Line
- City Limits

Projected Activity Level	
Annual Operations	75,104
Average Annual Day	206

Note:

Contours represent composite of noise contours from four sources:

- Forecasts and noise contours from Air Installation Compatible Use Study for March Air Reserve Base (August 2005).
- Environmental Assessment for Proposed Military Construction and Total Force Integration at March Air Reserve Base (Air Force Reserve Command, June 2010); Environmental Impact Report for March Inland Port General Aviation Facilities Development (March Joint Powers Authority, August 2012).
- F-15 Aircraft Conversion Environmental Impact Statement 144th Fighter Wing California Air National Guard Fresno-Yosemite International Airport (National Guard Bureau, March 2013).

N

2 MILES

0 MILES 4 MILES

Map Source: March Air Reserve Base Land Use Compatibility Plan, 2014

RECON

Most of Moreno Valley is located between the I-215 and SR-60 highways; noise from these sources can be a significant environmental concern.

Construction and equipment can produce very high noise levels. The City currently regulates construction activity through Municipal Code Chapter 8.

Aircraft flying in and out of the March Air Reserve Base contribute to the ambient noise environment of the city.

Industrial Noise

Industrial uses, including manufacturing, warehousing, and distribution-related uses, are another source of noise that can have a varying degree of impact on adjacent uses. Mechanical equipment, generators, and vehicles associated with these uses all contribute to noise levels at industrial sites. Existing industrial uses in Moreno Valley are largely concentrated in the southwest of the City, adjacent to MARB and Interstate-215; however, significant light industrial uses are planned at the World Logistics Center site at the eastern edge of the city. While industrial uses are generally concentrated at the periphery of the city, the potential for noise conflicts exists where these uses abut residential areas.

Construction Noise

Construction can be another source of unwanted noise, although typically short-term in duration. Construction is most significant when it takes place near sensitive land uses, such as homes, schools, or hospitals, or when it occurs at night or in the early morning hours. The dominant construction equipment noise source is diesel engines without sufficient muffling; however, impact pile driving or pavement breaking can also generate unwanted noise. The City currently regulates construction activity through Municipal Code Chapter 11.80.

Other Equipment Noise

Other portable or small-scale pieces of equipment may also produce noise effects. Portable power equipment, such as leaf blowers and drills, is ubiquitous in the modern city, and can produce very high noise levels at the location of the work for intermittent periods. Mechanical equipment, such as pumps and fans may produce low noise levels, but continuously and for substantial distances. Other amplified sounds, from automotive audio equipment or loudspeakers also create noise exposure.

PROJECTED NOISE SOURCES AND LEVELS

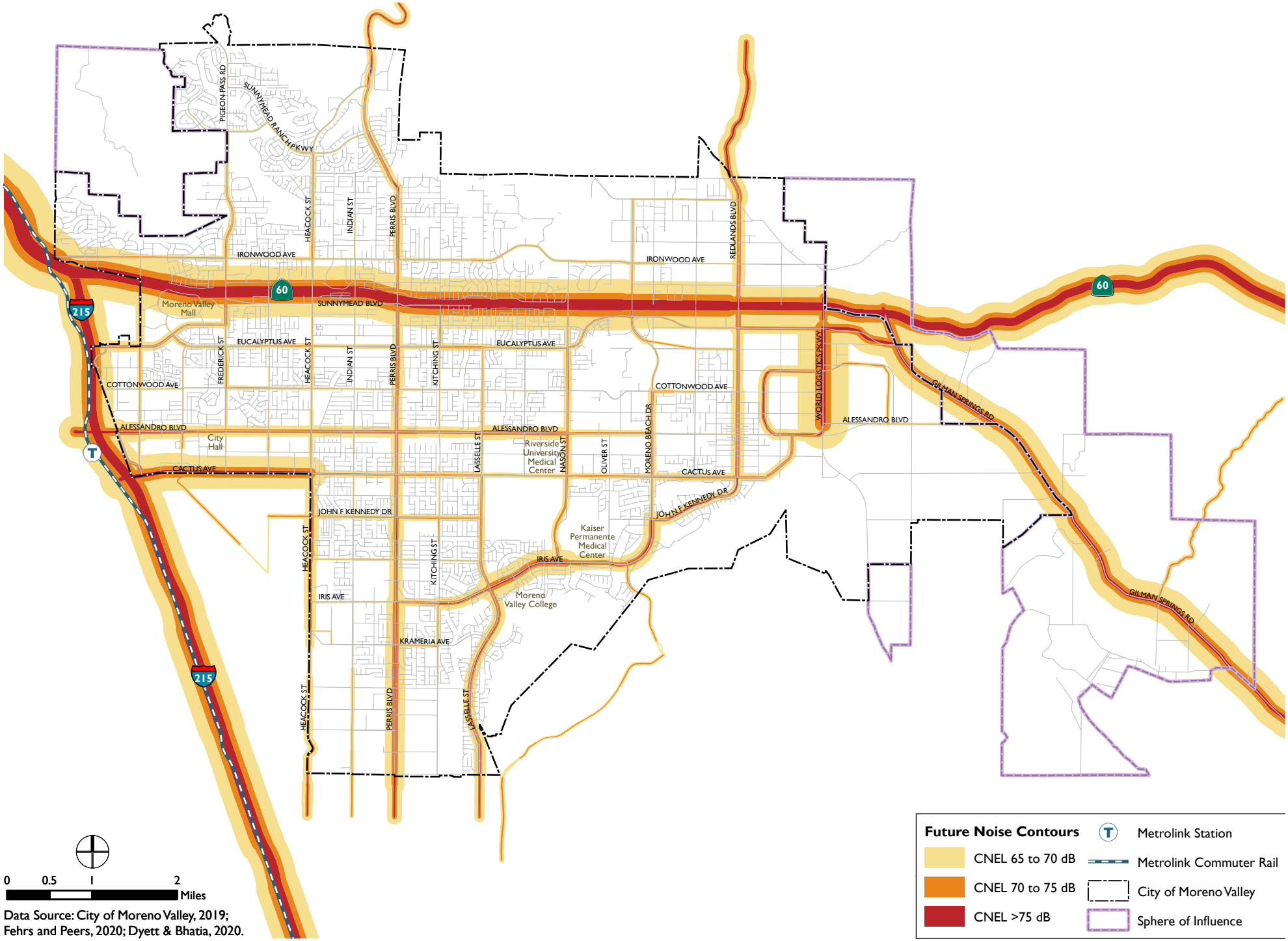
Future development within the Planning Area along with pass-through traffic will result in increased noise levels. Vehicular traffic, including automobile and truck traffic, will continue to be the predominant noise source within the city. The level of vehicular traffic noise varies with many factors, including traffic volume, vehicle mix (including percentage of trucks), traffic speed, and distance from the roadway. Map N-3 shows projected noise level contours at buildout of General Plan land uses in 2040.

Planning for a Pleasant, Healthy Noise Environment

Integrating noise reduction into the planning and design of projects can help address the potential for increased noise as development occurs and ensure a healthy and pleasant noise environment for residents and visitors alike. Proactively reducing noise at its source, separating and buffering noisy land uses, and designing for a quiet indoor environment will contribute to a healthy, livable neighborhood and a vibrant local economy.

In a vibrant city, some noise is inevitable, and making sure that noise-sensitive land uses such as schools and housing are separated from noisy uses is important to ensuring a pleasant, healthy noise environment for all. Land uses have different levels of compatibility relative to noise, and the State of California mandates that general plans include noise level compatibility standards for the development of land as a function of a range of noise exposure values. Noise level is often measured on the Community Noise Equivalent Level (CNEL) scale. CNEL ratings measure levels in noise over a typical day, with higher weight given to noises

Map N-3: Future Noise Contours



occurring during evening and sleeping hours. Table N-1 identifies noise level compatibility standards and interior noise standards to be used to guide land use planning decisions within a given contour.

The Municipal Code also contains regulations intended to ensure best practices in siting new development. The air installation compatibility use overlay district (AICUZ) contained in the zoning code includes standards that limit public exposure to aircraft accidents and noise and encourage future development that is compatible with the continued operation of MARB. Additionally, the City has adopted Good Neighbor Guidelines for warehouse and distribution facilities into the zoning code that specify requirements to minimize the potential for impacts from these facilities on surrounding areas, including limiting noise generating activities near residential areas.

Design practices, such as building placement and interior noise proofing, can be used to promote healthy indoor and outdoor noise environments throughout the community. Insulation, primarily used to improve a building's energy performance, can help reduce indoor noise significantly. Sound-reducing window designs and landscaped buffer areas can also reduce interior noise, even in noisy areas. Noise from traffic on the freeways can be reduced by constructing sound barriers with acoustic dampening materials. Sound reducing paving materials can also significantly reduce sound from arterial roads within the city. General Plan policies seek to promote the use of thoughtful planning and design to minimize unwanted noise in the community and promote a pleasant, healthy noise environment.

Table N-1: Community Noise Compatibility Matrix

Land Use Category	*Community Noise Exposure (CNEL)* 55	60	65	70	75	80
Residential – Low Density Single Family, Duplex, Mobile Homes	A		B	C	D	
Residential – Multiple Family	A		B	C	D	
Transient Lodging: Hotels and Motels	A		B	C		D
Schools, Libraries, Churches, Hospitals, Nursing Homes	A			C		D
Auditoriums, Concert Halls, Amphitheaters	B			C		
Sports Arena, Outdoor Spectator Sports	B				C	
Playground, Neighborhood Parks	A			B	C	
Golf Courses, Riding Stables, Water Recreation, Cemeteries	A				C	D
Office Buildings, Businesses, Commercial and Professional	A			B	C	
Industrial, Manufacturing, Utilities, Agricultural	A				B	C

Source: Governor's Office of Planning and Research 2017.

A

Normally Acceptable:
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

B

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

C

Normally Unacceptable:
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

D

Clearly Unacceptable:
New construction or development should generally not be undertaken.

Goal N-1: Design for a pleasant, healthy sound environment conducive to living and working.

POLICIES

N.1-1: Protect occupants of existing and new buildings from exposure to excessive noise, particularly adjacent to freeways, major roadways, the railroad, and within areas of aircraft overflight.

N.1-2: Guide the location and design of transportation facilities, industrial uses, and other potential noise generators to minimize the effects of noise on adjacent land uses.

N.1-3: Apply the community noise compatibility standards (Table N-1) to all new development and major redevelopment projects outside the noise and safety compatibility zones established in the March Air Reserve Base/ Inland Port Airport Land Use Compatibility (ALUC) Plan in order to protect against the adverse effects of noise exposure. Projects within the noise and safety compatibility zones are subject to the standards contained in the ALUC Plan.

N.1-4: Require a noise study and/or mitigation measures if applicable for all projects that would expose people to noise levels greater than the "normally acceptable" standard and for any other projects that are likely to generate noise in excess of these standards.

N.1-5: Noise impacts should be controlled at the noise source where feasible, as opposed to at receptor end with measures to buffer, dampen, or actively cancel noise sources. Site design, building orientation, building design, hours of operation, and other techniques, for new developments deemed to be noise generators shall be used to control noise sources.

N.1-6: Require noise buffering, dampening, or active cancellation, on rooftop or other outdoor mechanical equipment located near residences, parks, and other noise sensitive land uses.

N.1-7: Developers shall reduce the noise impacts on new development through appropriate means (e.g. double-paned or soundproof windows, setbacks, berming, and screening). Noise attenuation methods should avoid the use of visible sound walls where possible.

ACTIONS

N.1-A: Continue to review proposed projects for conformance with the March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan, including consideration of the Compatibility Zone Factors shown in Table MA-1 and the Basic Compatibility Criteria shown in Table MA-2, as may be amended.

N.1-B: Require dedication of an aviation easement as a condition of development approval for projects within the noise and safety compatibility zones identified by the March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan, as may be amended. The intention of this action is to alert interested individuals, including property buyers and developers, to the proximity of aircraft operations and related noise and safety compatibility protections.

N.1-C: Study the feasibility of using alternative pavement materials such as rubberized asphalt pavements on roadways to reduce noise generation. Update City standards as appropriate.

Noise attenuation measures such as double paned windows (above) and rubberized asphalt (below) can reduce noise and mitigate its effects.

Addressing Noise Concerns

As in any bustling and vibrant city, some noise is inevitable in Moreno Valley. Having systems in place to minimize unwanted noise before it occurs, and to manage noise concerns when they arise is important to ensure a healthy and economically dynamic future.

Moreno Valley's Municipal Code establishes allowable levels of noise within the city and consequences for violation of the standards it sets. When instances of excessive noise do occur, residents can report noise complaints to the City's Code & Neighborhood Services Division, the division responsible for handling violations, including noise complaints, and for generally protecting the health and safety of the community. Noise complaints received by the Division typically involve residential noise, including complaints regarding loud music, animal noise, and noise from unlicensed home business activities.

In addition to the noise controls built into the Municipal Code, the City works closely with the neighboring MARB to coordinate noise control efforts.

As Moreno Valley continues to grow culturally and economically, the potential for noise conflicts will increase, particularly in mixed use areas or locations near public gathering places. While some noise is expected – and even welcome – in a dynamic city, Moreno Valley will continue to ensure that the noises of daily life do not exceed comfortable and pleasant levels for all by maintaining a robust system for addressing noise concerns.

Goal N-2: Ensure that noise does not have a substantial, adverse effect on the quality of life in the community.

POLICIES

N.2-1: Use the development review process to proactively identify and address potential noise compatibility issues.

N.2-2: Continue to work with community members and business owners to address noise complaints and ensure voluntary resolution of issues through the enforcement of Municipal Code provisions.

N.2-3: Limit the potential noise impacts of construction activities on surrounding land uses through noise regulations in the Municipal Code that address allowed days and hours of construction, types of work, construction equipment, and sound attenuation devices.

N.2-4: Collaborate with the March Joint Powers Authority, March Inland Port Airport Authority, Riverside County Airport Land Use Commission, and other responsible agencies to formulate and apply strategies to address noise and safety compatibility protection from airport operations.

N.2-5: Encourage residential development heavily impacted by aircraft-related noise to transition to uses that are more compatible.

ACTIONS

N.2-A: Continue to maintain performance standards in the Municipal Code to ensure that noise generated by proposed projects is compatible with surrounding land uses.

N.2-B: Update the Municipal Code to establish controls on outdoor noise in public places, such as outdoor dining terraces in commercial mixed use areas, public plazas, or parks. Controls may include limits on noise levels or hours of operation.

Noise is part of a bustling, dynamic city. However, controls such as limits on hours of operation or noise levels can help ensure that the noises of daily life are not unpleasant or uncomfortable.

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City of Moreno Valley, CA
Tuesday, March 26, 2024

Title 11. Peace, Morals and Safety

Chapter 11.80. NOISE REGULATION

§ 11.80.010. Legislative findings.

It is found and declared that:

A. Excessive sound within the limits of the city is a condition which has existed for some time, and the amount and intensity of such sound is increasing.

B. Such excessive sound is a detriment to the public health, safety, and welfare and quality of life of the residents of the city.

C. The necessity in the public interest for the provisions and prohibitions hereinafter contained and enacted is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of and for the purpose of securing and promoting the public health, safety, welfare and quality of life of the city and its inhabitants.

(Ord. 740 § 1.2, 2007)

§ 11.80.020. Definitions.

For purposes of this chapter, certain words and phrases used herein are defined as follows:

"A-weighted sound level" means the sound pressure level in decibels as measured with a sound level meter using the A-weighting network. The unit of measurement is the dB(A).

"Commercial" means all uses of land not otherwise classified as residential, as defined in this section.

"Construction" means any site preparation, and/or any assembly, erection, repair, or alteration, excluding demolition, of any structure, or improvements to real property.

"Continuous airborne sound" means sound that is measured by the slow-response setting of a meter manufactured to the specifications of ANSI Section 1.4-1983 (R2006) "Specification for Sound Level Meters," or its successor.

"Daytime" means eight a.m. to ten p.m. the same day.

"Decibel" (dB) means a unit for measuring 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, which is 20 microPascals (20 microNewtons per square meter.)

"Demolition" means any dismantling, intentional destruction or removal of structures or other improvements to real property.

"Disturb" means to interrupt, interfere with, or hinder the enjoyment of peace or quiet or the normal listening activities or the sleep, rest or mental concentration of the hearer.

"Emergency" means any occurrence or set of circumstances involving actual or imminent physical trauma or significant property damage which necessitates immediate action. Economic loss alone shall not constitute an emergency. It shall be the burden of an alleged violator to prove an "emergency."

"Emergency work" means any work made necessary to restore property to a safe condition following an emergency, or to protect persons or property threatened by an imminent emergency, to the extent such work is, in fact, necessary to protect persons or property from exposure to imminent danger or damage.

"Frequency" means the number of complete oscillation cycles per unit of time.

"Impulsive sound" means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and discharge of firearms.

"Nighttime" means 10:01 p.m. to 7:59 a.m. the following day.

"Noise disturbance" means any sound which:

1. Disturbs a reasonable person of normal sensitivities;
2. Exceeds the sound level limits set forth in this chapter; or
3. Is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of 200 feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property.

"Person" means any person, person's firm, association, copartnership, joint venture, corporation, or any entity public or private in nature.

"Plainly audible" means that the sound or noise produced or reproduced by any particular source, can be clearly distinguished from ambient noise by a person using his/her normal hearing faculties.

"Public right-of-way" means any street, avenue, boulevard, sidewalk, bike path or alley, or similar place normally accessible to the public which is owned or controlled by a governmental entity.

"Public space" means any park, recreational or community facility, or lot which contains at least one building that is open to the general public during its hours of operation.

"Residential" means all uses of land primarily for dwelling units, as well as hospitals, schools, colleges and universities, and places of religious assembly.

"Sound" means an oscillation in pressure, particle displacement, particle velocity or other physical parameter, in a medium with internal forces that causes compression and rarefaction of that medium capable of producing an auditory impression. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

"Sound level" means the weighted sound pressure level as measured in dB(A) by a sound level meter and as specified in American National Standards Institute (ANSI) specifications for sound level meters (ANSI Section 1.4-1971 (R1976)). If the frequency weighting employed is not indicated, the A-weighting shall apply.

"Sound level meter" means an instrument, demonstrably capable of accurately measuring sound levels as defined above.

All technical definitions not defined above shall be in accordance with applicable publications and standards of the American National Standards Institute (ANSI).

(Ord. 740 § 1.2, 2007)

§ 11.80.030. Prohibited acts.

A. General Prohibition. It is unlawful and a violation of this chapter to maintain, make, cause, or allow the making of any sound that causes a noise disturbance, as defined in Section **11.80.020**.

B. Sound causing permanent hearing loss.

1. Sound level limits. Based on statistics from the Center for Disease Control and Prevention and the National Institute for Occupational Safety and Health, Table 1 and Table 1-A specify sound level limits which, if exceeded, will have a high probability of producing permanent hearing loss in anyone in the area where the sound levels are being exceeded. No sound shall be permitted within the city which exceeds the parameters set forth in Tables 11.80.030-1 and 11.80.030-1-A of this chapter:

Table 11.80.030-1 MAXIMUM CONTINUOUS SOUND LEVELS*	
Duration per Day	
Continuous Hours	**Sound level [dB(A)]**
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

Notes:

* When the daily sound exposure is composed of two or more periods of sound exposure at different levels, the combined effect of all such periods shall constitute a violation of this section if the sum of the percent of allowed period of sound exposure at each level exceeds 100 percent

Table 11.80.030-1A MAXIMUM IMPULSIVE SOUND LEVELS	
Number of Repetitions per 24-Hour Period	**Sound level [dB(A)]**
1	145
10	135
100	125

2. Exemptions. No violation shall exist if the only persons exposed to sound levels in excess of those listed in Tables 11.80.030-1 and 11.80.030-1A are exposed as a result of:

   a. Trespass;

   b. Invitation upon private property by the person causing or permitting the sound; or

   c. Employment by the person or a contractor of the person causing or permitting the sound.

C. Nonimpulsive Sound Decibel Limits. No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any nonimpulsive sound which exceeds the limits set forth for the source land use category (as defined in Section **11.80.020**) in Table 11.80.030-2 when measured at a distance of 200 feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance.

Table 11.80.030-2 MAXIMUM SOUND LEVELS (IN dB(A)) FOR SOURCE LAND USES			
Residential		**Commercial**	
Daytime	**Nighttime**	**Daytime**	**Nighttime**
60	55	65	60

D. Specific Prohibitions. In addition to the general prohibitions set out in subsection **A** of this section, and unless otherwise exempted by this chapter, the following specific acts, or the causing or permitting thereof, are regulated as follows:

1. Motor Vehicles. No person shall operate or cause to be operated a public or private motor vehicle, or combination of vehicles towed by a motor vehicle, that creates a sound exceeding the sound level limits in

Table 11.80.030-2 when the vehicle(s) are not otherwise subject to noise regulations provided for by the California **Vehicle Code**.

2. Radios, Televisions, Electronic Audio Equipment, Musical Instruments or Similar Devices from a Stationary Source. No person shall operate, play or permit the operation or playing of any radio, tape player, television, electronic audio equipment, musical instrument, sound amplifier or other mechanical or electronic sound making device that produces, reproduces or amplifies sound in such a manner as to create a noise disturbance. However, this subsection shall not apply to any use or activity exempted in subsection **E** of this section and any use or activity for which a special permit has been issued pursuant to Section **11.80.040**.

3. Radios, Electronic Audio Equipment, or Similar Devices from a Mobile Source Such as a Motor Vehicle. Sound amplification or reproduction equipment on or in a motor vehicle is subject to regulation in accordance with the California **Vehicle Code** when upon the public right-of-way. When upon public space or publicly owned property other than the public right-of-way or upon private property open to the public, sound amplification or reproduction equipment shall not be operated in such a manner that it is plainly audible at a distance of 50 feet in any direction from the vehicle.

4. Portable, Hand-Held Music or Sound Amplification or Reproduction Equipment. Such equipment shall not be operated on a public right-of-way, public space or other publicly owned property in such a manner as to be plainly audible at a distance of 50 feet in any direction from the operator.

5. Loudspeakers and Public Address Systems.

    a. Except as permitted by Section **11.80.040**, no person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any commercial purpose:

        1. Which produces, reproduces or amplifies sound in such a manner as to create a noise disturbance; or

        2. During nighttime hours on a public right-of-way, public space or other publicly owned property.

    b. No person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any noncommercial purpose, during nighttime hours in such a manner as to create a noise disturbance.

6. Animals. No person shall own, possess or harbor an animal or bird that howls, barks, meows, squawks, or makes other sounds that:

    a. Create a noise disturbance;

    b. Are of frequent or continued duration for 10 or more consecutive minutes and are plainly audible at a distance of 50 feet from the real property line of the source of the sound; or

    c. Are intermittent for a period of 30 or more minutes and are plainly audible at a distance of 50 feet from the real property line of the source of the sound.

7. Construction and Demolition. No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee. This section shall not apply to the use of power tools as provided in subsection **(D)(9)** of this section.

8. Emergency Signaling Devices. No person shall intentionally sound or permit the sounding outdoors of any fire, burglar or civil defense alarm, siren or whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing as follows:

    a. Testing of a stationary emergency signaling device shall not occur between seven p.m. and seven a.m. the following day;

    b. Testing of a stationary emergency signaling device shall use only the minimum cycle test time, in no case to exceed 60 seconds;

    c. Testing of a complete emergency signaling system, including the functioning of the signaling device and the personnel response to the signaling device, shall not occur more than once in each calendar month. Such testing shall only occur only on weekdays between seven a.m. and seven p.m. and shall be exempt from the time limit specified in subsection **(D)(2)** of this section.

9. Power Tools. No person shall operate or permit the operation of any mechanically, electrically or gasoline motor-driven tool during nighttime hours so as to cause a noise disturbance across a residential real

property boundary.

10. Pumps, Air Conditioners, Air-Handling Equipment and Other Continuously Operating Equipment. Notwithstanding the general prohibitions of subsection a of this section, no person shall operate or permit the operation of any pump, air conditioning, air-handling or other continuously operating motorized equipment in a state of disrepair or in a manner which otherwise creates a noise disturbance distinguishable from normal operating sounds.

E. Exemptions. The following uses and activities shall be exempt from the sound level regulations except the maximum sound levels provided in Tables 11.80.030-1 and 11.80.030-1A:

1. Sounds resulting from any authorized emergency vehicle when responding to an emergency call or acting in time of an emergency.

2. Sounds resulting from emergency work as defined in Section **11.80.020**

3. Any aircraft operated in conformity with, or pursuant to, federal law, federal air regulations and air traffic control instruction used pursuant to and within the duly adopted federal air regulations; and any aircraft operating under technical difficulties in any kind of distress, under emergency orders of air traffic control, or being operated pursuant to and subsequent to the declaration of an emergency under federal air regulations.

4. All sounds coming from the normal operations of interstate motor and rail carriers, to the extent that local regulation of sound levels of such vehicles has been preempted by the Noise Control Act of 1972 (42 U.S.C. § 4901 et seq.) or other applicable federal laws or regulations

5. Sounds from the operation of motor vehicles, to the extent they are regulated by the California **Vehicle Code**.

6. Any constitutionally protected noncommercial speech or expression conducted within or upon a any public right-of-way, public space or other publicly owned property constituting an open or a designated public forum in compliance with any applicable reasonable time, place and manner restrictions on such speech or expression or otherwise pursuant to legal authority.

7. Sounds produced at otherwise lawful and permitted city-sponsored events, organized sporting events, school assemblies, school playground activities, by permitted fireworks, and by permitted parades on public right-of-way, public space or other publicly owned property.

8. An event for which a temporary use permit or special event permit has been issued under other provisions of this code, where the provisions of Section **11.80.040** are met, the permit granted expressly grants an exemption from specific standards contained in this chapter, and the permittee and all persons under the permittee's reasonable control actually comply with all conditions of such permit. Violation of any condition of such a permit related to sound or sound equipment shall be a violation of this chapter and punishable as such.

F. Nothing in this chapter shall be construed to limit, modify or repeal any other regulation elsewhere in this code relating to the regulation of noise sources, nor shall any such other regulation be read to permit the emission of noise in violation of any provision of this chapter.

(Ord. 740 § 1.2, 2007)

§ 11.80.040. Special provisions for temporary use and special event permits.

The exemption by permit set forth in Section **11.80.030(E)(8)** shall be subject to the following requirements and conditions:

A. The permit application shall include the name, address and telephone number of the permit applicant; the date, hours and location for which the permit is requested; and the nature of the event or activity. It shall also specify the types of sounds and/or sound equipment to be permitted, the proposed duration of such sound, the specific standards from which the sound is to be exempted, and the reasons for each requested exemption.

B. The permit shall be issued provided the proposed activity meets the requirements of this section and the issuing official determines that the sound to be emitted at the event as proposed would not be detrimental to the public health, safety or welfare, that the event cannot reasonably achieve its legitimate aims and purposes without the exemption and that the sound levels proposed will not unreasonably damage the peace and quiet enjoyment of the lawful users of surrounding properties, nor constitute a public nuisance.

C. The official issuing the permit may prescribe any reasonable conditions or requirements he/she deems necessary to minimize noise disturbances upon the community or the surrounding neighborhood, and/or to protect the health, safety or welfare of the public, including participants in the permitted event, including use of mufflers, screens or other sound-attenuating devices.

D. Any permit granted must be in writing and shall contain all conditions upon which the permit shall be effective.

E. No more than six events requiring a sound limit exemption may be held at any particular location upon privately owned or controlled property per calendar year, provided further that the number of events shall not exceed the number permitted under the regulations for the type of permit issued. For purposes of this subsection, "location" means a legal parcel of real property or a complete shopping or commercial center or mall sharing common parking and access even if comprised of multiple legal parcels.

F. The exemption from sound limits under such permit shall not exceed maximum period of four hours in one twenty-four (24) hour day.

G. The permit will only be granted for hours between nine a.m. and ten p.m. on all days other than Friday and Saturday; and, on Friday and Saturday, between the hours of nine a.m. and one a.m. of the following day, except in the following circumstances:

1. A permit may be granted for hours between nine a.m. on New Year's Eve and one a.m. the following day (New Year's Day).

2. A permit may be granted for hours between nine a.m. and two a.m. the following day if there are no residences, hospitals, or nursing homes within a 0.5 mile radius of the property where the function is taking place.

H. Functions for which the permits are issued shall be limited to a continuous airborne sound level not to exceed 70 dB(A), as measured 200 feet from the real property boundary of the source property if on private property, or from the source if on public right-of-way, public space or other publicly owned property.

(Ord. 740 § 1.2, 2007)

§ 11.80.050. Measurement or assessment of sound.

A. Measurement With Sound Meter.

1. The measurement of sound shall be made with a sound level meter meeting the standards prescribed by ANSI Section 1.4-1983 (R2006). The instruments shall be maintained in calibration and good working order. A calibration check shall be made of the system at the time of any sound level measurement. Measurements recorded shall be taken so as to provide a proper representation of the source of the sound. The microphone during measurement shall be positioned so as not to create any unnatural enhancement or diminution of the measured sound. A windscreen for the microphone shall be used at all times. However, a violation of this chapter may occur without the occasion of the measurements being made as otherwise provided.

2. The slow meter response of the sound level meter shall be used in order to best determine the average amplitude.

3. The measurement shall be made at any point on the property into which the sound is being transmitted and shall be made at least three feet away from any ground, wall, floor, ceiling, roof and other plane surface.

4. In case of multiple occupancy of a property, the measurement may be made at any point inside the premises to which any complainant has right of legal private occupancy; provided that the measurement shall not be made within three feet of any ground, wall, floor, ceiling, roof or other plane surface.

5. All measurements of sound provided for in this chapter will be made by qualified officials of the city who are designated by the city manager or designee to operate the apparatus used to make the measurements.

B. Assessment Without Sound Level Meter. Any police officer, code enforcement officer, or other official designated by the city manager or designee who hears a noise or sound that is plainly audible, as defined in Section **11.80.020**, in violation of this chapter, may enforce this chapter and shall assess the noise or sound according to the following standards:

1. The primary means of detection shall be by means of the official's normal hearing faculties, not artificially enhanced.

2. The official shall first attempt to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates so that the official can readily identify the offending source of the sound or noise and the distance involved. If the official is unable to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates, then the official shall confirm the source of the sound or noise by approaching the suspected vehicle or real property until the official is able to obtain a direct line of sight and hearing, and confirm the source of the sound or noise that was heard at the place of the original assessment of the sound or noise.

3. The official need not be required to identify song titles, artists, or lyrics in order to establish a violation.

(Ord. 740 § 1.2, 2007)

§ 11.80.060. Violation.

A. Violation of Sound Level Limits. Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punishable by a fine not to exceed $1,000 and/or six months in the county jail, or both. Notwithstanding the foregoing, any violation of the provisions of this chapter may, in the discretion of the citing officer or the city attorney, be cited and/or prosecuted as an infraction or be subject to civil citation pursuant to Chapter **1.10**.

B. Joint and Several Responsibility. In addition to the person causing the offending sound, the owner, tenant or lessee of property, or a manager, overseer or agent, or any other person lawfully entitled to possess the property from which the offending sound is emitted at the time the offending sound is emitted, shall be responsible for compliance with this chapter if the additionally responsible party knows or should have known of the offending noise disturbance. It shall not be a lawful defense to assert that some other person caused the sound. The lawful possessor or operator of the premises shall be responsible for operating or maintaining the premises in compliance with this chapter and may be cited regardless of whether or not the person actually causing the sound is also cited.

C. Violation May be Declared a Public Nuisance. The operation or maintenance of any device, equipment, instrument, vehicle or machinery in violation of any provisions of this chapter which endangers the public health, safety and quality of life of residents in the area is declared to be a public nuisance, and may be subject to abatement summarily or by a restraining order or injunction issued by a court of competent jurisdiction.

(Ord. 740 § 1.2, 2007; Ord. 824 § 1.2, 2011)

Appendix B

Field Data and Photos

Field Sheet

Project: TTM 37858 Single Family Residential Project
Engineer: B. Morrison
Date: 3/25/2024
JN: 1742-2024-02

Measurement Address: Northeast corner of Cactus Ave. and Bradshaw Cir.
City: Moreno Valley, CA
Site No.: 1

Sound Level Meter:
Piccolo II
Serial # P0222082205
P0221010801

Calibrator:
BSWA
Serial # 500732

Calibration Record:

Meter	Input, dB/	Time	Date
1	94.0	12:31 p.m.	3/25/2024
2	94.0	12:32 p.m.	3/25/2024
3	/	/	/
4	/	/	/
5	/	/	/

Conditions (3/26/2024):

Temp (Deg. F.):	High: 65, Low: 43
Windspeed:	2 m.p.h.
Direction:	North-northwest
Skies:	Mostly Cloudy

Meter Settings:

- ☑ A-WTD ☐ C-WTD
- ☐ LINEAR ☐ IMPULSE
- ☑ SLOW ☐ FAST
- ☐ 1/1 OCT ☐ 1/3 OCT
- ☑ _60_ MINUTE INTERVALS
- ☑ L(N) PERCENTILE VALUES

Notes:
Noise measurements were taken at 60-minute intervals for a 24-hour period. The primary sources of ambient noise during the measurement period consisted of roadway noise from adjacent streets, bird/nature sounds, and general residential activity.

Measurement Type:
☑ Long-term
☐ Short-term

1 = Noise Monitoring Location

RK engineering group, inc.

Field Sheet - Noise Monitoring Location 1 Photo

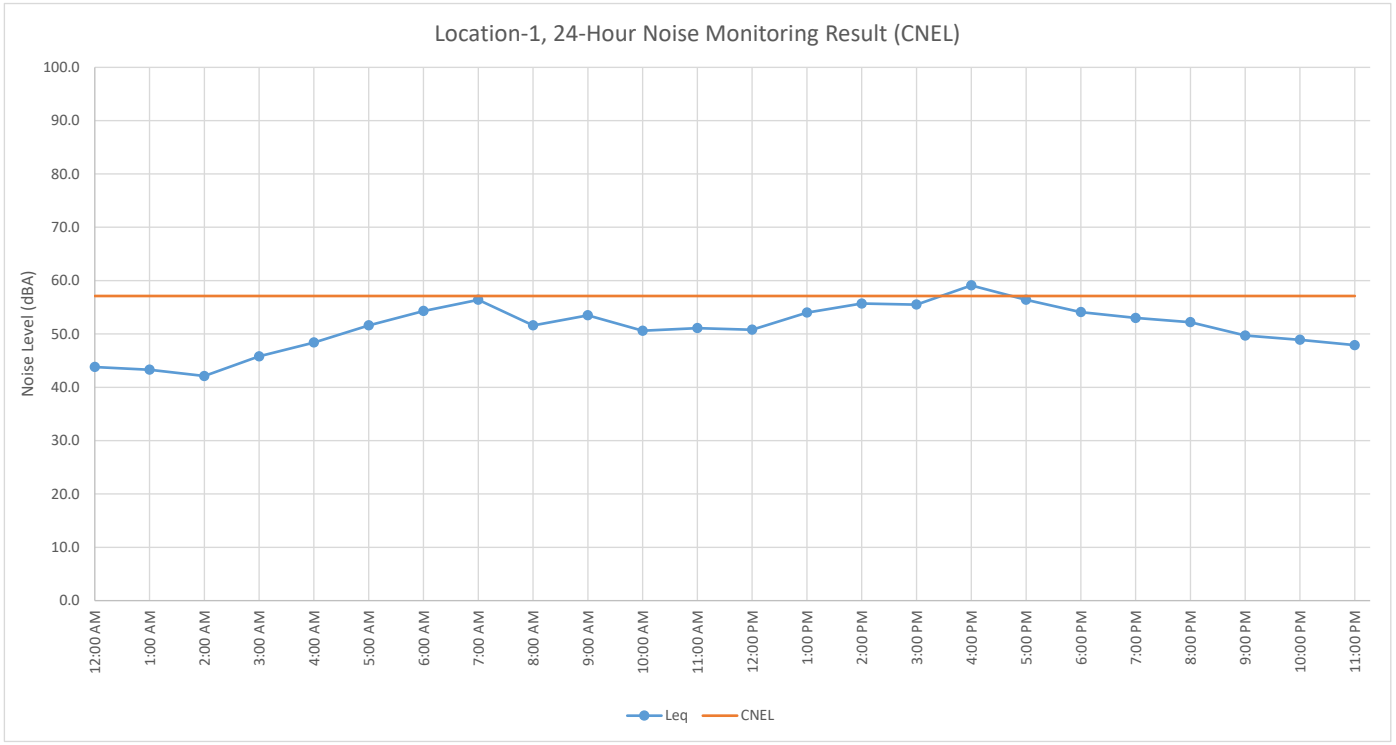
Project:	TTM 37858 Single Family Residential Project	**Engineer:** B. Morrison	
Measurement Address:	Northeast corner of Cactus Ave. and Bradshaw Cir.	**City:** Moreno Valley, CA	
Notes:	Noise Monitoring Location 1 (L-1) was taken at the western boundary of the project site, approximately 276 feet north of the centerline of Cactus Avenue.		

Date:	3/26/2024
JN:	1742-2024-02
Location No.:	1

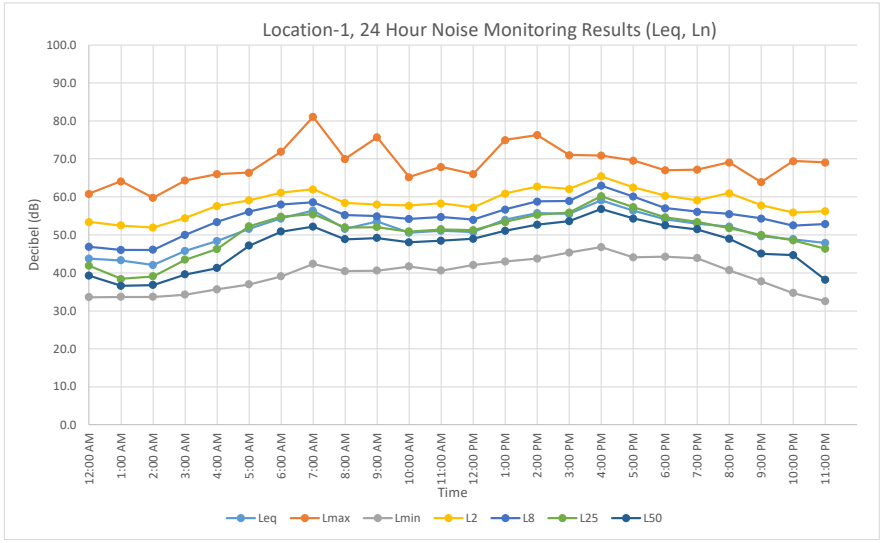
RK engineering group, inc.

Time	Leq	CNEL
12:00 AM	43.8	57.1
1:00 AM	43.3	57.1
2:00 AM	42.1	57.1
3:00 AM	45.8	57.1
4:00 AM	48.4	57.1
5:00 AM	51.6	57.1
6:00 AM	54.3	57.1
7:00 AM	56.4	57.1
8:00 AM	51.6	57.1
9:00 AM	53.5	57.1
10:00 AM	50.6	57.1
11:00 AM	51.1	57.1
12:00 PM	50.8	57.1
1:00 PM	54.0	57.1
2:00 PM	55.7	57.1
3:00 PM	55.5	57.1
4:00 PM	59.1	57.1
5:00 PM	56.4	57.1
6:00 PM	54.1	57.1
7:00 PM	53.0	57.1
8:00 PM	52.2	57.1
9:00 PM	49.7	57.1
10:00 PM	48.9	57.1
11:00 PM	47.9	57.1

Day Min:	49.7
Night Min	42.1



PROJECT:	TTM 37858 Single Family Residential Project					JOB #:	1742-2024-02
NOISE METER:	Piccolo II SLM, 24-Hour Measurement					DATE:	11/7/2023
LOCATION:	1					BY:	B. Morrison
Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	43.8	60.8	33.6	53.4	46.9	41.9	39.3
1:00 AM	43.3	64.1	33.7	52.5	46.0	38.4	36.6
2:00 AM	42.1	59.8	33.7	51.9	46.1	39.1	36.8
3:00 AM	45.8	64.3	34.3	54.4	50.0	43.5	39.6
4:00 AM	48.4	66.0	35.7	57.6	53.4	46.3	41.3
5:00 AM	51.6	66.4	37.0	59.1	56.1	52.3	47.2
6:00 AM	54.3	71.9	39.1	61.1	58.0	54.8	50.9
7:00 AM	56.4	81.1	42.4	62.0	58.6	55.4	52.2
8:00 AM	51.6	70.0	40.5	58.4	55.2	52.0	48.9
9:00 AM	53.5	75.7	40.6	58.0	54.9	52.1	49.2
10:00 AM	50.6	65.2	41.7	57.7	54.2	50.9	48.1
11:00 AM	51.1	67.9	40.6	58.3	54.7	51.5	48.5
12:00 PM	50.8	66.0	42.1	57.2	54.0	51.3	49.0
1:00 PM	54.0	75.0	43.0	60.9	56.7	53.4	51.1
2:00 PM	55.7	76.3	43.8	62.7	58.8	55.3	52.7
3:00 PM	55.5	71.0	45.4	62.1	58.9	55.9	53.6
4:00 PM	59.1	70.9	46.8	65.4	63.0	60.2	56.8
5:00 PM	56.4	69.6	44.1	62.5	60.1	57.3	54.3
6:00 PM	54.1	67.0	44.3	60.3	57.0	54.6	52.5
7:00 PM	53.0	67.2	43.9	59.1	56.1	53.4	51.5
8:00 PM	52.2	69.1	40.7	61.0	55.5	51.8	49.0
9:00 PM	49.7	63.9	37.8	57.8	54.3	50.0	45.1
10:00 PM	48.9	69.4	34.7	55.9	52.5	48.6	44.7
11:00 PM	47.9	69.1	32.5	56.2	52.9	46.4	38.2
Daytime	54.2	81.1	34.7	60.7	57.5	54.4	51.6
Nighttime	49.1	71.9	32.5	56.9	53.2	48.8	44.4



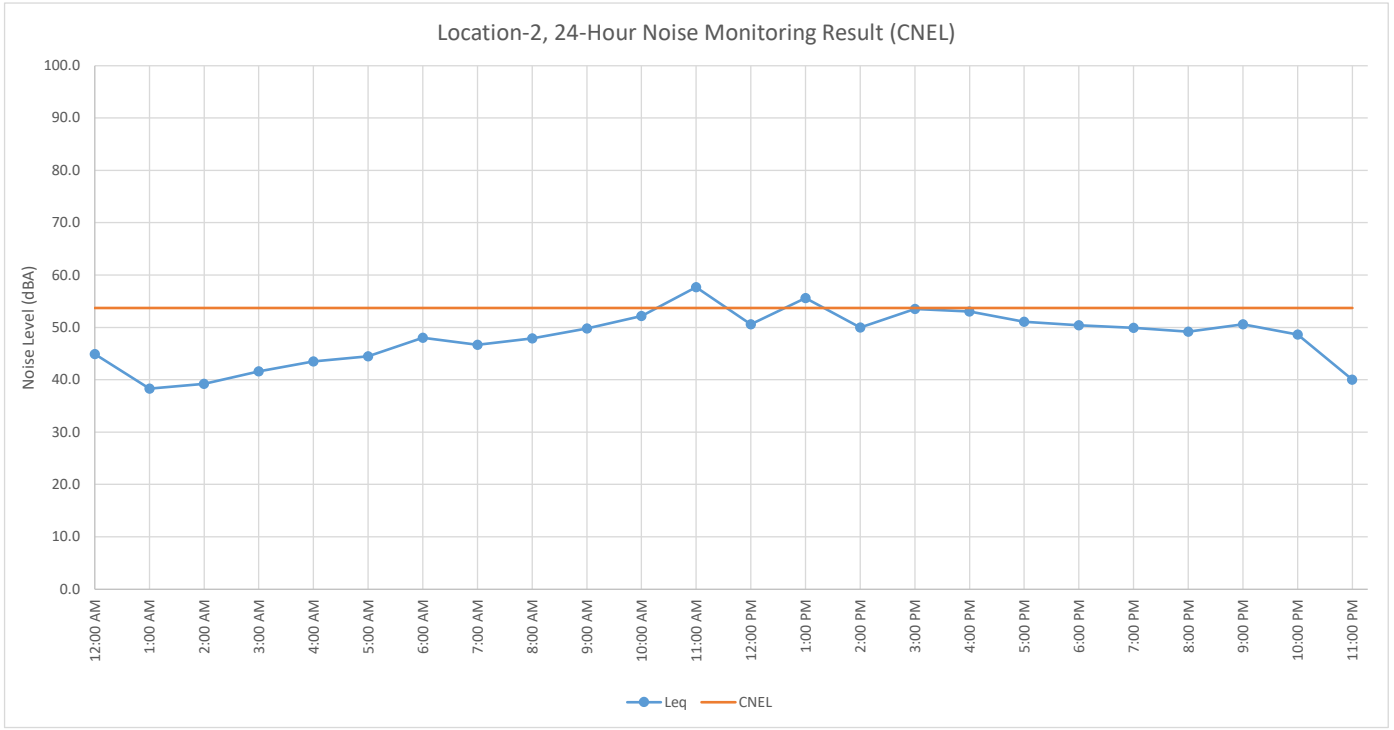
Field Sheet - Noise Monitoring Location 2 Photo

Project: TTM 37858 Single Family Residential Project	**Engineer:** B. Morrison	**Date:**	3/26/2024
		JN:	1742-2024-02
Measurement Address: Northeast corner of Cactus Ave. and Bradshaw Cir.	**City:** Moreno Valley, CA	**Location No.:**	2
Notes: Noise Monitoring Location 2 (L-2) was taken near the northeast corner of the project site, approximately 645 feet north of the centerline of Cactus Avenue.			

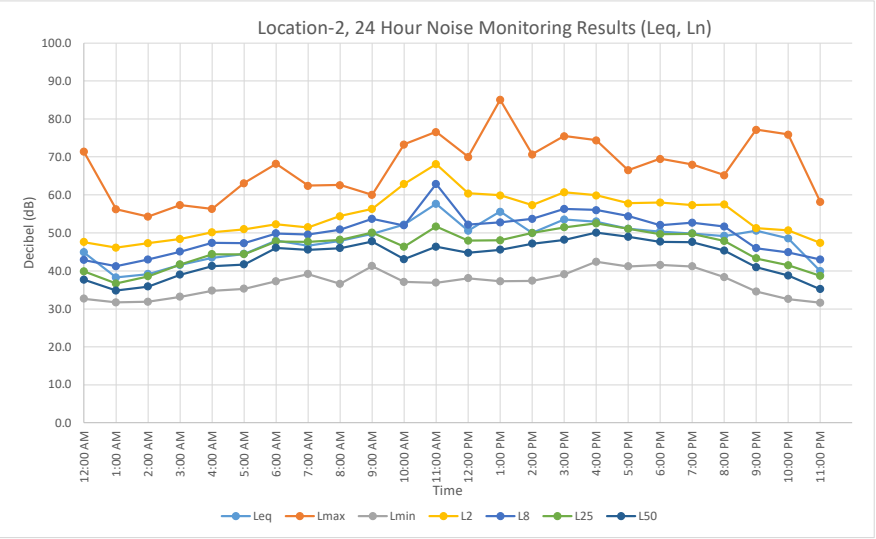
RK engineering group, inc.

Time	Leq	CNEL
12:00 AM	44.9	53.8
1:00 AM	38.3	53.8
2:00 AM	39.2	53.8
3:00 AM	41.6	53.8
4:00 AM	43.5	53.8
5:00 AM	44.5	53.8
6:00 AM	48.0	53.8
7:00 AM	46.7	53.8
8:00 AM	47.9	53.8
9:00 AM	49.8	53.8
10:00 AM	52.2	53.8
11:00 AM	57.7	53.8
12:00 PM	50.6	53.8
1:00 PM	55.6	53.8
2:00 PM	50.0	53.8
3:00 PM	53.5	53.8
4:00 PM	53.0	53.8
5:00 PM	51.1	53.8
6:00 PM	50.4	53.8
7:00 PM	49.9	53.8
8:00 PM	49.2	53.8
9:00 PM	50.6	53.8
10:00 PM	48.6	53.8
11:00 PM	40.0	53.8

Day Min:	46.7
Night Min	38.3



PROJECT:	TTM 37858 Single Family Residential Project					JOB #:	1742-2024-02
NOISE METER:	Piccolo II SLM, 24-Hour Measurement					DATE:	11/7/2023
LOCATION:	2					BY:	B. Morrison
Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	44.9	71.4	32.7	47.6	42.9	39.9	37.7
1:00 AM	38.3	56.2	31.7	46.1	41.2	36.7	34.8
2:00 AM	39.2	54.3	31.9	47.3	43.0	38.6	35.9
3:00 AM	41.6	57.3	33.2	48.4	45.1	41.7	39.0
4:00 AM	43.5	56.3	34.8	50.2	47.4	44.4	41.3
5:00 AM	44.5	63.1	35.3	51.0	47.3	44.4	41.7
6:00 AM	48.0	68.2	37.3	52.3	49.9	47.8	46.1
7:00 AM	46.7	62.4	39.2	51.5	49.6	47.7	45.6
8:00 AM	47.9	62.6	36.6	54.4	50.9	48.2	46.0
9:00 AM	49.8	60.0	41.3	56.3	53.7	50.1	47.8
10:00 AM	52.2	73.3	37.1	62.9	52.0	46.4	43.1
11:00 AM	57.7	76.6	36.9	68.1	62.9	51.7	46.4
12:00 PM	50.6	70.0	38.1	60.4	52.2	48.0	44.8
1:00 PM	55.6	85.1	37.3	59.9	52.8	48.1	45.6
2:00 PM	50.0	70.7	37.4	57.3	53.7	50.0	47.2
3:00 PM	53.5	75.5	39.1	60.7	56.3	51.5	48.2
4:00 PM	53.0	74.4	42.4	59.9	56.0	52.5	50.1
5:00 PM	51.1	66.5	41.2	57.8	54.4	51.1	49.0
6:00 PM	50.4	69.5	41.6	58.0	52.1	49.7	47.7
7:00 PM	49.9	68.0	41.2	57.3	52.7	49.8	47.6
8:00 PM	49.2	65.2	38.4	57.5	51.7	47.9	45.4
9:00 PM	50.6	77.2	34.6	51.3	46.0	43.3	41.0
10:00 PM	48.6	75.9	32.6	50.7	44.9	41.5	38.8
11:00 PM	40.0	58.2	31.6	47.4	43.0	38.7	35.2
Daytime	52.1	85.1	32.6	60.2	54.8	49.4	46.6
Nighttime	43.6	71.4	31.6	49.3	45.9	43.0	40.7



Appendix C

Stationary Noise
Calculation Worksheets

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
SOURCE:	HVAC	DATE:	4/1/2024
LOCATION:	Nearest adjacent receptors (Northern Receptors)	BY:	B. Morrison

NOISE INPUT DATA

OBS DIST=	200.0			
DT WALL=	14.0			
DT W/OB=	186.0			
HTH WALL=	7.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	3.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-8.60
NOISE EL =	0.0		NOISE HTH EL=	3.0
DROP-OFF=	15.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	5	77.4	77.4	77.4	77.4	77.4	77.4
PROJ LEVEL	200	53.4	53.4	53.4	53.4	53.4	53.4
SHIELDING	200	-8.6	-8.6	-8.6	-8.6	-8.6	-8.6
ADJ LEVEL	200	***44.8***	***44.8***	***44.8***	***44.8***	***44.8***	***44.8***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -24.0308999

Appendix D

Roadway Noise
Calculation Worksheets

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: TTM 37858 Single Family Residential Project
ROADWAY: Cactus Avenue (Existing Without Project Conditions)
LOCATION: Nearest adjacent residential receptors

JOB #: 1742-2024-02
DATE: 3/26/2024
ENGINEER: B. Morrison

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	40,600	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	31	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	4,060	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		45
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		45
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.780	0.040	0.180	0.9603
MEDIUM TRUCKS	0.780	0.040	0.180	0.0166
HEAVY TRUCKS	0.780	0.040	0.118	0.0231

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	42.35	- -
MEDIUM TRUCKS	4.0	42.26	- -
HEAVY TRUCKS	8.0	42.35	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	74.5	72.6	65.8	67.5	74.9	75.0
MEDIUM TRUCKS	64.6	62.7	55.8	57.6	65.0	65.1
HEAVY TRUCKS	70.2	68.4	61.5	61.4	69.4	69.6
NOISE LEVELS (dBA)	76.2	74.3	67.4	68.8	76.3	76.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	74.5	72.6	65.8	67.5	74.9	75.0
MEDIUM TRUCKS	64.6	62.7	55.8	57.6	65.0	65.1
HEAVY TRUCKS	70.2	68.4	61.5	61.4	69.4	69.6
NOISE LEVELS (dBA)	76.2	74.3	67.4	68.8	76.3	76.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	121	261	563	1213
LDN	119	255	550	1186

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ROADWAY:	Cactus Avenue (Existing With Project Conditions)	DATE:	3/26/2024
LOCATION:	Nearest adjacent residential receptors	ENGINEER:	B. Morrison

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	40,949	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	31	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	4,095	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		45
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		45
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.780	0.040	0.180	0.9603
MEDIUM TRUCKS	0.780	0.040	0.180	0.0166
HEAVY TRUCKS	0.780	0.040	0.118	0.0231

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	42.35	- -
MEDIUM TRUCKS	4.0	42.26	- -
HEAVY TRUCKS	8.0	42.35	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	74.5	72.7	65.8	67.6	74.9	75.1
MEDIUM TRUCKS	64.6	62.7	55.9	57.6	65.0	65.1
HEAVY TRUCKS	70.3	68.4	61.5	61.4	69.5	69.7
NOISE LEVELS (dBA)	76.2	74.4	67.5	68.8	76.3	76.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	74.5	72.7	65.8	67.6	74.9	75.1
MEDIUM TRUCKS	64.6	62.7	55.9	57.6	65.0	65.1
HEAVY TRUCKS	70.3	68.4	61.5	61.4	69.5	69.7
NOISE LEVELS (dBA)	76.2	74.4	67.5	68.8	76.3	76.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	122	263	566	1220
LDN	119	257	553	1192

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ROADWAY:	Cactus Avenue (Future Year Without Project Conditions)	DATE:	3/26/2024
LOCATION:	Nearest adjacent residential receptors	ENGINEER:	B. Morrison

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	59,100	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	31	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	5,910	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		45
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		45
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.780	0.040	0.180	0.9603
MEDIUM TRUCKS	0.780	0.040	0.180	0.0166
HEAVY TRUCKS	0.780	0.040	0.118	0.0231

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	42.35	- -
MEDIUM TRUCKS	4.0	42.26	- -
HEAVY TRUCKS	8.0	42.35	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	76.1	74.3	67.4	69.2	76.5	76.7
MEDIUM TRUCKS	66.2	64.3	57.5	59.2	66.6	66.7
HEAVY TRUCKS	71.9	70.0	63.1	63.0	71.1	71.2
NOISE LEVELS (dBA)	77.8	76.0	69.1	70.4	77.9	78.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	76.1	74.3	67.4	69.2	76.5	76.7
MEDIUM TRUCKS	66.2	64.3	57.5	59.2	66.6	66.7
HEAVY TRUCKS	71.9	70.0	63.1	63.0	71.1	71.2
NOISE LEVELS (dBA)	77.8	76.0	69.1	70.4	77.9	78.1

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	156	336	723	1558
LDN	152	328	707	1523

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ROADWAY:	Cactus Avenue (Future Year With Project Conditions)	DATE:	3/26/2024
LOCATION:	Nearest adjacent residential receptors	ENGINEER:	B. Morrison

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	59,449	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	31	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	5,945	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		45
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		45
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.780	0.040	0.180	0.9603
MEDIUM TRUCKS	0.780	0.040	0.180	0.0166
HEAVY TRUCKS	0.780	0.040	0.118	0.0231

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	42.35	- -
MEDIUM TRUCKS	4.0	42.26	- -
HEAVY TRUCKS	8.0	42.35	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	76.2	74.3	67.4	69.2	76.5	76.7
MEDIUM TRUCKS	66.2	64.4	57.5	59.2	66.6	66.8
HEAVY TRUCKS	71.9	70.0	63.1	63.1	71.1	71.3
NOISE LEVELS (dBA)	77.9	76.0	69.1	70.5	78.0	78.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	76.2	74.3	67.4	69.2	76.5	76.7
MEDIUM TRUCKS	66.2	64.4	57.5	59.2	66.6	66.8
HEAVY TRUCKS	71.9	70.0	63.1	63.1	71.1	71.3
NOISE LEVELS (dBA)	77.9	76.0	69.1	70.5	78.0	78.1

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	156	337	726	1564
LDN	153	329	710	1529

Appendix E

Exterior Noise/Land Use Compatibility
Calculation Worksheets

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ROADWAY:	Cactus Avenue (Future Year With Project Conditions)	DATE:	3/26/2024
LOCATION:	Habitable backyards of first-row dwellings along Cactus Avenue (First Floor)	ENGINEER:	B. Morrison

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	59,449	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	31	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	5,945	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		60
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	6.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.780	0.040	0.180	0.9603
MEDIUM TRUCKS	0.780	0.040	0.180	0.0166
HEAVY TRUCKS	0.780	0.040	0.118	0.0231

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	57.75	- -
MEDIUM TRUCKS	4.0	57.63	- -
HEAVY TRUCKS	8.0	57.63	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	74.1	72.3	65.4	67.2	74.5	74.7
MEDIUM TRUCKS	64.2	62.3	55.5	57.2	64.6	64.7
HEAVY TRUCKS	69.9	68.0	61.1	61.1	69.1	69.3
NOISE LEVELS (dBA)	75.8	74.0	67.1	68.5	75.9	76.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	67.9	66.0	59.2	60.9	68.3	68.4
MEDIUM TRUCKS	58.5	56.6	49.8	51.5	58.9	59.0
HEAVY TRUCKS	64.8	62.9	56.0	56.0	64.0	64.2
NOISE LEVELS (dBA)	69.9	68.0	61.1	62.5	70.0	70.2

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	153	330	710	1530
LDN	150	322	694	1495

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ROADWAY:	Cactus Avenue (Future Year With Project Conditions)	DATE:	3/26/2024
LOCATION:	Habitable backyards of first-row dwellings along Cactus Avenue (Second Floor)	ENGINEER:	B. Morrison

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	59,449	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	31	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	5,945	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		60
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		15.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	6.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.780	0.040	0.180	0.9603
MEDIUM TRUCKS	0.780	0.040	0.180	0.0166
HEAVY TRUCKS	0.780	0.040	0.118	0.0231

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	59.40	- -
MEDIUM TRUCKS	4.0	59.00	- -
HEAVY TRUCKS	8.0	58.38	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	74.0	72.1	65.2	67.0	74.3	74.5
MEDIUM TRUCKS	64.1	62.2	55.3	57.1	64.4	64.6
HEAVY TRUCKS	69.8	67.9	61.0	61.0	69.0	69.2
NOISE LEVELS (dBA)	75.7	73.8	66.9	68.3	75.8	75.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	74.0	72.1	65.2	67.0	74.3	74.5
MEDIUM TRUCKS	64.1	62.2	55.3	57.1	64.4	64.6
HEAVY TRUCKS	69.8	67.9	61.0	61.0	69.0	69.2
NOISE LEVELS (dBA)	75.7	73.8	66.9	68.3	75.8	75.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	149	322	693	1493
LDN	146	314	677	1459

Appendix F

Construction Noise and Vibration
Calculation Worksheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/27/2024
Case Description: TTM 37858 Single Family Residential Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Site Preparation	Residential	46.7	46.7	46.7

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	100	84		192	0
Tractor	No	100	84		192	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Tractor		72.3	72.3
Tractor		72.3	72.3
	Total	72.3	75.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/27/2024
Case Description: TTM 37858 Single Family Residential Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Site Preparation	Residential	46.7	46.7	46.7

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	100	85		192	0
Tractor	No	100	84		192	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		73.3	73.3
Tractor		72.3	72.3
	Total	73.3	75.9

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/27/2024
Case Description: TTM 37858 Single Family Residential Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	46.7	46.7	46.7

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	100	84		192	0
Tractor	No	100	84		192	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Tractor		72.3	72.3
Tractor		72.3	72.3
	Total	72.3	75.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/27/2024
Case Description: TTM 37858 Single Family Residential Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Paving	Residential	46.7	46.7	46.7

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	100	84		192	0
Roller	No	100		80	192	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Tractor		72.3	72.3
Roller		68.3	68.3
	Total	72.3	73.8

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/27/2024
Case Description: TTM 37858 Single Family Residential Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	46.7	46.7	46.7

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	100		77.7	192	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Compressor (air)		66	66
	Total	66	66

*Calculated Lmax is the Loudest value.

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ACTIVITY:	Vibration Impact Study	DATE:	3/27/2024
LOCATION:	Nearest adjacent structures	ENGINEER:	B. Morrison

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.063 in/sec**

Equipment Type =	2	Large Bulldozer
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	34.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ACTIVITY:	Vibration Impact Study	DATE:	3/27/2024
LOCATION:	Nearest adjacent structures	ENGINEER:	B. Morrison

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.048 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	95.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	TTM 37858 Single Family Residential Project	JOB #:	1742-2024-02
ACTIVITY:	Vibration Impact Study	DATE:	3/27/2024
LOCATION:	Nearest adjacent structures	ENGINEER:	B. Morrison

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.054 in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	34.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400