ACOUSTICAL SITE ASSESSMENT
HAGERTY TENTATIVE PARCEL MAP
SAN DIEGO, CA

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INTRODUCTION AND DEFINITIONS

Existing Site Characterization

The proposed Hagerty Tentative Parcel Map site (APN 105-800-63) consists of approximately 2.7 gross acres, located in the Fallbrook Planning Area of San Diego County as shown in Figure 1 on the following page. Regional access to the site is obtained from either Interstate 15 (I-15) via East Fallbrook Street (CR S15), or locally via McDonald Road as shown in Figure 2 on Page 3 of this report. Surrounding land uses consist of single family estate residential lots and limited agricultural development.

The project site currently resides as mostly disturbed open area with vegetation scattered intermittently across the site. A single-family residential structure exists on the west side of the project site and would continue to reside on the proposed remainder lot. Elevations across the entire property range from approximately 708 to 720 feet above mean sea level (MSL).

Project Description

The Hagerty Tentative Parcel Map calls for the subdivision of the existing single parcel into five separate parcels including a remainder lot as shown in Figure 3 on Page 4 of this report. The project would also include necessary roadway and drainage improvements.

Acoustical Definitions and Theory

Sound waves are linear mechanical waves. They can be propagated in solids, liquids, and gases. The material transmitting such a wave oscillates in the direction of propagation of the wave itself. Sound waves originate from some sort of vibrating surface which alternatively compress the surrounding air on a forward movement, and expand it on a backward movement.

There is a large range of frequencies within which linear waves can be generated, sound waves being confined to the frequency range that can stimulate the auditory organs to the sensation of hearing. For humans, this range is from about 20 Hertz (Hz or cycles per second) to about 20,000 Hz. The air transmits these frequency disturbances outward from the source of the wave.

Noise can be represented as a superposition of periodic waves with a large number of components, and is generally defined as unwanted or annoying sound that is typically associated with human activity, and which interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day, and the sensitivity of the individual hearing the sound.

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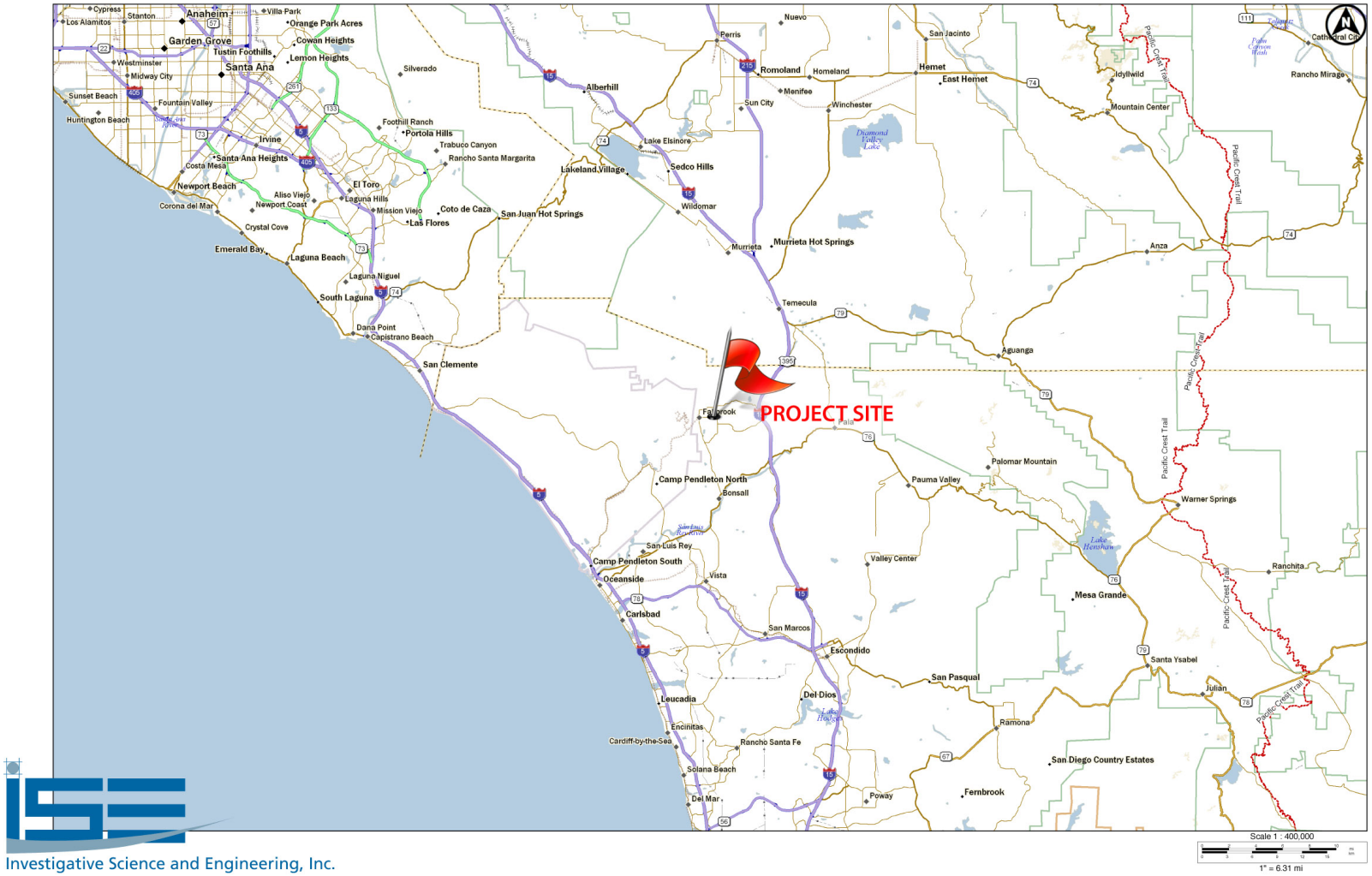

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FIGURE 1: Project Study Area Vicinity Map (ISE 3/14)

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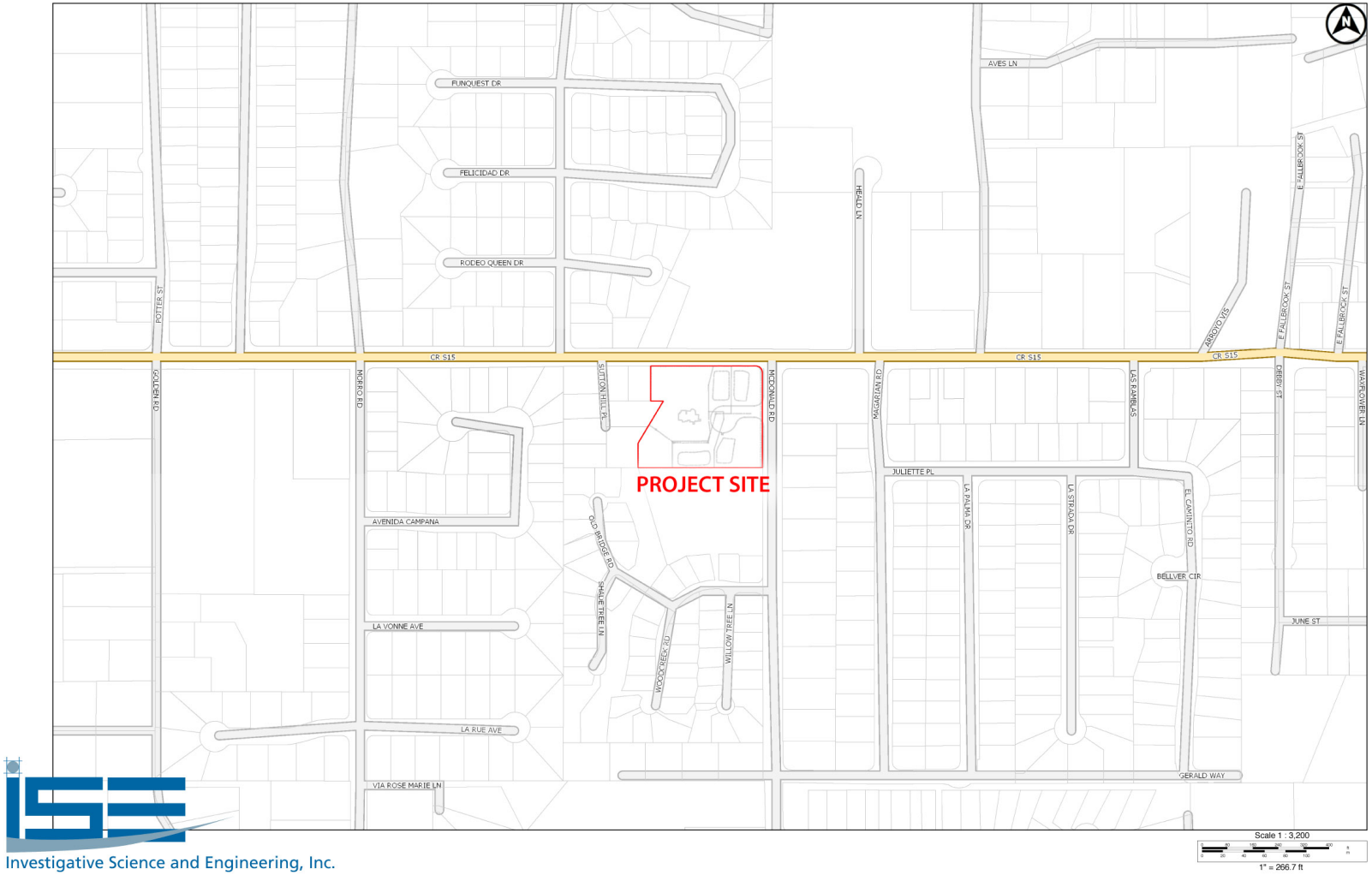

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FIGURE 2: Project Study Area Parcel Map (ISE 3/14)

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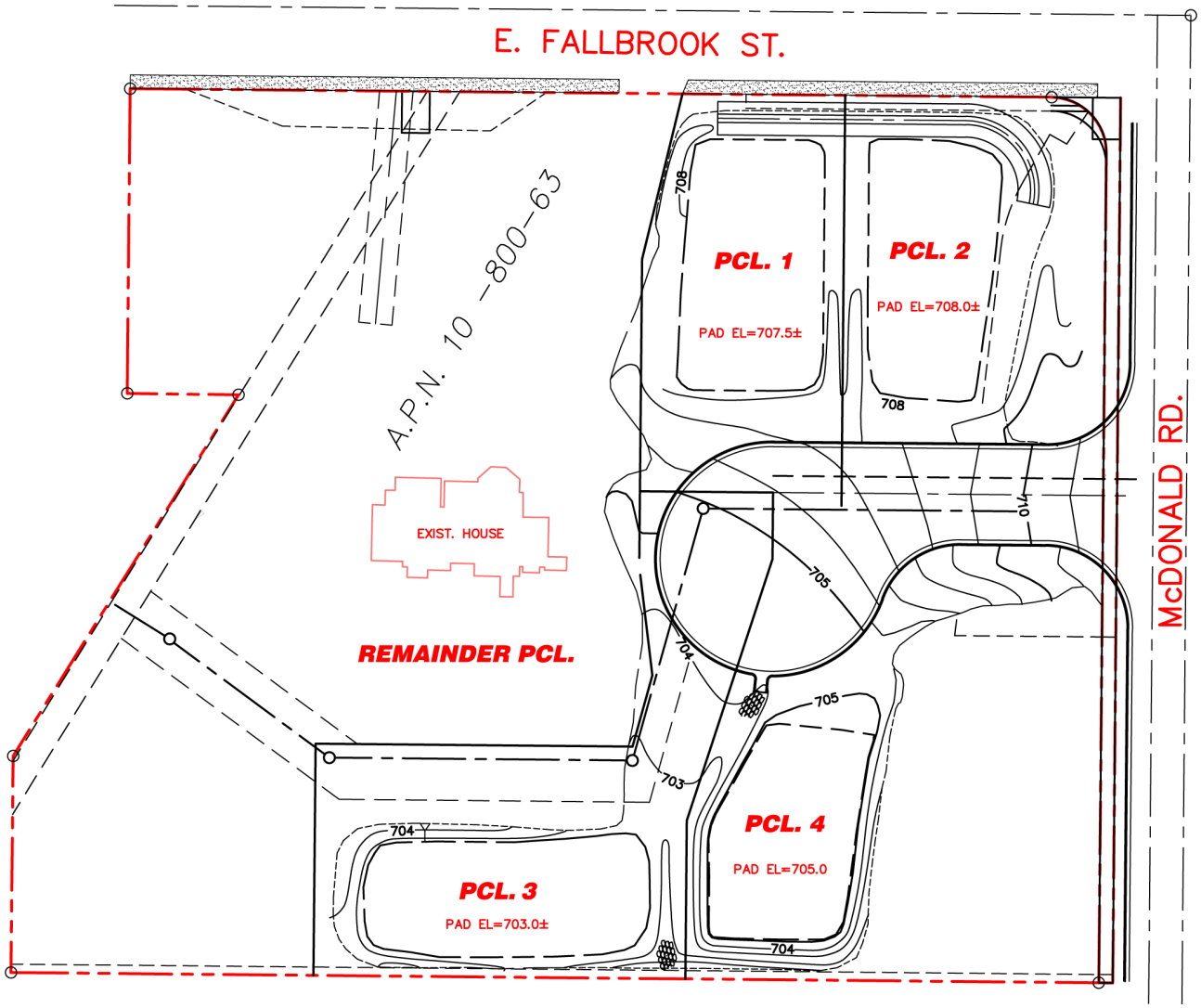

FIGURE 3: Proposed Hagerty Site Development Map (Farrington Engineering Consultants 8/13)

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The loudest sounds that the human ear can hear comfortably are approximately one trillion (or $1x10^{12}$) times the acoustic energy that the ear can barely detect. Because of this vast range, any attempt to represent the acoustic intensity of a particular sound on a linear scale becomes unwieldy. As a result, a logarithmic ratio, originally conceived for radio work, known as the decibel (dB), is commonly employed.[1]

A sound level of zero "0" dB is scaled such that it is defined as the threshold of human hearing, and would be barely audible to a human of normal hearing under extremely quiet listening conditions. Sound levels above 120 dB roughly correspond to the threshold of pain. The minimum change in sound level that the human ear can detect is approximately 3.0 dBA.[2] A change in sound level of 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness.[3] A change in sound level of 10 dB actually represents an approximate 90 percent change in the sound intensity, but only about a 50 percent change in the perceived loudness. This is due to the nonlinear response of the human ear to sound.

As mentioned above, most of the sounds we hear in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The intensities of each frequency add to generate the sound we hear. The method commonly used to quantify environmental sounds, consists of determining all of the frequencies of a sound according to a weighting system that reflects the nonlinear response characteristics of the human ear. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (or dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of sounds from distant sources that create a relatively steady background noise in which no particular source is identifiable. For this type of noise, a single descriptor called the Leq (or equivalent sound level) is used. Leq is the energy-mean A-weighted sound level during a measured time interval, and would be defined mathematically by the following continuous integral,

$$L_{eq} = 10Log_{10}\left[\frac{1}{T}\int_0^T SPL(t)^2\,dt\right]$$

[1] A unit used to express the relative magnitude of a sound wave. This level is defined as being equal to 20 times the common logarithm of the ratio of the pressure produced by a sound wave of interest, to a 'reference' pressure wave equal to 20 micro Pascal's (μPa) measured at a distance of 1 meter. 20 μPa is the smallest amount of pressure capable of producing the sensation of hearing in a human.

[2] Every 3 dB equates to a 50% drop (or increase) in wave strength; therefore a 6 dB drop/increase = a loss/increase of 75% of total signal strength and so on.

[3] This is a subjective reference based upon the nonlinear nature of the human ear.

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In the previous expression, L_{eq} is the energy equivalent sound level, t is the independent variable of time, T is the total time interval of the event, and, SPL is the sound pressure level *re. 20 μPa*. Thus, L_{eq} is the 'equivalent' constant sound level that would have to be produced by a given source to equal the average of the fluctuating level measured. For most acoustical studies, the study interval is generally taken as one-hour and the abbreviation used is $L_{eq\text{-}h}$ or $L_{eq(h)}$; however, other time intervals are utilized depending on the jurisdictional preference.

To describe the time-varying character of environmental noise, the statistical noise descriptors L_{10} and L_{90} are commonly used. They are the noise levels equaled or exceeded during 10 percent and 90 percent of a stated time. Sound levels associated with the L_{10} typically describe transient or short-term events, while levels associated with the L_{90} describe the steady state (or most prevalent) noise conditions. In addition, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum and minimum measured sound level (L_{max} and L_{min}) indicators. The L_{min} value obtained for a particular monitoring location is often called the *acoustic floor* for that location.

The aggregate of all community noise events are typically averaged into a single value known as the *Community Noise Equivalent Level* (CNEL). This descriptor is calculated by averaging all events over a specified time interval and applying a 5-dBA penalty to any sounds occurring between 7:00 p.m. and 10:00 p.m., and a 10-dBA penalty to sounds that occur during nighttime hours (i.e., 10 p.m. to 7 a.m.). This penalty is applied to compensate for the increased sensitivity to noise during the quieter nighttime hours.

Mathematically, CNEL can be derived based upon the hourly L_{eq} values, via the following expression where, '$L_{eq}(x)_i$' is the equivalent sound level during period '*x*' at time interval 'i', and 'n' is the number of time intervals:

$$CNEL = 10Log_{10}\frac{1}{n}\sum_{i=1}^{n}\left(10^{\frac{Leq(day)_i}{10}} + 10^{\frac{Leq(evening+5)_i}{10}} + 10^{\frac{Leq(night+10)_i}{10}}\right)$$

ENVIRONMENTAL SIGNIFICANCE THRESHOLDS

County of San Diego Community Noise Regulations

Transportation noise levels, such as those produced by roadways, railroads, airports, heliports, are governed under the *County of San Diego's Noise Element of the 2020 General Plan*. Chapter 8, Tables N-1 and N-2 of the General Plan specify the following exterior noise compatibility guidelines as outlined in Table 1 on the following page.

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TABLE 1: County of San Diego General Plan 2020 Noise Element Compatibility Guidelines

Table N-1 Noise Compatibility Guidelines

	Land Use Category	Exterior Noise Level (CNEL)						
			55	60	65	70	75	80
A	Residential—single family residences, mobile homes, senior housing, convalescent homes							
B	Residential—multi-family residences, mixed-use (commercial/residential)							
C	Transient lodging—motels, hotels, resorts							
D*	Schools, churches, hospitals, nursing homes, child care facilities							
E*	Passive recreational parks, nature preserves, contemplative spaces, cemeteries							
F*	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation							
G*	Office\professional, government, medical\dental, commercial, retail, laboratories							
H*	Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair							

	ACCEPTABLE—Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal construction, without any special noise insulation requirements.
	CONDITIONALLY ACCEPTABLE—New construction or development should be undertaken only after a detailed noise analysis is conducted to determine if noise reduction measures are necessary to achieve acceptable levels for land use. Criteria for determining exterior and interior noise levels are listed in Table N-2, Noise Standards. If a project cannot mitigate noise to a level deemed Acceptable, the appropriate county decision-maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.
	UNACCEPTABLE—New construction or development shall not be undertaken.

* Denotes facilities used for part of the day; therefore, an hourly standard would be used rather than CNEL (refer to Table N-2).

Table N-2 Noise Standards

1. The exterior noise level (as defined in Item 3) standard for Category A shall be 60 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
2. The exterior noise level standard for Categories B and C shall be 65 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
3. The exterior noise level standard for Categories D and G shall be 65 CNEL and the interior noise level standard shall be 50 dBA L_{eq} (one hour average).
4. For single-family detached dwelling units, "exterior noise level" is defined as the noise level measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum net lot area: *(i)* for lots less than 4,000 square feet in area, the exterior area shall include 400 square feet, *(ii)* for lots between 4,000 square feet to 10 acres in area, the exterior area shall include 10 percent of the lot area; *(iii)* for lots over 10 acres in area, the exterior area shall include 1 acre.
5. For all other residential land uses, "exterior noise level" is defined as noise measured at exterior areas which are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use of occupants of one dwelling unit, normally including yards, decks, and balconies. When the noise limit for Private Usable Open Space cannot be met, then a Group Usable Open Space that meets the exterior noise level standard shall be provided. "Group Usable Open Space" is defined as usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways.
6. For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.
7. For noise sensitive land uses where people normally do not sleep at night, the exterior and interior noise standard may be measured using either CNEL or the one-hour average noise level determined at the loudest hour during the period when the facility is normally occupied.
8. The exterior noise standard does not apply for land uses where no exterior use area is proposed or necessary, such as a library.
9. For Categories E and F the exterior noise level standard shall not exceed the limit defined as "Acceptable" in Table N-1 or an equivalent one-hour noise standard.

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Thus, for the proposed Hagerty Tentative Parcel Map, an exterior noise abatement standard of 60 dBA CNEL would be applicable as applied to areas previously identified under N-2(4).

State of California CCR Title 24

The California Code of Regulations (CCR), State Building Code, Part 2, Title 24, Appendix Chapter 35; "*Noise Insulation Standards for Multifamily Housing*" requires that multi-family dwellings, hotels, and motels located where the CNEL exceeds 60 dBA require an acoustical analysis showing that the proposed design will limit interior noise to less than 45 dBA CNEL for all residential spaces. Worst-case noise levels, either existing or future, must be used.

The County of San Diego has adopted the CCR Title 24 regulations for all types of residential dwellings as codified under the General Plan guidelines N-2(1)(2).

San Diego County Construction Noise Ordinance Regulations

The County of San Diego Noise Ordinance Sections 36.409 through 36.410 govern construction noise emissions and allowable daily thresholds. The relevant parts are cited below.

Section 36.409: Sound Level Limitations on Construction Equipment

Except for emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated, that exceeds an average sound level of 75 decibels for an eight-hour period, between 7 a.m. and 7 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

Section 36.410: Sound Level Limitations on Impulsive Noise

a) Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level… {of 82 dBA within a residential, village zoning or civic use area, or 85 dBA within an agricultural, commercial or industrial use zone}, …when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period. The maximum sound level depends on the use being made of the occupied property.

b) Except for emergency work, no person working on a public road project shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level… {of 85 dBA within a residential, village zoning or civic use area, or 90 dBA within an agricultural, commercial or industrial use zone}, …when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25

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percent of the minutes in the measurement period. The maximum sound level depends on the use being made of the occupied property.

c) The minimum measurement period for any measurements conducted under this section shall be one hour. During the measurement period a measurement shall be conducted every minute from a fixed location on an occupied property. The measurements shall measure the maximum sound level during each minute of the measurement period. If the sound level caused by construction equipment or the producer of the impulsive noise exceeds the maximum sound level for any portion of any minute, it will be deemed that the maximum sound level was exceeded during that minute.

APPROACH AND METHODOLOGY

Field Acoustical Reconnaissance

A Quest Model 2900 ANSI Type 2 integrating sound level meter was used as the data collection device. The meter was mounted to a tripod five feet above ground level in order to simulate the noise exposure of an average-height human being. Two short-term sound level measurements, shown pictorially in Figure 4 on Page 11 of this report, were taken on the proposed site as described below.

The first meter location (ML 1) was located in the south portion of the site roughly 100 ft to the west of McDonald Road. The second meter location (ML 2) was in the northern portion of the site roughly 50 feet south of East Fallbrook Street. The monitoring was done in this manner in order to obtain an estimate of the worst-case existing onsite noise during typical peak hour traffic conditions.

The measurements were performed on March 12, 2008. All monitoring sites were spatially logged using a geographic positioning system (GPS) in order to maintain horizontal and vertical control. Prior to testing, all equipment was calibrated at ISE's acoustics and vibration laboratory to verify conformance with ANSI S1-4 1983 Type 2 and IEC 651 Type 2 standards.[4] Photos of the test setup are shown in Figure 5 on Page 12 of this report.

Construction Noise Impact Assessment Approach

Major construction noise emission generators expected within the Hagerty TPM site would consist predominately of diesel-powered grading and earthwork equipment required for grading activities, underground work, and surface paving. Construction noise present at the project site was based upon past measured levels and sources from

[4] All testing and calibration is performed by ISE's Acoustics and Vibration Laboratory using a LORAN-C and Rubidium atomic frequency and time standard traceable to National Institute of Standards & Technology (NIST). The time and frequency calibration signal has a long-term stability of 10^{-10}. Specifications for traceability can be obtained at *www.nist.gov*.

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EPA PB 206717 of each expected equipment type, the duty cycle of each of the equipment components, and the expected average noise level (over a given eight-hour workday), as well as the expected worst-case noise level at the nearest sensitive receptor.

Cumulative (i.e., worst case aggregate) levels were calculated for a range of expected worst-case noise emissions from proposed equipment at the closest sensitive receptor under spherically-soft propagation conditions, and compared against the aforementioned County of San Diego Noise Ordinance Sections 36.409 through 36.410.

Exterior Traffic Noise Impact Assessment Approach

The *Traffic Noise Model version 2.5* (TNM 2.5) based on FHWA-PD-96-010 and FHWA/CA/TL-87/03 standards was used to calculate future onsite vehicular traffic noise levels.[5] Currently, TNM 2.5 is the only noise-modeling program formally accepted for use within the State of California. Dominant input to the acoustical model included the following:

- The proposed site development plan (Source: Farrington Engineering Consultants, 12/07).
- A digitized line-of-sight representation of all major roadways affecting the project site under the worst-case future noise condition (i.e., East Fallbrook Street and McDonald Road).
- Future Average Daily Trips (ADT's) for the aforementioned roadway segments (Source: SANDAG Series 10 – 2030 Enhanced Traffic Prediction Model).
- A 94/4/2 (automobiles/medium/heavy) traffic mix in accordance with CALTRANS.
- A peak hour traffic percentage of 10% of the ADT.[6]
- Receptor and topographic elevations (Source: USGS Digital Elevation Model).
- A composite pavement type, consisting of an average of Portland Cement Concrete (PCC) and Dense-Graded Asphaltic Concrete (DGAC) in accordance with TNM 2.5 test results (1998).

Modeled receptor areas consisting of useable space locations within the project footprint as well as exterior building façade points were sampled at various locations to determine the variation of all acoustic sources across, and affecting, the project site. The modeled receptor locations can be seen in Figure 6 on Page 13 of this report.

[5] The components of the TNM model are supported by a scientifically founded and experimentally calibrated acoustic computation methodology. The database is made up of over 6,000 individual pass-by events measured at forty sites across the country.

[6] For values between approximately 8 and 12 percent, the energy-mean A-weighted sound level is equivalent to the CNEL.

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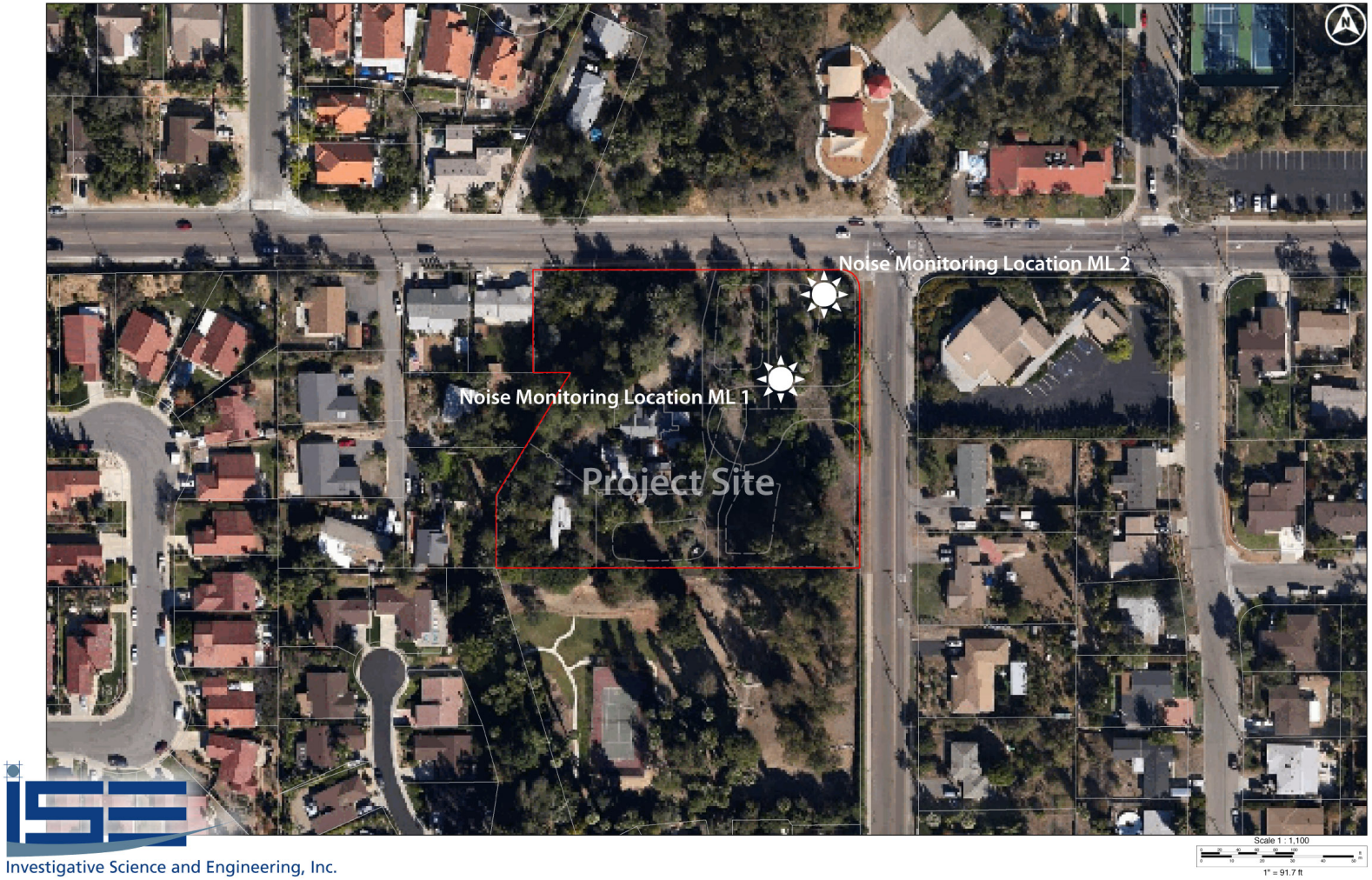

FIGURE 4: Ambient Noise Monitoring Locations ML 1 and ML 2 (ISE 3/14)

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FIGURE 5: Ambient Noise Monitoring Location Photos (ISE 3/14)

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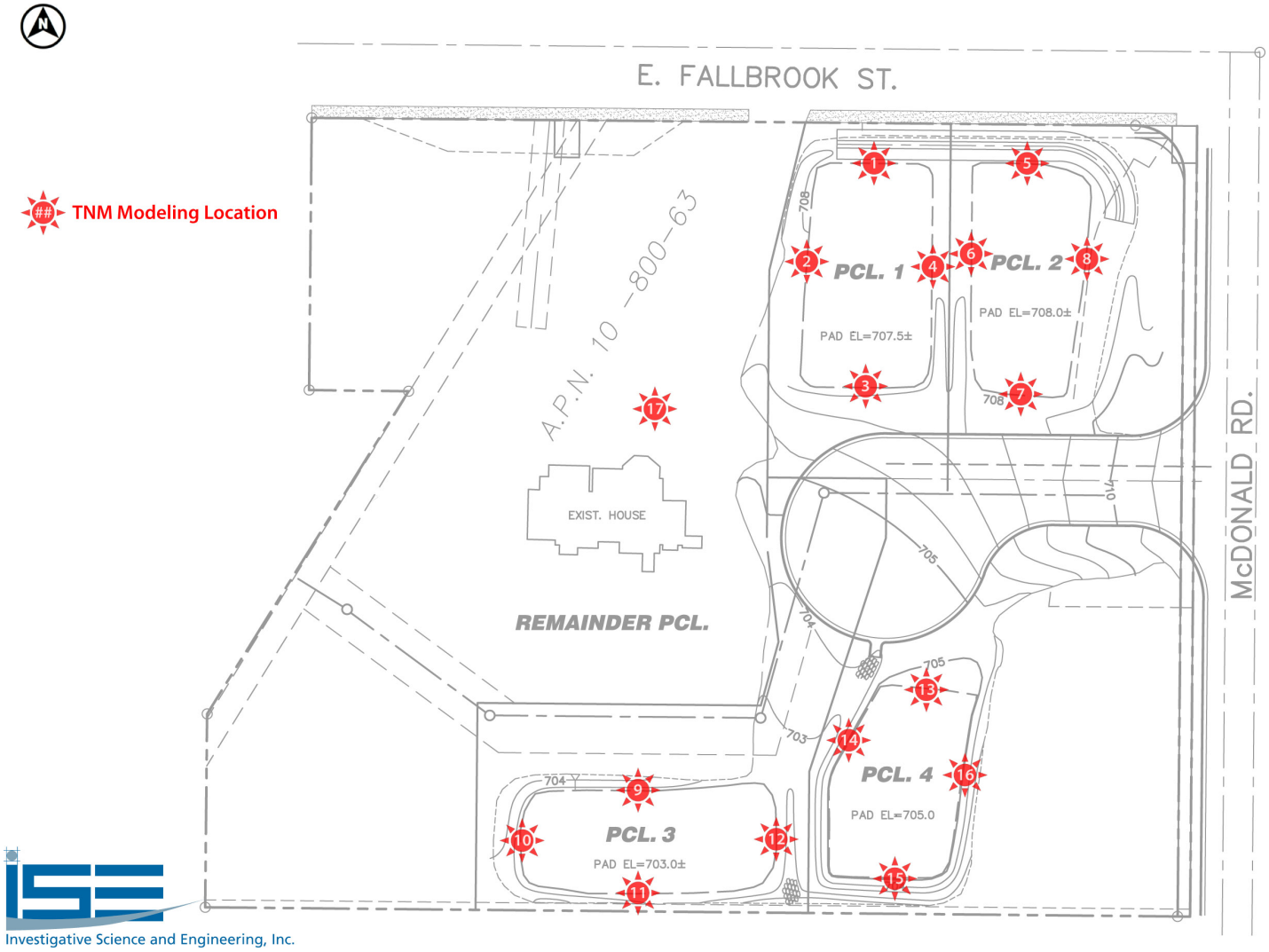

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FIGURE 6: TNM Receptor Modeling Locations (ISE 3/14)

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FINDINGS AND RECOMMENDATIONS

Field Acoustical Reconnaissance Findings

The results of the field reconnaissance sound level monitoring are shown in Table 2 below. The values for the equivalent sound level (L_{eq-h}), the maximum and minimum measured sound levels (L_{max} and L_{min}), and the statistical indicators L_{10} and L_{90}, are given for the monitoring location examined.

TABLE 2: Measured Ambient Sound Levels – Hagerty Tentative Parcel Map

		1-Hour Noise Level Descriptors in dBA				
Monitoring Location	**Start Time**	L_{eq}	L_{max}	L_{min}	L_{10}	L_{90}
ML 1	3:30 p.m.	54.0	71.7	37.7	56.8	48.8
ML 2	4:30 p.m.	57.4	69.1	43.9	59.8	56.4

Monitoring Location:

Location ML 1: Southern portion of project site facing McDonald Road. GPS: 32°22.573'N x 117°14.201'W.

Location ML 2: Northern portion of project site facing East Fallbrook Street. GPS: 32°22.584'N x 117°14.202'W

Measurements performed by ISE on 3/12/08.

EPE = Estimated GPS Position Error = 13 ft.
Temperature = 71.0 °F. Barometric Pressure = 29.76 in-Hg.

Measurements collected at the monitoring locations ML 1 and ML 2 reflect the typical sound levels associated with the community setting with existing adjacent roadway activities. The hourly average sound levels (or Leq-h) recorded over the monitoring period ranged between 54.0 dBA at ML 1 and 57.4 dBA at ML 2. The dominant noise source was peak hour traffic along East Fallbrook Street.

As indicated by the monitoring equipment, at least 90 percent of the time (L90) the onsite sound levels at ML 1 and ML 2 were 42.1 dBA and 51.9 dBA, respectively. The acoustic floor for the site, as seen by the Lmin indicator was found to be 37.7 dBA at ML 1 and 43.9 dBA at ML 2. This would be considered the lowest attainable sound levels for the project area near East Fallbrook Street and McDonald Road during peak hour traffic times.

Construction Noise Emission Levels

The closest residential receptor which could be potentially affected by construction noise is located approximately 150-feet away from any construction activity (i.e., on the opposite side of McDonald Road). This condition is shown graphically in Figure 7 on the following page. Aggregate construction noise emissions are tabulated under this identified condition in Table 3 on Page 16 of this report.

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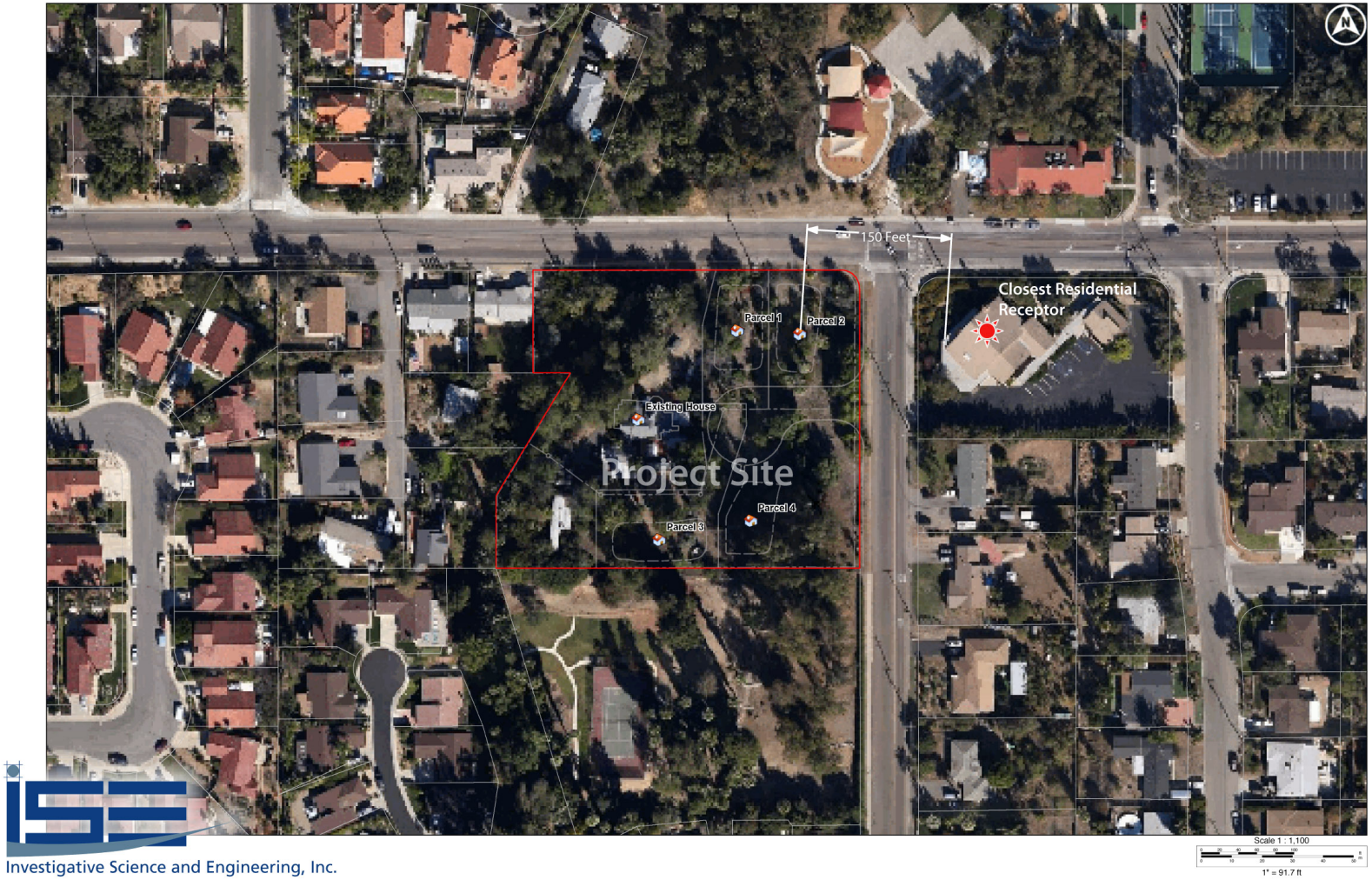

FIGURE 7: Identified Sensitive Receptors Adjacent to Project Site (ISE 3/14)

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TABLE 3: Predicted Construction Noise Levels – Hagerty Tentative Parcel Map

Equipment Type Model	Selected EPA Tier Level	Quantity Used (#)	Duty Cycle (hrs/day)	Source Level @ 50 Feet (dBA)	Cumulative Effect @ 50 Feet (dBA Leq_{8h})
Front Loader D6	3	1	8	75	75.0
Dozer w/ rippers D8R	3	1	8	70	70.0
Backhoe D6	3	1	8	75	75.0
Dump Truck (200 HP)	3	1	8	80	80.0
Low Boy	3	1	8	70	70.0
Water Truck	3	1	8	70	70.0
				Worst-Case Aggregate Sum @ 50 Ft. (Σ):	**82.9**
				Leq_{8h} at Receptor Area 150-Feet Distant:	**70.9**

Source: EPA PB 206717, Environmental Protection Agency, 12/31/71, "Noise from Construction Equipment and Operations"

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Construction within the proposed project area would typically occur between the hours of 7:00 a.m. and 3:00 p.m. Monday through Friday. Since the nearest sensitive residential receptor line would be, at a minimum, approximately 150-feet from any construction activity centroid, the predicted worst-case construction noise levels could be as high as 82.9 dBA Leq_{8h} at 50-feet, with a resultant receptor level of 70.9 dBA Leq_{8h} or less. This level is below the County of San Diego construction noise abatement threshold and is not expected to generate impacts, nor require mitigation.

Future Traffic Noise Impacts to Proposed Development

Traffic noise affecting the proposed Hagerty Tentative Parcel Map is currently, and would continue to be, the aggregation of surface street traffic along East Fallbrook Street and McDonald Road. Future traffic estimates for East Fallbrook Street and McDonald Road predict volumes and road speeds of 17,000 ADT at 45 MPH and 2,000 ADT at 25 MPH, respectively.[7]

The results of the acoustical modeling for the selected lots are shown in Table 4 below. The complete model runs are provided as an attachment to this report. Noise sensitive areas on both Lots 1 and 2 would exceed the County's 60 dBA CNEL noise threshold and would require noise mitigation for noise sensitive areas.

TABLE 4: Predicted Future Transportation Noise Levels – Hagerty Tentative Parcel Map

Modeled Receptor No.	Corresponding Lot #	Ground Floor Unmitigated Sound Levels	First Floor Mitigated Sound Levels	Second Floor Mitigated Sound Levels
1	Parcel 1 – North	68.2	58.1	69.2
2	Parcel 1 – West	64.3	59.2	66.8
3	Parcel 1 – South	62.3	59.8	64.9
4	Parcel 1 – East	64.2	59.6	66.5
5	Parcel 2 – North	67.7	58.2	68.9
6	Parcel 2 - West	64.4	60.2	66.6
7	Parcel 2 – South	62.0	59.7	64.7
8	Parcel 2 – East	64.3	59.7	66.7
9	Parcel 3 – North	53.2	52.8	56.3
10	Parcel 3 - West	52.4	52.1	55.8
11	Parcel 3 – South	52.3	52.1	55.4
12	Parcel 3 – East	53.0	52.6	55.9
13	Parcel 4 – North	55.5	54.8	57.4
14	Parcel 4 - West	54.6	54.1	56.7
15	Parcel 4 – South	53.4	53.0	55.9
16	Parcel 4 – East	54.7	54.1	56.9
17	Remaining Lot Facade	60.5	60.3	62.8

[7] *Source: SANDAG Series 10 - 2030 Traffic Volume Forecast.*

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A proposed mitigation plan consisting of one seven-foot-high wall was examined and found to be adequate to mitigate noise levels under the County's noise thresholds. The recommended placement of the wall segment is shown in Figure 8 on the following page.

The mitigation noise wall should be constructed of a solid material such as an earthen berm, masonry block, glass or any combination of these materials. A general rule is the material should have a density of 3.5 lbs per a cubic foot. The noise barrier should be installed at the top of slope for maximum attenuation. Once the mitigation plan has been implemented, the County will consider rear yard areas of Parcel 1 and Parcel 2 acoustically acceptable.

It should be noted that second story structural façades for any two story buildings proposed on Parcel 1 and Parcel 2 would be exposed to sound levels in excess of 60 dBA Leq (as shown in Table 4 above). This would exceed CCR Title 24 Noise Insulation Standards and would need to be further analyzed in order to demonstrate that the 45-dBA Leq interior noise thresholds can be attained.

This analysis would be completed at the time of submittal for building permits and would only be applicable to two-story structures. Noise contours for both first- and second-floor areas are also shown in Figure 8 on the following page.

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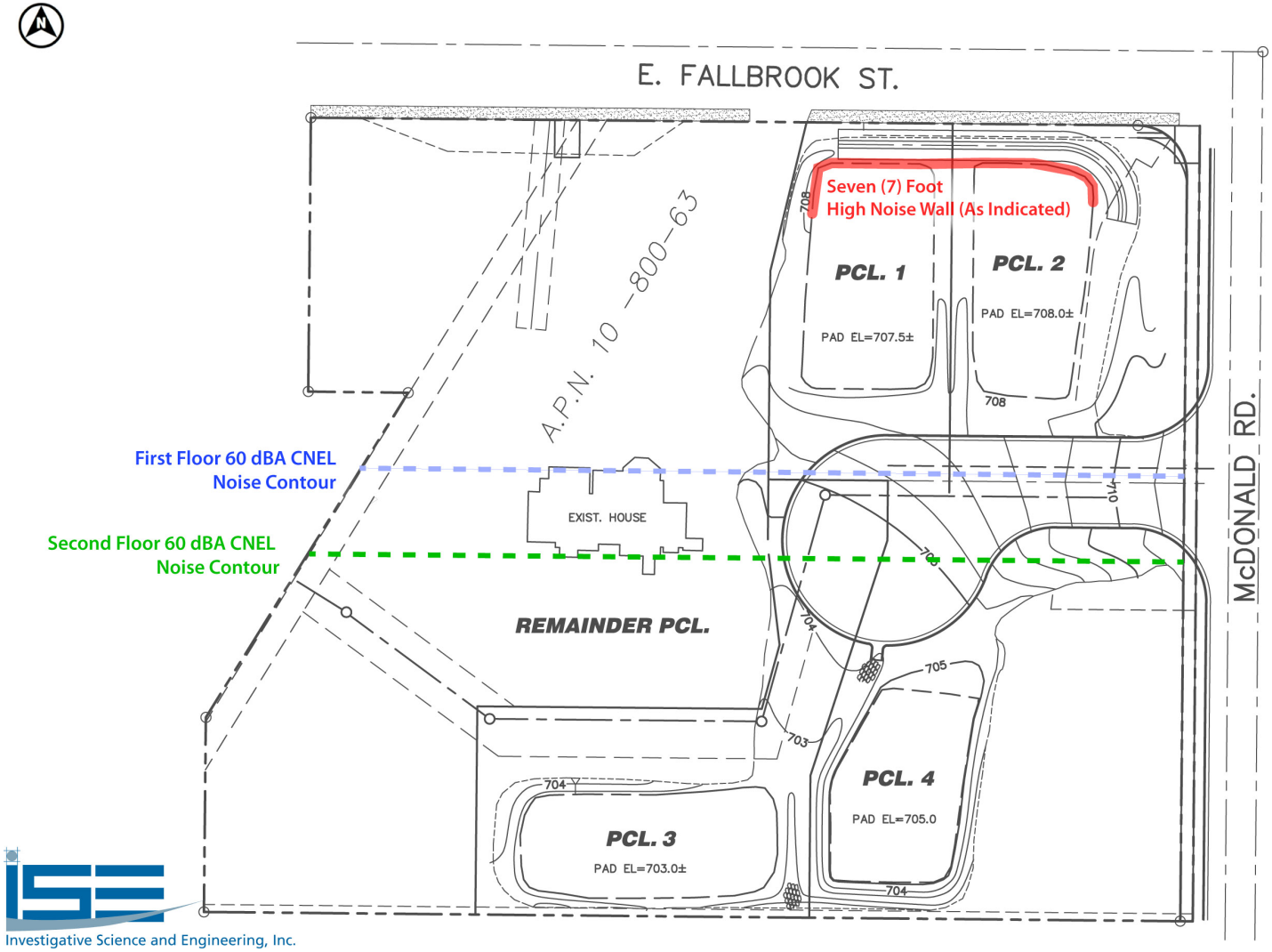

FIGURE 8: Proposed Hagerty TPM Mitigation Plan (ISE 3/14)

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CERTIFICATION OF ACCURACY AND QUALIFICATIONS

This report was prepared by Investigative Science and Engineering, Inc. (ISE), located at 1134 D Street, Ramona, CA 92065. The members of its professional staff contributing to the report are listed below:

Rick Tavares *(rtavares@ise.us)*	Ph.D. Civil Engineering M.S. Structural Engineering M.S. Mechanical Engineering B.S. Aerospace Engineering / Engineering Mechanics
Karen Tavares *(ktavares@ise.us)*	B.S. Electrical Engineering

ISE affirms to the best of its knowledge and belief that the statements and information contained herein are in all respects true and correct as of the date of this report. Content and information contained within this report is intended only for the subject project and is protected under 17 U.S.C. §§ 101 through 810.

Should the reader have any questions regarding the findings and conclusions presented in this report, please do not hesitate to contact ISE at (760) 787-0016.

Approved as to Form and Content:

Rick Tavares, Ph.D.

Project Principal
Investigative Science and Engineering, Inc. (ISE)

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APPENDICIES AND SUPPLEMENTAL INFORMATION

TNM Model Input/Output Data

INPUT: ROADWAYS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Unmitigated**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Fallbrook Eastbound	12.0	point1	1	50.0	460.0	720.00				Average	
		point2	2	283.0	458.0	710.00				Average	
		point3	3	745.0	456.0	713.00					
Fallbrook Westbound	12.0	point6	6	745.0	471.0	713.00				Average	
		point5	5	283.0	473.0	710.00				Average	
		point4	4	50.0	475.0	720.00					
McDonald Southbound	12.0	point7	7	535.0	452.0	708.00				Average	
		point8	8	535.0	263.0	712.00				Average	
		point9	9	531.0	11.0	708.00					
McDonald Northbound	12.0	point12	12	546.0	11.0	708.00				Average	
		point11	11	550.0	263.0	712.00				Average	
		point10	10	550.0	452.0	708.00					

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INPUT: TRAFFIC FOR LAeq1h Volumes **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Unmitigated**

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Fallbrook Eastbound	point1	1	799	45	34	45	14	45	0	0	0	0
	point2	2	799	45	34	45	14	45	0	0	0	0
	point3	3										
Fallbrook Westbound	point6	6	799	45	34	45	14	45	0	0	0	0
	point5	5	799	45	34	45	14	45	0	0	0	0
	point4	4										
McDonald Southbound	point7	7	94	25	4	25	2	25	0	0	0	0
	point8	8	94	25	4	25	2	25	0	0	0	0
	point9	9										
McDonald Northbound	point12	12	94	25	4	25	2	25	0	0	0	0
	point11	11	94	25	4	25	2	25	0	0	0	0
	point10	10										

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INPUT: RECEIVERS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Unmitigated**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Parcel 1 N	1	1	378.6	405.6	707.00	4.92	0.00	66	10.0	8.0	
Parcel 1 W	2	1	361.4	364.3	707.00	4.92	0.00	66	10.0	8.0	
Parcel 1 S	3	1	375.7	332.4	707.00	4.92	0.00	66	10.0	8.0	
Parcel 1 E	4	1	394.3	363.1	707.00	4.92	0.00	66	10.0	8.0	
Parcel 2 N	6	1	441.5	402.3	708.00	4.92	0.00	66	10.0	8.0	
Parcel 2 W	7	1	427.6	365.0	708.00	4.92	0.00	66	10.0	8.0	
Parcel 2 S	8	1	440.0	326.2	708.00	4.92	0.00	66	10.0	8.0	
Parcel 2 E	9	1	455.0	364.2	708.00	4.92	0.00	66	10.0	8.0	
Parcel 3 N	11	1	284.7	154.9	703.00	4.92	0.00	66	10.0	8.0	
Parcel 3 W	12	1	244.5	138.9	703.00	4.92	0.00	66	10.0	8.0	
Parcel 3 S	13	1	284.7	123.1	703.00	4.92	0.00	66	10.0	8.0	
Parcel 3 E	14	1	331.9	140.7	703.00	4.92	0.00	66	10.0	8.0	
Parcel 4 N	16	1	394.0	195.5	704.00	4.92	0.00	66	10.0	8.0	
Parcel 4 W	17	1	365.2	168.1	704.00	4.92	0.00	66	10.0	8.0	
Parcel 4 S	18	1	382.7	125.7	704.00	4.92	0.00	66	10.0	8.0	
Parcel 4 E	19	1	412.3	163.0	704.00	4.92	0.00	66	10.0	8.0	
Remaining Parcel	22	1	214.8	303.4	710.00	4.92	0.00	66	10.0	8.0	Y

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INPUT: TERRAIN LINES **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: TERRAIN LINES
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Unmitigated**

Terrain Line Name	Points No.	Coordinates (ground) X ft	Y ft	Z ft
Parcel 1	1	359.0	410.0	707.00
	2	402.0	409.0	707.00
	3	400.0	323.0	707.00
	4	351.0	324.0	707.00
	5	359.0	409.0	707.00
Parcel 2	6	421.0	411.0	708.00
	7	466.0	403.0	708.00
	8	456.0	317.0	708.00
	9	422.0	321.0	708.00
	10	421.0	410.0	708.00
Parcel 3	11	243.0	156.0	703.00
	12	335.0	161.0	703.00
	13	335.0	121.0	703.00
	14	239.0	121.0	703.00
	15	243.0	155.0	703.00
Parcel 4	16	359.0	123.0	703.00
	17	358.0	162.0	703.00
	18	381.0	200.0	703.00
	19	423.0	195.0	703.00
	20	407.0	124.0	703.00
	21	359.0	122.0	703.00
Terrain Line7	24	572.0	301.0	715.00
	25	593.0	401.0	715.00
	26	575.0	417.0	709.00

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INPUT: TERRAIN LINES

08-013 APN 105-800-63

	27	599.0	408.0	715.00
	28	653.0	401.0	715.00
Terrain Line9	32	531.0	15.0	708.00
	33	534.0	417.0	708.00

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RESULTS: SOUND LEVELS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Unmitigated**
BARRIER DESIGN: **INPUT HEIGHTS**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: **68 deg F, 50% RH**

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Parcel 1 N	1	1	0.0	68.2	66	68.2	10	Snd Lvl	68.2	0.0	8	-8.0
Parcel 1 W	2	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
Parcel 1 S	3	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0
Parcel 1 E	4	1	0.0	64.2	66	64.2	10	----	64.2	0.0	8	-8.0
Parcel 2 N	6	1	0.0	67.7	66	67.7	10	Snd Lvl	67.7	0.0	8	-8.0
Parcel 2 W	7	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
Parcel 2 S	8	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
Parcel 2 E	9	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
Parcel 3 N	11	1	0.0	53.2	66	53.2	10	----	53.2	0.0	8	-8.0
Parcel 3 W	12	1	0.0	52.4	66	52.4	10	----	52.4	0.0	8	-8.0
Parcel 3 S	13	1	0.0	52.3	66	52.3	10	----	52.3	0.0	8	-8.0
Parcel 3 E	14	1	0.0	53.0	66	53.0	10	----	53.0	0.0	8	-8.0
Parcel 4 N	16	1	0.0	55.5	66	55.5	10	----	55.5	0.0	8	-8.0
Parcel 4 W	17	1	0.0	54.6	66	54.6	10	----	54.6	0.0	8	-8.0
Parcel 4 S	18	1	0.0	53.4	66	53.4	10	----	53.4	0.0	8	-8.0
Parcel 4 E	19	1	0.0	54.7	66	54.7	10	----	54.7	0.0	8	-8.0
Remaining Parcel	22	1	0.0	60.5	66	60.5	10	----	60.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min dB	Avg dB	Max dB
All Selected	17	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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INPUT: ROADWAYS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Mitigated**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Fallbrook Eastbound	12.0	point1	1	50.0	460.0	720.00				Average	
		point2	2	283.0	458.0	710.00				Average	
		point3	3	745.0	456.0	713.00					
Fallbrook Westbound	12.0	point6	6	745.0	471.0	713.00				Average	
		point5	5	283.0	473.0	710.00				Average	
		point4	4	50.0	475.0	720.00					
McDonald Southbound	12.0	point7	7	535.0	452.0	708.00				Average	
		point8	8	535.0	263.0	712.00				Average	
		point9	9	531.0	11.0	708.00					
McDonald Northbound	12.0	point12	12	546.0	11.0	708.00				Average	
		point11	11	550.0	263.0	712.00				Average	
		point10	10	550.0	452.0	708.00					

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INPUT: TRAFFIC FOR LAeq1h Volumes **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Mitigated**

Roadway Name	Points Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
Fallbrook Eastbound	point1	1	799	45	34	45	14	45	0	0	0	0	
	point2	2	799	45	34	45	14	45	0	0	0	0	
	point3	3											
Fallbrook Westbound	point6	6	799	45	34	45	14	45	0	0	0	0	
	point5	5	799	45	34	45	14	45	0	0	0	0	
	point4	4											
McDonald Southbound	point7	7	94	25	4	25	2	25	0	0	0	0	
	point8	8	94	25	4	25	2	25	0	0	0	0	
	point9	9											
McDonald Northbound	point12	12	94	25	4	25	2	25	0	0	0	0	
	point11	11	94	25	4	25	2	25	0	0	0	0	
	point10	10											

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INPUT: RECEIVERS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Mitigated**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Parcel 1 N	1	1	378.6	406.5	707.00	4.92	0.00	66	10.0	8.0	
Parcel 1 W	2	1	361.4	369.4	707.00	4.92	0.00	66	10.0	8.0	
Parcel 1 S	3	1	375.7	332.4	707.00	4.92	0.00	66	10.0	8.0	
Parcel 1 E	4	1	394.3	363.1	707.00	4.92	0.00	66	10.0	8.0	
Parcel 2 N	6	1	442.4	404.4	708.00	4.92	0.00	66	10.0	8.0	
Parcel 2 W	7	1	427.6	365.0	708.00	4.92	0.00	66	10.0	8.0	
Parcel 2 S	8	1	440.0	326.2	708.00	4.92	0.00	66	10.0	8.0	
Parcel 2 E	9	1	455.6	367.3	708.00	4.92	0.00	66	10.0	8.0	
Parcel 3 N	11	1	284.7	154.9	703.00	4.92	0.00	66	10.0	8.0	
Parcel 3 W	12	1	244.5	138.9	703.00	4.92	0.00	66	10.0	8.0	
Parcel 3 S	13	1	284.7	123.1	703.00	4.92	0.00	66	10.0	8.0	
Parcel 3 E	14	1	331.9	140.7	703.00	4.92	0.00	66	10.0	8.0	
Parcel 4 N	16	1	394.0	195.5	704.00	4.92	0.00	66	10.0	8.0	
Parcel 4 W	17	1	365.2	168.1	704.00	4.92	0.00	66	10.0	8.0	
Parcel 4 S	18	1	382.7	125.7	704.00	4.92	0.00	66	10.0	8.0	
Parcel 4 E	19	1	412.3	163.0	704.00	4.92	0.00	66	10.0	8.0	
Remaining Parcel	22	1	214.8	303.4	710.00	4.92	0.00	66	10.0	8.0	Y

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INPUT: BARRIERS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: BARRIERS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Mitigated**

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Incre-ment	Perturbs #Up	Perturbs #Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier5	W	0.00	99.99	0.00				0.00	point7	7	352.1	373.1	707.00	7.00	0.00	0	0		
									point8	8	358.7	410.1	707.00	7.00	0.00	0	0		
									point9	9	401.9	409.4	707.00	7.00	0.00	0	0		
									point10	10	419.6	412.0	708.00	7.00	0.00	0	0		
									point11	11	467.4	403.3	708.00	7.00	0.00	0	0		
									point12	12	468.1	366.4	708.00	7.00					

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RESULTS: SOUND LEVELS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **1st Floor Mitigated**
BARRIER DESIGN: **INPUT HEIGHTS**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: **68 deg F, 50% RH**

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Parcel 1 N	1	1	0.0	58.1	66	58.1	10	----	58.1	0.0	8	-8.0
Parcel 1 W	2	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0
Parcel 1 S	3	1	0.0	59.8	66	59.8	10	----	59.8	0.0	8	-8.0
Parcel 1 E	4	1	0.0	59.6	66	59.6	10	----	59.6	0.0	8	-8.0
Parcel 2 N	6	1	0.0	58.2	66	58.2	10	----	58.2	0.0	8	-8.0
Parcel 2 W	7	1	0.0	60.2	66	60.2	10	----	60.2	0.0	8	-8.0
Parcel 2 S	8	1	0.0	59.7	66	59.7	10	----	59.7	0.0	8	-8.0
Parcel 2 E	9	1	0.0	59.7	66	59.7	10	----	59.7	0.0	8	-8.0
Parcel 3 N	11	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
Parcel 3 W	12	1	0.0	52.1	66	52.1	10	----	52.1	0.0	8	-8.0
Parcel 3 S	13	1	0.0	52.1	66	52.1	10	----	52.1	0.0	8	-8.0
Parcel 3 E	14	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
Parcel 4 N	16	1	0.0	54.8	66	54.8	10	----	54.8	0.0	8	-8.0
Parcel 4 W	17	1	0.0	54.1	66	54.1	10	----	54.1	0.0	8	-8.0
Parcel 4 S	18	1	0.0	53.0	66	53.0	10	----	53.0	0.0	8	-8.0
Parcel 4 E	19	1	0.0	54.1	66	54.1	10	----	54.1	0.0	8	-8.0
Remaining Parcel	22	1	0.0	60.3	66	60.3	10	----	60.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min dB	Avg dB	Max dB
All Selected	17	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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INPUT: ROADWAYS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **2nd Floor Mitigated**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Fallbrook Eastbound	12.0	point1	1	50.0	460.0	720.00				Average	
		point2	2	283.0	458.0	710.00				Average	
		point3	3	745.0	456.0	713.00					
Fallbrook Westbound	12.0	point6	6	745.0	471.0	713.00				Average	
		point5	5	283.0	473.0	710.00				Average	
		point4	4	50.0	475.0	720.00					
McDonald Southbound	12.0	point7	7	535.0	452.0	708.00				Average	
		point8	8	535.0	263.0	712.00				Average	
		point9	9	531.0	11.0	708.00					
McDonald Northbound	12.0	point12	12	546.0	11.0	708.00				Average	
		point11	11	550.0	263.0	712.00				Average	
		point10	10	550.0	452.0	708.00					

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INPUT: TRAFFIC FOR LAeq1h Volumes **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **2nd Floor Mitigated**

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Fallbrook Eastbound	point1	1	799	45	34	45	14	45	0	0	0	0
	point2	2	799	45	34	45	14	45	0	0	0	0
	point3	3										
Fallbrook Westbound	point6	6	799	45	34	45	14	45	0	0	0	0
	point5	5	799	45	34	45	14	45	0	0	0	0
	point4	4										
McDonald Southbound	point7	7	94	25	4	25	2	25	0	0	0	0
	point8	8	94	25	4	25	2	25	0	0	0	0
	point9	9										
McDonald Northbound	point12	12	94	25	4	25	2	25	0	0	0	0
	point11	11	94	25	4	25	2	25	0	0	0	0
	point10	10										

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INPUT: RECEIVERS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **2nd Floor Mitigated**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Parcel 1 N	1	1	378.6	406.5	707.00	15.00	0.00	66	10.0	8.0	
Parcel 1 W	2	1	361.4	369.4	707.00	15.00	0.00	66	10.0	8.0	
Parcel 1 S	3	1	375.7	332.4	707.00	15.00	0.00	66	10.0	8.0	
Parcel 1 E	4	1	394.3	363.1	707.00	15.00	0.00	66	10.0	8.0	
Parcel 2 N	6	1	442.4	404.4	708.00	15.00	0.00	66	10.0	8.0	
Parcel 2 W	7	1	427.6	365.0	708.00	15.00	0.00	66	10.0	8.0	
Parcel 2 S	8	1	440.0	326.2	708.00	15.00	0.00	66	10.0	8.0	
Parcel 2 E	9	1	455.6	367.3	708.00	15.00	0.00	66	10.0	8.0	
Parcel 3 N	11	1	284.7	154.9	703.00	15.00	0.00	66	10.0	8.0	
Parcel 3 W	12	1	244.5	138.9	703.00	15.00	0.00	66	10.0	8.0	
Parcel 3 S	13	1	284.7	123.1	703.00	15.00	0.00	66	10.0	8.0	
Parcel 3 E	14	1	331.9	140.7	703.00	15.00	0.00	66	10.0	8.0	
Parcel 4 N	16	1	394.0	195.5	704.00	15.00	0.00	66	10.0	8.0	
Parcel 4 W	17	1	365.2	168.1	704.00	15.00	0.00	66	10.0	8.0	
Parcel 4 S	18	1	382.7	125.7	704.00	15.00	0.00	66	10.0	8.0	
Parcel 4 E	19	1	412.3	163.0	704.00	15.00	0.00	66	10.0	8.0	
Remaining Parcel	22	1	214.8	303.4	710.00	15.00	0.00	66	10.0	8.0	Y

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INPUT: BARRIERS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: BARRIERS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **2nd Floor Mitigated**

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Incre-ment	Perturbs #Up	Perturbs #Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier5	W	0.00	99.99	0.00				0.00	point7	7	352.1	373.1	707.00	7.00	0.00	0	0		
									point8	8	358.7	410.1	707.00	7.00	0.00	0	0		
									point9	9	401.9	409.4	707.00	7.00	0.00	0	0		
									point10	10	419.6	412.0	708.00	7.00	0.00	0	0		
									point11	11	467.4	403.3	708.00	7.00	0.00	0	0		
									point12	12	468.1	366.4	708.00	7.00					

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INPUT: TERRAIN LINES **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**

INPUT: TERRAIN LINES
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **2nd Floor Mitigated**

Terrain Line Name	Points No.	Coordinates (ground) X ft	Y ft	Z ft
Parcel 1	1	359.4	409.5	707.00
	2	402.0	409.0	707.00
	3	400.0	323.0	707.00
	4	351.0	324.0	707.00
	5	359.0	409.0	707.00
Parcel 2	6	421.0	411.0	708.00
	7	466.0	403.0	708.00
	8	456.0	317.0	708.00
	9	422.0	321.0	708.00
	10	421.0	410.0	708.00
Parcel 3	11	243.0	156.0	703.00
	12	335.0	161.0	703.00
	13	335.0	121.0	703.00
	14	239.0	121.0	703.00
	15	243.0	155.0	703.00
Parcel 4	16	359.0	123.0	703.00
	17	358.0	162.0	703.00
	18	381.0	200.0	703.00
	19	423.0	195.0	703.00
	20	407.0	124.0	703.00
	21	359.0	122.0	703.00
Terrain Line7	24	572.0	301.0	715.00
	25	593.0	401.0	715.00
	26	575.0	417.0	709.00

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INPUT: TERRAIN LINES

08-013 APN 105-800-63

	27	599.0	408.0	715.00
	28	653.0	401.0	715.00
Terrain Line9	32	531.0	15.0	708.00
	33	534.0	417.0	708.00

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RESULTS: SOUND LEVELS **08-013 APN 105-800-63**

ISE **13 March 2008**
Case van Genuchten **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: **08-013 APN 105-800-63**
RUN: **2nd Floor Mitigated**
BARRIER DESIGN: **INPUT HEIGHTS**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: **68 deg F, 50% RH**

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Parcel 1 N	1	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0
Parcel 1 W	2	1	0.0	66.8	66	66.8	10	Snd Lvl	66.8	0.0	8	-8.0
Parcel 1 S	3	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
Parcel 1 E	4	1	0.0	66.5	66	66.5	10	Snd Lvl	66.5	0.0	8	-8.0
Parcel 2 N	6	1	0.0	68.9	66	68.9	10	Snd Lvl	68.9	0.0	8	-8.0
Parcel 2 W	7	1	0.0	66.6	66	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
Parcel 2 S	8	1	0.0	64.7	66	64.7	10	----	64.7	0.0	8	-8.0
Parcel 2 E	9	1	0.0	66.7	66	66.7	10	Snd Lvl	66.7	0.0	8	-8.0
Parcel 3 N	11	1	0.0	56.3	66	56.3	10	----	56.3	0.0	8	-8.0
Parcel 3 W	12	1	0.0	55.8	66	55.8	10	----	55.8	0.0	8	-8.0
Parcel 3 S	13	1	0.0	55.4	66	55.4	10	----	55.4	0.0	8	-8.0
Parcel 3 E	14	1	0.0	55.9	66	55.9	10	----	55.9	0.0	8	-8.0
Parcel 4 N	16	1	0.0	57.4	66	57.4	10	----	57.4	0.0	8	-8.0
Parcel 4 W	17	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
Parcel 4 S	18	1	0.0	55.9	66	55.9	10	----	55.9	0.0	8	-8.0
Parcel 4 E	19	1	0.0	56.9	66	56.9	10	----	56.9	0.0	8	-8.0
Remaining Parcel	22	1	0.0	62.8	66	62.8	10	----	62.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min dB	Avg dB	Max dB
All Selected	17	0.0	0.0	0.0
All Impacted	6	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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