ACOUSTICAL SITE ASSESSMENT
TPM 34760 - RIVERSIDE CA

Submitted to:

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ISE Project #08-025

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EXECUTIVE SUMMARY

The findings contained within this *Acoustical Site Assessment* for the proposed TPM 34760 project site indicate that no traffic noise impacts were identified. No mitigation is required.

INTRODUCTION AND DEFINITIONS

Existing Site Characterization

The subject project site consists of approximately 65.4-acres divided amongst Assessor's Parcel Numbers (APN's) 114-040-019, 114-040-020, 275-100-003, and 275-100-004. The project site is partially situated in the City of Corona and the County of Riverside.[1]. Regional access to the project site can be obtained from Ontario Avenue via Interstate 15 (I-15) to the east as is generally denoted in Figure 1 on the following page.

The project site is located south of the intersection of Shepard Crest Drive and Malaga Street and lies adjacent to the north border of the Cleveland National Forest as can be seen in Figure 2 on Page 3 of this report.

Existing Land uses and zoning adjacent to the project site include:

- North: Single Family Residential, Estate Residential (E-R);
- South: Cleveland National Forest;
- East: Vacant, Estate Residential (E-R);
- West: Vacant, Open Space (OS).

Currently the project site resides as an agricultural area, specifically an avocado grove. The current land use for the site is Agricultural and is zoned as *Hillside Development Overlay Rural Residential* (R-R). Onsite elevations on the site range from approximately 1,367 to 1,410 feet above mean sea level (MSL).

Project Description

The proposed TPM 34760 project includes the development of 34 lots on a total 65.4-acre site as can be seen in Figure 3 on Page 4 of this report. The average lot area will be approximately 20,100-square feet and each lot will include one residential dwelling. The project also proposes an annexation to be consistent in zoning with the Mountain Gate Specific Plan (SP-89-01).

[1] The acreage breakdown between the City of Corona and the County of Riverside is 39.9-acres and 25.5-acres, respectively.

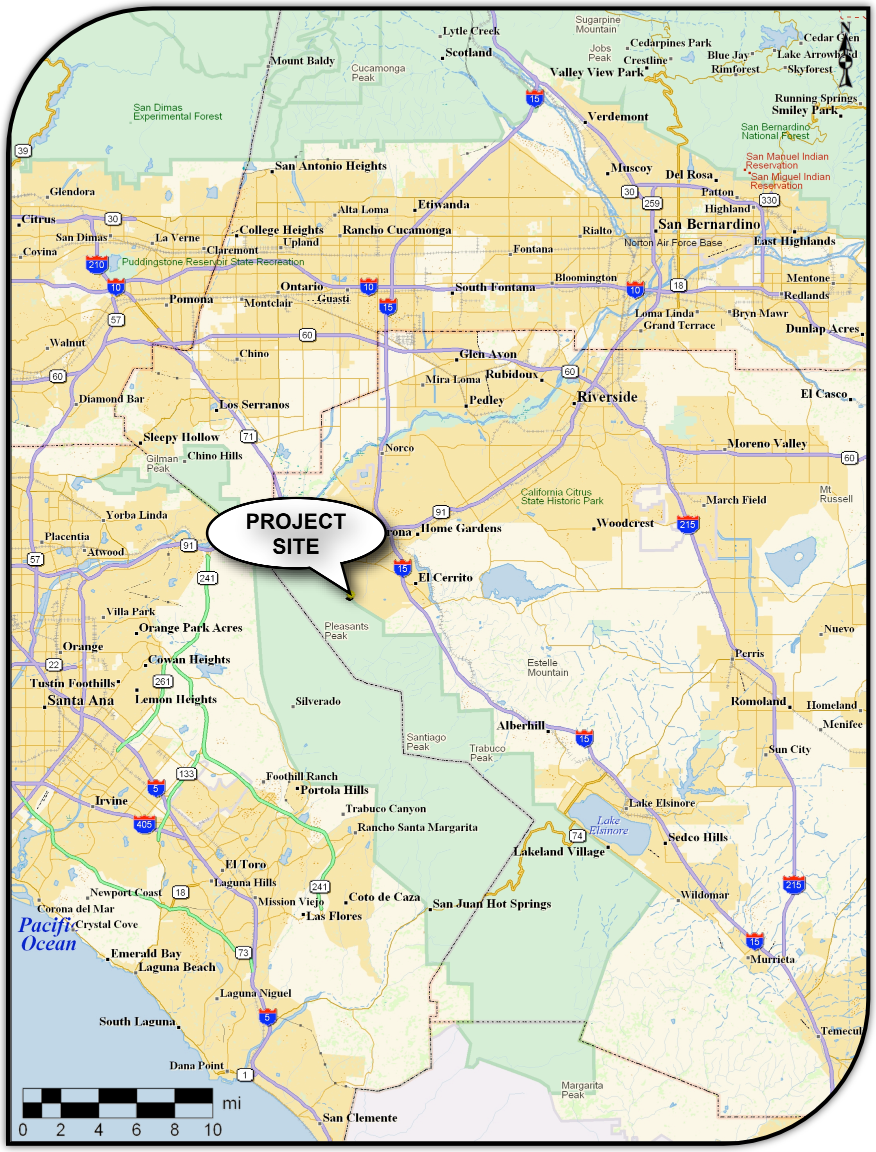

FIGURE 1: Project Vicinity Map (ISE 5/08)

Acoustical Definitions

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. Whether this surface is the vibrating string of a violin or a person's vocal cords, a vibrating column of air from an organ or clarinet, or a vibrating panel from a loudspeaker, drum, or aircraft, the sound waves generated are all similar. All of these vibrating elements alternatively compress the surrounding air on a forward movement and expand it on a backward movement.

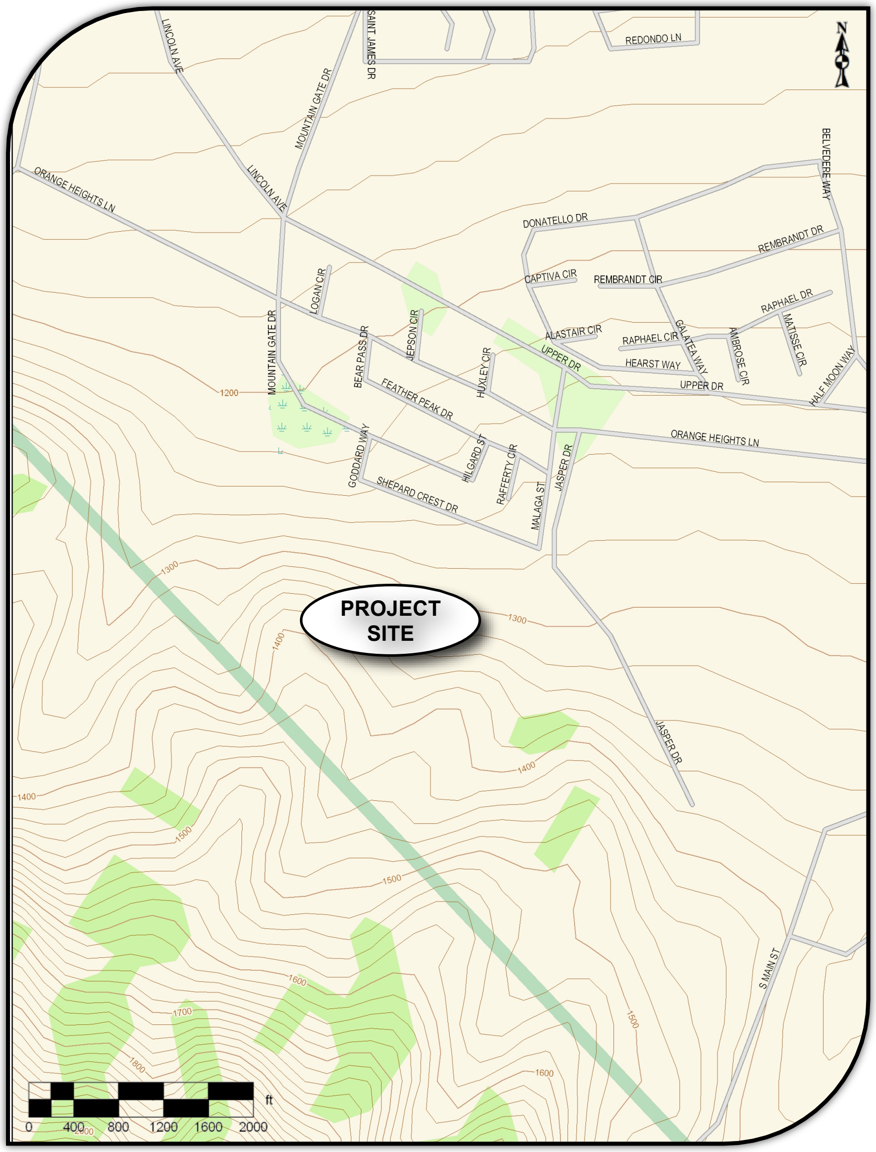

FIGURE 2: Project Site Location Map w/ Topography (ISE 5/08)

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. Sound waves, if unimpeded, will spread out in all directions from a source. Upon entering the auditory organs, these waves produce the sensation of sound. Waveforms that are approximately periodic or consist of a small number of periodic components can give rise to a pleasant sensation (assuming the intensity is not too high), for example, as in a musical composition.

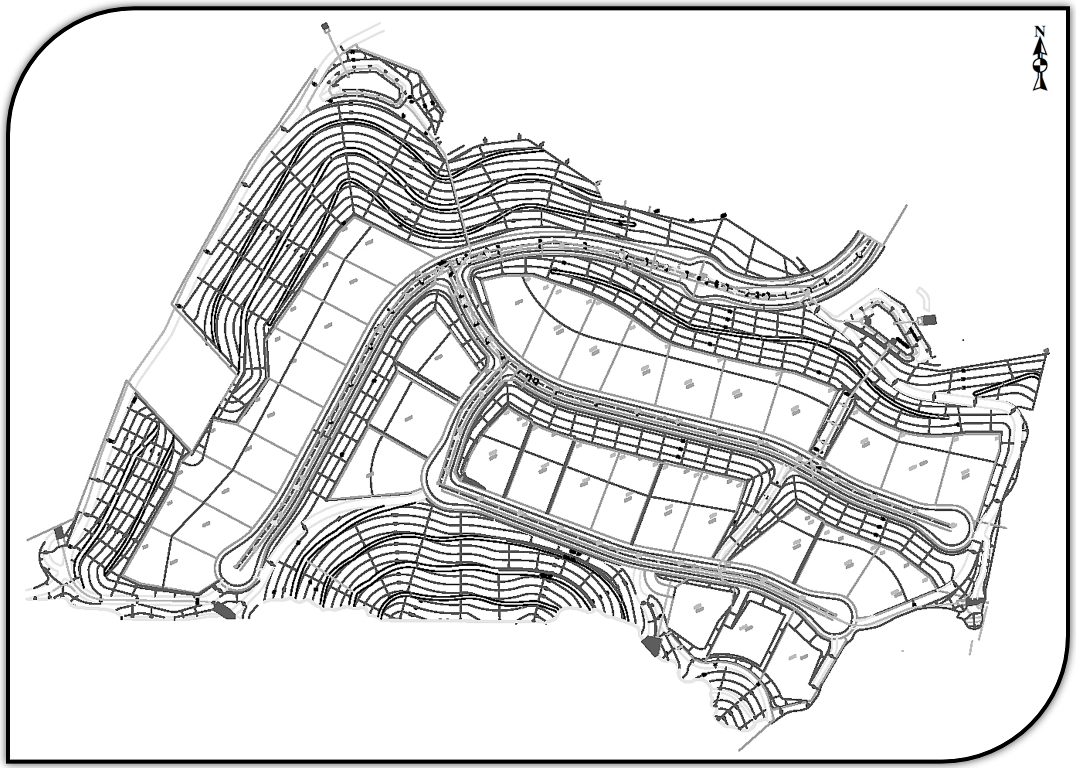

FIGURE 3: Proposed TPM 34760 (Armstrong & Brooks Consulting Engineers 6/07)

Noise, on the other hand, 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.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric levels. 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.[2]

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. Such conditions can only be generated in anechoic or “dead rooms”. Typically, the quietest environmental conditions (extreme rural areas with extensive shielding) yield sound levels of approximately 20 decibels. Normal speech has a sound level of approximately 60 dB. 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.[3] A change in sound level of 10 dB is usually perceived by the average person as a doubling (or halving) of the sounds loudness.[4] 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. It 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 monitoring interval is generally taken as one-hour and is abbreviated *Leq-h*.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10 percent, 50 percent, and 90 percent of a stated time.

[2] A unit used to express the intensity 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 (which is defined as 1 micro Pascal measured at a distance of 1 meter).

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

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

Sound levels associated with the L10 typically describe transient or short-term events, while levels associated with the L90 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 (Lmax and Lmin) indicators. The Lmin value obtained for a particular monitoring location is often called the *acoustic floor* for that location.

Finally, another sound measure employed by the State of California as well as the City of Corona and County of Riverside is known as the Community Noise Equivalence Level (CNEL) is defined as the "A" weighted average sound level for a 24-hour day. It is calculated by adding a 5-decibel penalty to sound levels in the evening (7:00 p.m. to 10:00 p.m.), and a 10-decibel penalty to sound levels in the night (10:00 p.m. to 7:00 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. A similar metric known as the day-night level (or Ldn) is calculated in a manner very similar to CNEL, except that there is no penalty applied to noises occurring between 7:00 p.m. and 10:00 p.m.[5]

APPLICABLE SIGNIFICANCE CRITERIA

County of Riverside/City of Corona Noise Element Regulations

Transportation noise levels in the County of Riverside are governed under the Noise Element of the County's General Plan. Exterior noise standards are typically applied to areas within a proposed development that would be classified as "usable exterior space", such as rear and some side yards. Based upon these guidelines, residential and other sensitive areas (such as parks and schools) are considered compatible with maximum exterior noise levels of up to 65 dBA CNEL.[6] The County of Riverside Department of Public Health also provides specific guidelines to noise modeling parameters. These guidelines include vehicle mix ratios, vehicular speeds, terrain conditions, barriers requirements and receiver heights.

Similarly, the City of Corona has established under Policy 11.5.1 an identical requirement that all new development not be exposed to noise levels in excess of 65 dBA Ldn.[7] This noise threshold is consistent with the County of Riverside's standards and can be used interchangeably.

State of California CCR Title 24

The California Code of Regulations (CCR), Title 24, Noise Insulation Standards, states that multi-family dwellings, hotels, and motels located where the CNEL exceeds 60 dBA, must obtain an acoustical analysis showing that the proposed design will limit interior noise to less than 45 dBA CNEL. Interior noise standards are typically applied to sensitive areas within the structure where low noise levels are desirable (such as living rooms, dining rooms, bedrooms, and dens or studies).

[5] The maximum variance between CNEL and Ldn is approximately 1.0 dBA.

[6] This was confirmed by a memo released by the Riverside County Department of Public Health dated 2/28/02.

[7] Source: City of Corona General Plan, Public Health and Safety, Policy 11.5.1 et. al.

Worst-case noise levels, either existing or future, must be used for this determination. Future noise levels must be predicted at least ten years from the time of building permit application. The County of Riverside and the City of Corona have adopted the CCR Title 24 standards and applies them equally to all residential dwellings.

Thus, for the purposes of analysis, the applicable exterior noise design threshold is 65 dBA CNEL. The applicable interior noise standard is 45 dBA CNEL.

ANALYSIS METHODOLOGY

Ambient Noise Monitoring Procedure

ISE performed a baseline field survey of the proposed project site for the purpose of assessing current ambient onsite noise conditions. Environmental noise data consistent with the metrics previously identified were taken. Two ambient site monitoring locations (denoted as ML's 1 and -2) were selected and are shown graphically in Figure 4 on the following page.

A single Quest Model 2900 ANSI Type 2 integrating sound level meter was utilized as the data collection device at two locations on site. The meter was mounted on a tripod roughly five feet above the ground in order to simulate the average height of the human ear above ground level. The measurements were performed on May 6th, 2008. All monitoring sites were spatially logged using a geographic positioning system (GPS) in order to maintain horizontal and vertical control. All equipment was calibrated before testing at ISE's acoustics and vibration laboratory to verify conformance with ANSI S1-4 1983 Type 2 and IEC 651 Type 2 standards.

Traffic Noise Impact Assessment Approach

The *Traffic Noise Model version 2.5* (TNM 2.5)[8] based on FHWA-PD-96-010 and FHWA/CA/TL-87/03 standards was used to calculate future onsite vehicular traffic noise levels. Currently TNM 2.5 is the only noise-modeling program accepted by Caltrans for use within the State of California.

Modeled receptor locations were situated along the northern property line closest to all identified major roadways in order to represent the worst-case traffic sound levels across the project site. Receptor elevations were considered five feet above the appropriate floor (noise sensitive areas/patios) elevation for first floor predictions as well as at 15 feet above appropriate floor elevation for second floor predictions. The receptor locations can be seen in Figure 5 on Page 9 of this report.

[8] These components 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.

FIGURE 4: Ambient Noise Monitoring Locations at Proposed Project Site (ISE 5/08)

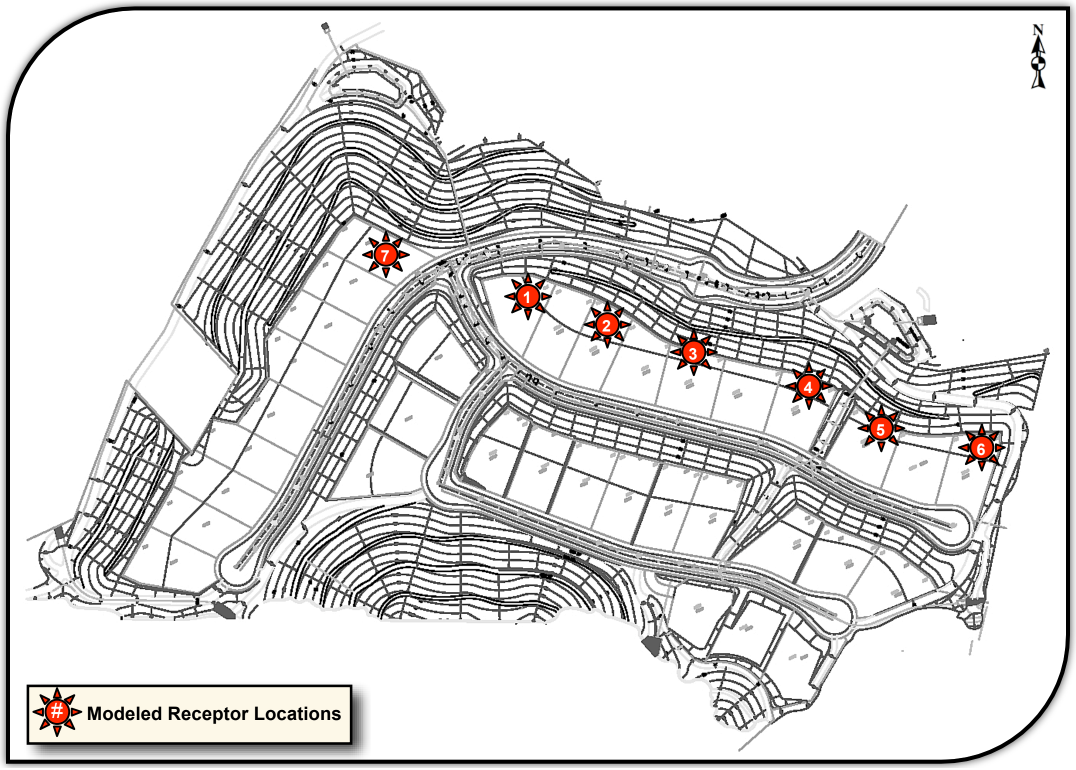

FIGURE 5: Modeled Receptor Locations for TPM 34760 (ISE 5/08)

Input to the acoustical model includes the following:

- A digitized representation of all affected roadways (i.e., *Shepard Crest Drive, Malaga Street*).
- Future Average Daily Trips (ADTs) for nearby major roadways.[9]
- A 94/4/2 (automobiles/medium/heavy) traffic mix in accordance with CALTRANS.
- A peak hour traffic percentage of 10% of the ADT.[10]
- Receptor and topographic elevations as identified in the project site plans.[11]

FINDINGS AND RECOMMENDATIONS

Ambient Sound Measurement Results

Testing conditions during the monitoring period were sunny with an average barometric pressure reading of 29.54 in-Hg, an average westerly wind speed of 1 to 2 miles per hour (MPH) and an approximate mean temperature of 75 degrees Fahrenheit. The results of one-hour sound level monitoring are shown in Table 1 on the following page. The

[9] Source: *Caltrans standards for residential collector roadways.*

[10] For values between approximately 8 and 12 percent, the energy-mean A-weighted sound level is equivalent to the CNEL. Outside this range, a maximum variance of up to two dBA occurs between Leq-h and CNEL.

[11] *Source: Armstrong & Brooks Consulting Engineers 6/07.*

values for the energy equivalent sound level (Leq), the maximum and minimum measured sound levels (Lmax and Lmin), and the statistical indicators L10, L50, and L90, are given for each monitoring location.

TABLE 1: Measured Ambient Sound Levels – TPM 34760 Project Site

		1-Hour Noise Level Descriptors in dBA					
Site	**Start Time**	**Leq**	**Lmax**	**Lmin**	**L10**	**L50**	**L90**
ML 1	9:30 a.m.	43.8	54.7	40.0	46.1	42.3	40.7
ML 2	10:30 a.m.	42.0	53.6	38.0	44.6	40.0	38.9

Monitoring Locations:

- ML 1: East portion of project site 350 feet south of Shepard Crest Drive. GPS: 33°49.920'N x 117°34.990'W, EPE 12 ft.
- ML 2: West portion of project site 300 feet south of Shepard Crest Drive. GPS: 33°49.947'N x 117°35.071'W, EPE 12 ft.

Measurements performed by ISE on May 6, 2008. EPE = Estimated Position Error.

Measurements collected onsite reflect the ambient sound levels within the project site. The hourly average sound levels (or Leq-h) recorded over the monitoring period were 43.8 and 42.0 dBA at ML's 1 and -2, respectively. The predominant noise source at the monitoring location was generated from distant surface traffic noise along adjacent roadway segments.

As indicated by the monitoring equipment, the acoustical background (L90) was 40.7 dBA at ML 1 and 38.9 dBA at ML 2 while the acoustic floor for the site, as seen by the Lmin indicator was found to be 40.0 and 38.0 dBA at ML 1 and ML 2, respectively. These indicators show that the adjacent traffic noise sources within the area are fairly constant in nature and very close to the acoustic floor for the site indicative of their distant community noise nature. These levels are consistent with the proposed development plan. No unusual noise sources were indicated.

Future Traffic Noise Impacts

The primary sources of future traffic noise near the project site would be from combined surface traffic on Shepard Crest Drive and Malaga Street. In accordance with a residential collector roadway, ISE assumed a conservative traffic volume of 2,500 average daily trips (ADT) at a speed of 25 MPH for both affected roadways.[12]

The results of the acoustical modeling for the selected lots are shown in Table 2 on the following page. The table output shows the unmitigated sound levels at each selected lot near the north property line, as well as the corresponding second floor sound levels. Noise sensitive areas within the unmitigated column of the table exceeding 65 dBA CNEL/Ldn would require noise mitigation.

[12] In accordance with SCAG *de minis* traffic thresholds for residential collector roadways.

TABLE 2: Predicted Transportation Noise Levels – TPM 34760

Modeled Receptor No.	Corresponding Lot Number	Unmitigated 1st Floor Sound Levels	Unmitigated 2nd Floor Sound Levels
1	Lot 1	40.3	42.3
2	Lot 3	41.0	43.1
3	Lot 5	41.2	43.9
4	Lot 7	45.4	46.2
5	Lot 8	39.7	44.0
6	Lot 10	39.9	42.4
7	Lot 26	39.2	40.9

All levels given in dBA CNEL/Ldn.

Based on the findings, no exterior mitigation would be necessary since noise emitted from vehicular traffic along adjacent collector roadways is not significant enough to produce sound levels exceeding the City/County 65 dBA standard. Additionally, none of the proposed residential areas would encroach on the 60 dBA CNEL contour line, thus the project would not exceed Title 24 interior noise abatement standards. No remedial mitigation would be required.

CERTIFICATION OF ACCURACY AND QUALIFICATIONS

This report was prepared by Investigative Science and Engineering, Inc. (ISE). The members of its professional staff contributing to the report are listed below:

Rick Tavares *(rtavares@ise.us)*	B.S. Aerospace Engineering / Engineering Mechanics M.S. Mechanical Engineering M.S. Structural Engineering Ph.D. Civil Engineering
Case van Genuchten *(cvangenuchten@ise.us)*	B.S. Environmental 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. 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.

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. Original reports contain non-photo blue ISE watermark at the bottom of each page.

Approved as to Form and Content:

Rick Tavares, Ph.D.
Project Principal
Investigative Science and Engineering, Inc.

Attachments to this report: TNM 2.5 Input/Output Data

ISE 22 May 2008
Case van Genuchten TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 08-025 TPM 34760
RUN: 1st Floort 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	%		
Shepard Crest Drive Eastbound	12.0	point1	1	1,580.0	2,337.0	1,195.00				Average	
		point2	2	1,437.0	2,026.0	1,210.00				Average	
		point3	3	1,817.0	1,831.0	1,227.00				Average	
		point4	4	2,245.0	1,705.0	1,238.00				Average	
		point5	5	2,567.0	1,485.0	1,260.00					
Shepard Crest Drive Westbound	12.0	point6	6	1,590.4	2,334.9	1,195.00				Average	
		point7	7	1,448.3	2,032.3	1,210.00				Average	
		point8	8	1,817.0	1,843.0	1,227.00				Average	
		point9	9	2,245.0	1,717.0	1,238.00				Average	
		point10	10	2,567.0	1,497.0	1,260.00					
Malaga Street Southbound	12.0	point11	11	2,794.0	1,982.0	1,250.00				Average	
		point12	12	2,586.0	1,472.0	1,261.00				Average	
		point13	13	2,479.0	1,276.0	1,280.00					
Malaga Street Northbound	12.0	point14	14	2,809.0	1,982.0	1,250.00				Average	
		point15	15	2,601.0	1,472.0	1,261.00				Average	
		point16	16	2,494.0	1,276.0	1,280.00					

ISE			**22 May 2008**	
Case van Genuchten			**TNM 2.5**	
INPUT: TERRAIN LINES				
PROJECT/CONTRACT:	**08-025 TPM 34760**			
RUN:	**1st Floort Unmitigated**			

Terrain Line	**Points**			
Name	**No.**	**Coordinates (ground)**		
		X	**Y**	**Z**
		ft	ft	ft
Middle Terrain	1	1,570.0	1,213.0	1,368.00
	2	1,689.0	1,225.0	1,368.00
	3	1,746.0	1,206.0	1,368.00
	4	1,840.0	1,171.0	1,369.00
	5	1,928.0	1,122.0	1,370.00
	6	2,017.0	1,063.0	1,369.00
	7	2,147.0	1,028.0	1,369.00
	8	2,282.0	999.0	1,368.00
	9	2,411.0	951.0	1,368.00
West Terrain	10	1,204.0	1,284.0	1,360.00
	11	1,269.0	1,364.0	1,360.00
	12	1,463.0	1,266.0	1,360.00
	13	1,369.0	1,199.0	1,360.00
Terrain Line3	14	2,455.0	915.0	1,368.00
	15	2,564.0	855.0	1,368.00
	16	2,689.0	846.0	1,369.00
	17	2,798.0	850.0	1,370.00

ISE						**22 May 2008**						
Case van Genuchten						**TNM 2.5**						
INPUT: RECEIVERS												
PROJECT/CONTRACT:	**08-025 TPM 34760**											
RUN:	**1st Floort Unmitigated**											
Receiver												
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**					**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**		**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**		**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB		
Lot 1	1	1	1,679.0	1,212.0	1,368.00	4.92	0.00	66	10.0	8.0		Y
Lot 3	2	1	1,875.0	1,131.0	1,370.00	4.92	0.00	66	10.0	8.0		Y
Lot 5	3	1	2,078.0	1,022.0	1,369.00	4.92	0.00	66	10.0	8.0		Y
Lot 7	4	1	2,344.0	958.0	1,368.00	4.92	0.00	66	10.0	8.0		Y
Lot 8	5	1	2,493.0	859.0	1,368.00	4.92	0.00	66	10.0	8.0		Y
Lot 10	6	1	2,734.0	814.0	1,370.00	4.92	0.00	66	10.0	8.0		Y
Lot 26	8	1	1,342.0	1,302.0	1,360.00	4.92	0.00	66	10.0	8.0		Y

ISE | 22 May 2008
Case van Genuchten | TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 08-025 TPM 34760
RUN: 1st Floort 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
Shepard Crest Drive Eastbound	point1	1	235	25	10	25	5	25	0	0	0	0
	point2	2	235	25	10	25	5	25	0	0	0	0
	point3	3	235	25	10	25	5	25	0	0	0	0
	point4	4	235	25	10	25	5	25	0	0	0	0
	point5	5										
Shepard Crest Drive Westbound	point6	6	235	25	10	25	5	25	0	0	0	0
	point7	7	235	25	10	25	5	25	0	0	0	0
	point8	8	235	25	10	25	5	25	0	0	0	0
	point9	9	235	25	10	25	5	25	0	0	0	0
	point10	10										
Malaga Street Southbound	point11	11	235	25	10	25	5	25	0	0	0	0
	point12	12	235	25	10	25	5	25	0	0	0	0
	point13	13										
Malaga Street Northbound	point14	14	235	25	10	25	5	25	0	0	0	0
	point15	15	235	25	10	25	5	25	0	0	0	0
	point16	16										

ISE						22 May 2008
Case van Genuchten						TNM 2.5
						Calculated with TNM 2.5
RESULTS: SOUND LEVELS						
PROJECT/CONTRACT:	08-025 TPM 34760					
RUN:	1st Floort 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
Lot 1	1	1	0.0	40.3	66	40.3	10	----	40.3	0.0	8	-8.0
Lot 3	2	1	0.0	41.0	66	41.0	10	----	41.0	0.0	8	-8.0
Lot 5	3	1	0.0	41.2	66	41.2	10	----	41.2	0.0	8	-8.0
Lot 7	4	1	0.0	45.4	66	45.4	10	----	45.4	0.0	8	-8.0
Lot 8	5	1	0.0	39.7	66	39.7	10	----	39.7	0.0	8	-8.0
Lot 10	6	1	0.0	39.9	66	39.9	10	----	39.9	0.0	8	-8.0
Lot 26	8	1	0.0	39.2	66	39.2	10	----	39.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	7	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

ISE | **22 May 2008**
Case van Genuchten | **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **08-025 TPM 34760**
RUN: **2nd 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		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Shepard Crest Drive Eastbound	12.0	point1	1	1,580.0	2,337.0	1,195.00				Average	
		point2	2	1,437.0	2,026.0	1,210.00				Average	
		point3	3	1,817.0	1,831.0	1,227.00				Average	
		point4	4	2,245.0	1,705.0	1,238.00				Average	
		point5	5	2,567.0	1,485.0	1,260.00					
Shepard Crest Drive Westbound	12.0	point6	6	1,590.4	2,334.9	1,195.00				Average	
		point7	7	1,448.3	2,032.3	1,210.00				Average	
		point8	8	1,817.0	1,843.0	1,227.00				Average	
		point9	9	2,245.0	1,717.0	1,238.00				Average	
		point10	10	2,567.0	1,497.0	1,260.00					
Malaga Street Southbound	12.0	point11	11	2,794.0	1,982.0	1,250.00				Average	
		point12	12	2,586.0	1,472.0	1,261.00				Average	
		point13	13	2,479.0	1,276.0	1,280.00					
Malaga Street Northbound	12.0	point14	14	2,809.0	1,982.0	1,250.00				Average	
		point15	15	2,601.0	1,472.0	1,261.00				Average	
		point16	16	2,494.0	1,276.0	1,280.00					

ISE			**22 May 2008**	
Case van Genuchten			**TNM 2.5**	
INPUT: TERRAIN LINES				
PROJECT/CONTRACT:	**08-025 TPM 34760**			
RUN:	**2nd Floor Unmitigated**			

Terrain Line	**Points**			
Name	**No.**	**Coordinates (ground)**		
		X	**Y**	**Z**
		ft	ft	ft
Middle Terrain	1	1,570.0	1,213.0	1,368.00
	2	1,689.0	1,225.0	1,368.00
	3	1,746.0	1,206.0	1,368.00
	4	1,840.0	1,171.0	1,369.00
	5	1,928.0	1,122.0	1,370.00
	6	2,017.0	1,063.0	1,369.00
	7	2,147.0	1,028.0	1,369.00
	8	2,282.0	999.0	1,368.00
	9	2,411.0	951.0	1,368.00
West Terrain	10	1,204.0	1,284.0	1,360.00
	11	1,269.0	1,364.0	1,360.00
	12	1,463.0	1,266.0	1,360.00
	13	1,369.0	1,199.0	1,360.00
Terrain Line3	14	2,455.0	915.0	1,368.00
	15	2,564.0	855.0	1,368.00
	16	2,689.0	846.0	1,369.00
	17	2,798.0	850.0	1,370.00

ISE		22 May 2008
Case van Genuchten		TNM 2.5
INPUT: RECEIVERS		
PROJECT/CONTRACT:	08-025 TPM 34760	
RUN:	2nd 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	
Lot 1	1	1	1,679.0	1,212.0	1,368.00	15.00	0.00	66	10.0	8.0	Y
Lot 3	2	1	1,875.0	1,131.0	1,370.00	15.00	0.00	66	10.0	8.0	Y
Lot 5	3	1	2,078.0	1,022.0	1,369.00	15.00	0.00	66	10.0	8.0	Y
Lot 7	4	1	2,344.0	958.0	1,368.00	15.00	0.00	66	10.0	8.0	Y
Lot 8	5	1	2,493.0	859.0	1,368.00	15.00	0.00	66	10.0	8.0	Y
Lot 10	6	1	2,734.0	814.0	1,370.00	15.00	0.00	66	10.0	8.0	Y
Lot 26	8	1	1,342.0	1,302.0	1,360.00	15.00	0.00	66	10.0	8.0	Y

ISE — **22 May 2008**

Case van Genuchten — **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes

PROJECT/CONTRACT: **08-025 TPM 34760**

RUN: **2nd Floor Unmitigated**

Roadway	Points		Segment									
Name	Name	No.	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
Shepard Crest Drive Eastbound	point1	1	235	25	10	25	5	25	0	0	0	0
	point2	2	235	25	10	25	5	25	0	0	0	0
	point3	3	235	25	10	25	5	25	0	0	0	0
	point4	4	235	25	10	25	5	25	0	0	0	0
	point5	5										
Shepard Crest Drive Westbound	point6	6	235	25	10	25	5	25	0	0	0	0
	point7	7	235	25	10	25	5	25	0	0	0	0
	point8	8	235	25	10	25	5	25	0	0	0	0
	point9	9	235	25	10	25	5	25	0	0	0	0
	point10	10										
Malaga Street Southbound	point11	11	235	25	10	25	5	25	0	0	0	0
	point12	12	235	25	10	25	5	25	0	0	0	0
	point13	13										
Malaga Street Northbound	point14	14	235	25	10	25	5	25	0	0	0	0
	point15	15	235	25	10	25	5	25	0	0	0	0
	point16	16										

ISE
Case van Genuchten

22 May 2008
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 08-025 TPM 34760
RUN: 2nd Floor Unmitigated
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

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

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
Lot 1	1	1	0.0	42.3	66	42.3	10	----	42.3	0.0	8	-8.0
Lot 3	2	1	0.0	43.1	66	43.1	10	----	43.1	0.0	8	-8.0
Lot 5	3	1	0.0	43.9	66	43.9	10	----	43.9	0.0	8	-8.0
Lot 7	4	1	0.0	46.2	66	46.2	10	----	46.2	0.0	8	-8.0
Lot 8	5	1	0.0	44.0	66	44.0	10	----	44.0	0.0	8	-8.0
Lot 10	6	1	0.0	42.4	66	42.4	10	----	42.4	0.0	8	-8.0
Lot 26	8	1	0.0	40.9	66	40.9	10	----	40.9	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	7	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