APPENDIX 2.6-1

Noise Assessment

DUDEK

MEMORANDUM

To:	Asha Bleier
From:	Jonathan Leech, INCE Bd. Cert.
Subject:	Noise Assessment for Villages at Escondido Country Club
Date:	June 21, 2017
Attachment(s):	Figures 1–5 Attachments 1–3

1 INTRODUCTION

1.1 Purpose

This assessment was conducted to address potential noise impacts from the proposed Villages at Escondido Country Club Project, a residential subdivision to be located within the former country club property. The assessment includes examination of noise generation from project construction and project related traffic, and also evaluates future potential noise exposure levels at the locations for proposed future residences.

1.2 Project Description

The project site is located generally west of North Nutmeg Street, along the north and south sides of West Country Club Lane, within the City of Escondido. The project site is composed of the former country club/golf course property, which is bordered on all sides by existing single-family residential development. Refer to Figure 1 for the site location.

The proposed project consists of a residential planned development consisting of 313 single family residential lots, and 13 lots for attached residential units. A community center parcel is also included. Refer to Figure 2 for the site plan for the proposed project. Per the City of Escondido Land Use Element, the project site carries a designation of Residential: Urban 1 (up to 5.5 dwelling units per acre).

1.3 Noise Background and Terminology

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of

cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting called "A" weighting is typically used for quieter noise levels which de-emphasizes the low frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the "noise level" and is referenced in units of dBA (refer to Attachment 1, Definitions, for definitions of acoustical terms).

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dBA are not typically noticed by the human ear (Caltrans 2013). Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA increase is readily noticeable. The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual's noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. The equivalent noise level L_{eq}, also referred to as the average sound level, is a single-number representing the fluctuating sound level in decibels (dB) over a specified period of time. It is a sound-energy average of the fluctuating level and is equal to a constant unchanging sound of that dB level. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment.

Noise levels are generally higher during the daytime and early evening when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed "community noise equivalent level" (CNEL) was developed, The CNEL scale represents a time-weighted 24-hour average noise level based on the A-weighted sound level. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding five dB to the average sound levels occurring during the evening hours and 10 dB to the sound levels occurring during nighttime hours.

1.4 Noise Criteria

1.4.1 City of Escondido

General Plan Noise Element. The City of Escondido General Plan Community Protection Element (Section G, Noise) indicates that the maximum normally acceptable noise level for new single-family and duplex residential developments is a CNEL of 60 dB[1] (City of Escondido May 2012). The range considered by the City to be conditionally acceptable for single-family and duplex residential developments is 60 to 70 dB CNEL.[2] The City typically applies the noise criterion of 60 dB CNEL within the backyards of residential parcels. The City of Escondido also requires that the interior noise level not exceed 45 dB CNEL for new residences.

Municipal Code. The City of Escondido Noise Ordinance (Municipal Code Article 12, Noise Abatement and Control) contains regulations restricting land use related noise-generating activities and operations, so as to avoid noise nuisance in the community. Section 17-229 establishes the maximum allowable exterior noise limits, based upon the classification of the receiving land use. These standards typically apply to stationary sources such as noise from mechanical equipment (including mechanical ventilation and air condition noise, pool pump noise) or event noise, as opposed to traffic noise. For instance, a school, commercial enterprise, or industrial operation must not generate noise that exceeds a certain specified noise level at any property boundary where an adjacent residential use exists. The property-line noise standards are presented in Table 1.

Table 1
City of Escondido Exterior Property-Line Noise Limits

Receiving Land Use Category	Noise Level (dBA)	
	10 p.m. to 7 a.m. (Weekdays)	*7 a.m. to 10 p.m. (Weekdays)*
	10 p.m. to 8 a.m. (Weekends)	*8 a.m. to 10 p.m. (Weekends)*
All residential (except multiple dwelling)	45	50
Multiple-dwelling residential	50	55
Commercial	55	60
Light industrial/industrial park zones	70	70
General industrial	75	75

[1] The city classifies a "normally acceptable" noise exposure as follows: "Specified land use is satisfactory, based upon the assumption that buildings involved are of normal conventional construction, without any special requirements."

[2] The city classifies a "conditionally acceptable" noise exposure as follows: "New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements 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 usually suffice."

Section 17-234 regulates construction noise in the City. The pertinent portions of Section 17-234 are summarized below:

- **Section 17-234 (a)** It shall be unlawful for any person, including the City of Escondido, to operate construction equipment at any construction site, except on Monday through Friday during a week between the hours of seven (7) a.m. and six (6) p.m. and on Saturdays between the hours of nine (9) a.m. and five (5) p.m., and provided that the operation of such construction equipment complies with the requirements of subsection (d) of this section.
- **Section 17-234 (b)** It shall be unlawful for any person, including the City of Escondido, to operate construction equipment at any construction site on Sundays and on days designated by the president, governor or city council as public holidays.
- **Section 17-234 (d)** No construction equipment or combination of equipment, regardless of age or date of acquisition, shall be operated so as to cause noise in excess of a one-hour average sound level limit of seventy-five (75) dB at any time, unless a variance has been obtained in advance from the city manager.
- **Section 17-234 (e)** Persons engaged in construction for profit or as a business shall post signs at conspicuous places on a construction site, indicating hours of work as prescribed by this article or authorized by permit and the applicable noise level limits. (Ord. No. 90-8, § 2, 3-28-90)

1.4.2 Blasting

Neither the Escondido General Plan nor Municipal Code identify specific construction noise level limits for blasting activities. Therefore, the Office of Surface Mining Reclamation and Enforcement (OSMRE) and the Code of Federal Regulations (CFR) *Air Blast Limits* (30 CFR 816.67(b)) are used in this noise evaluation. Section 816.2 of Title 30 of the CFR indicates that the blasting regulations are intended to ensure that all surface mining activities are conducted in a manner which preserves and enhances environmental and other values in accordance with the Act. While the OSMRE regulates mining activities, the blasting activities at the Project site represent surface mining activities which, to satisfy California Environmental Quality Act (CEQA) guidelines, must demonstrate that they do not adversely affect the existing environment.

Therefore, the OSMRE blasting regulations are applied to the blasting activities anticipated at the Project site. For mining operations, which require larger blasts than that of the Project, the lowest noise level threshold identified in the CFR is a maximum noise level of 129 dBA L_{max} for blasting activity measured at the location of any dwelling, public building, school, church, or community or institutional building. The L_{max} threshold used in the noise analysis is more

suitable for single-event noise levels, such as blasting activities, compared to the average noise level (L_{eq}) standards found in most community noise regulations. These average noise level metrics in essence spread the peak noise across a longer averaging period, thus allowing single event noise levels well above the permissible average. The L_{max}, therefore, allows for the shorter-duration single-event noise levels to be evaluated against an appropriate threshold.

The Caltrans *Transportation and Construction Vibration Guidance Manual* vibration velocity levels for avoidance of damage to wood frame buildings is also used in this report to evaluate the potential vibration impacts due to blasting at the Project site. For residential structures, the threshold of damage for vibration is approximately 3.0 in/sec (PPV) for potential cosmetic cracking and damage.

1.5 Significance Thresholds

Based on the criteria identified in Appendix G of the CEQA Guidelines, the proposed project would have a significant impact on noise if it would result in:

1. The exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
2. The exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

With respect to Significance Criteria #1, and based upon the above information, a significant impact could occur if the ambient noise level encompassing the proposed new buildings is greater than 70 dB CNEL (above the limit for "conditionally acceptable").

With respect to Significance Criteria #2, the project would not have the potential to generate long-term ground-borne vibration or noise. Typical residential structures do not include equipment or activities which produce perceptible vibration levels outside the structure. Ground vibrations from construction activities do not often reach the levels that can damage structures or affect activities that are not vibration-sensitive, although the vibrations may be felt by nearby persons in close proximity and result in annoyance (FTA 2006). As a guide, major construction activity within 200 feet and pile driving within 600 feet may be potentially disruptive to sensitive

operations (Caltrans 2002). The project construction activity would include blasting, and therefore the potential for temporary vibration effects from blasting are evaluated and compared to the Caltrans threshold of 3.0 in/sec (PPV).. Long-term, operational, groundborne vibration impacts would be less than significant, and this issue is not discussed further.

With respect to Significance Criteria #3, a "substantial" increase in ambient noise level is typically defined as a greater than 3 dB increase in the CNEL for the vicinity surrounding the proposed project (Caltrans 2013). Therefore, a significant impact would occur if the project increased off-site ambient noise levels by more than 3 CNEL dBA; since it is a residential development, off-site noise impacts would be those associated with traffic related noise level increases attributable to the project's contribution of trips on vicinity roadways.

With respect to Significance Criteria #4, construction is the most common source of temporary increases in the ambient noise levels caused by a proposed project. As detailed in Section 1.1, the City restricts the times of day when construction may occur (i.e., 7 a.m. to 6 p.m. Mondays through Fridays, 9 a.m. to 5 p.m. on Saturdays and not at all on Sundays or on public holidays) and has a maximum one-hour average construction noise limit of 75 dB at noise-sensitive land uses, unless a variance has been obtained in advance from the city manager. Therefore, a significant impact would occur if construction noise levels exceed the 75 dBA $L_{EQ\ HOUR}$ limit.

2 EXISTING CONDITIONS

Traffic on West Country Club Lane, North Nutmeg Street, and West El Norte Parkway are the primary sources of noise in the vicinity of the project. The existing average daily traffic (ADT) volume along West Country Club Lane adjacent to the project site is approximately 5,330 ADT; North Nutmeg Street carries approximately 3,120 ADT; and West El Norte Parkway carries approximately 17,880 ADT (Linscott Law & Greenspan, 2016).

2.1 Ambient Noise Monitoring

Noise measurements were conducted on-site and along vicinity roadways to characterize the existing noise levels. The measurements were made with a calibrated Rion NL-52 digital integrating sound level meter. This sound level meter meets the current American National Standards Institute standard for a Type 1 precision sound level meter. For all measurements, the sound level meter was positioned on a tripod at a height of approximately five feet above the ground and fitted with a windscreen.

Four short-term noise measurements were conducted on March 2, 2017, at the locations shown in Figure 3. Noise measurements were conducted at three locations adjacent to existing roadways

on-site; ST1was approximately 20 feet west of the edge of pavement from North Nutmeg Street, south of West Country Club Lane, near future residences; ST2 was approximately 25 north of the edge of pavement from West Country Club Lane, midway between Nutmeg and La Brea, near future residences; and ST3 was approximately 300 feet from the north edge of pavement for West Country Club Lane, near the north end of the community center parcel. Additionally a noise measurement (ST4) was conducted near the rear yard boundary for the row of residences along the west side of David Drive, to establish baseline noise conditions for reference in the construction noise analysis. With the exception of at ST4 (because of the lack of a clear view of the roadways), traffic volumes were counted concurrently with the noise measurements in order to validate the accuracy of the subsequent traffic noise modeling. The measured average noise levels (in L_{EQ}) and the concurrent traffic volumes are presented in Table 2.

Table 2
Measured Average Sound Levels at Roadways

Site	Description	Date/Time	L_{eq} (dBA)[1]	Cars	MT[2]	HT[3]
ST1	West side Nutmeg Street	3/2/2017 10:50 a.m.to 11:00 a.m.	61.4	48	0	1
ST2	North side of Country Club Lane	3/2/2017 11.05 a.m. to 11:15 a.m.	53.4	28	0	0
ST3	North End of Community Center Parcel	3/2/2017 10.35 a.m. to 10:45 a.m.	49.4	12	0	0
ST4	Residences on the west side of David Drive	3/2/2017 10.30 a.m.to 11:30 a.m.	56.6	n/a	n/a	n/a

Notes:
1 Equivalent Continuous Sound Level (Time-Average Sound Level) using A-weighted decibels (dBA)
2 Medium Trucks
3 Heavy Trucks
n/a – Counts not conducted at this location because the view of traffic was obstructed by buildings.

2.2 Noise Modeling

Traffic noise is generally assessed using software provided by the Federal Highway Administration (FHWA), the current version of which is titled Transportation Noise Model 2.5 (TNM 2.5). The worksheets in Attachment 2, FHWA Traffic Model Noise Calculation Worksheets, are based on the FHWA TNM 2.5 model, but provide an easier to understand format than the full model input and output data sheets. Existing traffic counts were provided by the project traffic engineers (Linscott, Law & Greenspan 2017) for North Nutmeg Street and West Country Club; these traffic counts were used in the FHWA model to determine the ambient noise levels along these roadways associated with current traffic levels.

Table 3 presents the results of the noise modelling of existing traffic noise levels, at the noise measurement locations.

Table 3
Existing Ambient Noise Levels Noise Monitor Locations (dBA)

Measurement Location	Noise Source	L_{EQ} Daytime	CNEL
ST-1	North Nutmeg Street	64	65
ST-2	West Country Club Lane	60	60
ST-3	West Country Club Lane	49	49

3 FUTURE CONDITIONS

The future proposed residence sites and community center would primarily be affected by traffic noise along North Nutmeg Street and West Country Club Lane. Internal roadways are not anticipated to carry roadway traffic volumes that would generate noise levels greater than 60 dBA CNEL at the edge of their right-of-ways. The future (year 2035) cumulative with project traffic volumes along North Nutmeg Street adjacent to the project are forecast to be 9,790 average daily trips (ADT); along the segments of West Country Club Lane within or adjacent to the project boundaries, 2035 cumulative with project traffic volumes are forecast to range from approximately 10,330 (west end) to 12,130 (east end) ADT (Linscott, Law & Greenspan, 2017).

3.1 Exterior Traffic Noise Impact

In order to determine the maximum noise levels to which future residences would be exposed, Dudek modeled the future traffic noise levels based upon the Linscott, Law & Greenspan projections for the "2035 Cumulative With Project" scenario. The FHWA model was again employed for this analysis; refer to Attachment 2 for the worksheets.

For the future traffic noise exposure modelling, a receptor was placed at the approximate backyard boundary closest to each given roadway segment. For the segment of West Country Club Lane from Golden Circle to Firestone (west segment) the closest backyard boundary appears to be approximately 70 feet from the north roadway edge (105 feet from the center-line). For the segment of West Country Club Lane from Firestone to La Brea (center segment) the closest backyard boundary appears to be approximately 95 feet from the north roadway edge (130 feet from the center-line). For the segment of West Country Club Lane from La Brea to Nutmeg (east segment) the closest backyard boundary appears to be approximately 30 feet from the north roadway edge (65 feet from the center-line). For the segment of North Nutmeg

Street adjacent to the project, the closest backyard boundary appears to be approximately 30 feet from the west roadway edge (50 feet from the center-line). These distances were used in modelling the maximum future exterior noise exposure levels for backyards closest to these roadways. Table 4 summarizes the future noise levels as determined from the modelling.

Table 4
Future Ambient Noise Levels at Residential Backyards

Receptor Location	Noise Source	Distance from Roadway	CNEL
Backyard, Country Club Lane West	West Country Club Lane	70 feet	61
Backyard, Country Club Lane Center	West Country Club Lane	95 feet	60
Backyard, Country Club Lane East	West Country Club Lane	30 feet	65
Backyard, North Nutmeg Street	North Nutmeg Street	30 feet	65

Traffic noise results displayed in Table 4 indicate that future traffic noise exposure levels at the closest backyard property lines would all be well under the maximum "conditionally acceptable" exterior noise level for single family residences and duplexes of 70 CNEL dBA. However, at the closest backyard boundaries in the west segment of West Country Club Lane, the predicted future traffic noise level would marginally exceed the "normally acceptable" limit of 60 dBA CNEL (by 1 dBA), while the closest backyards along the east segment of West Country Club Lane and along Nutmeg Street would exceed this limit by up to 5 dBA CNEL. In order to achieve compliance with the 60 dBA CNEL criterion for single family residential backyards, mitigation would be required. Refer to ***Section 4, Mitigation.***

3.2 Interior Noise Impact

The City and the State require that interior noise levels not exceed a CNEL of 45 dB within residences. Typically, with the windows open, building shells provide approximately 15 dB of noise reduction; while with windows closed residential construction generally provides a minimum of 25 dB attenuation. Therefore, rooms exposed to an exterior CNEL not greater than 60 dB would result in an interior CNEL of 45 dB or less, even with windows open. The future exterior noise levels in Table 4 are calculated at the backyard boundary, and therefore noise levels at the façade of future structures are anticipated to be lower. Consequently, interior noise levels within future residences on the project site would be expected to achieve compliance with the interior noise criterion of 45 dBA CNEL by employing standard residential construction techniques and materials. No mitigation is required.

3.3 Off-Site Traffic Noise Impact

The FHWA noise model and the project's traffic report were used to assess the potential off-site project-related noise impact along roadway segments included in the traffic report. Dudek analyzed the difference in traffic noise levels comparing existing traffic to "existing plus project" traffic, as well as for the Year 2035 traffic levels, without and with project contributions. The results of the analysis are presented in Table 5. As shown in Table 5, the proposed project would not result in either a measurable or noticeable increase in traffic noise levels, nor would it cause or exacerbate an exceedance in City traffic noise standards. Therefore, the project's effects on off-site traffic noise would be less than significant. No mitigation is required.

Table 5
Summary of Off-Site Future Unmitigated Traffic Noise Levels

Street	Segment	dBA CNEL					
		Existing	*Existing with Project*	*Change*	*2035*	*2035 with Project*	*Change*
Country Club Lane	El Norte to Country Club	59.1	60.1	1.0	61.7	62.3	0.6
	Country Club to Gary	57.6	58.2	0.6	61.0	61.2	0.2
	Gary to La Brea	58.3	59.5	1.2	61.0	61.6	0.6
	La Brea to Nutmeg	58.4	59.4	1.0	61.4	61.9	0.5
	Nutmeg to Centre City Pkwy	60.9	61.4	0.5	61.9	62.2	0.3
El Norte Parkway	Woodland Pk to Country Club Lane	64.2	64.3	0.1	64.2	64.3	0.1
	Country Club to Bennett	63.2	63.4	0.2	63.7	63.8	0.1
	Bennett to Rees	63.7	63.8	0.1	65.3	65.3	0.0
	Rees to Nutmeg	63.7	63.8	0.1	65.6	65.6	0.0
	Nutmeg to I-15 Ramps	66.2	66.3	0.1	67.3	67.4	0.1
	I-15 to Morning View	65.2	65.3	0.1	66.1	66.1	0.0
	Morning View to Centre City Pkwy	65.2	65.3	0.1	66.7	66.7	0.0
	Centre City Pkwy to Broadway	65.2	65.3	0.1	66.1	66.1	0.0
Nutmeg Street	North of Country Club Lane	56.1	56.1	0.0	60.8	60.8	0.0
	Country Club Lane to Via Alexander	59.9	60.2	0.3	60.8	61.0	0.2
	Via Alexander to El Norte Pkwy	59.9	60.2	0.3	61.2	61.3	0.1

3.4 Project Generated Noise – Village Center Component

Once operational, the Project would primarily include residential dwellings and distributed open space areas, with associated landscape maintenance that could generate limited daytime noise consistent with residential neighborhood ambient levels. However, the former ECC Clubhouse would be replaced by a new resort-style Village Center and an on-site professionally managed community farm. The Village Center would have special events on

occasion with guests reaching up to 300 people. Additionally, the Project would feature an on-site contemporary restaurant and bar featuring local farm-to-table produce. The Village Center is proposed to have two operating restrictions designed to limit nuisance noise:

A. No outdoor amplified entertainment or announcements shall be allowed after 9:00 pm on weeknights or after 10:00 pm on weekend or holiday nights.

B. Maximum occupancy for special events at the meeting facilities, event courtyard, and banquet shall be 300 people.

The Village Center would be separated from residences on the west by a 30-foot vegetated buffer; from residences on the east by a 20-foot road and 30-foot vegetated buffer; and from proposed new residencies on the north by a 20-foot road and 30-foot vegetated buffer. Thus, sensitive residential uses could be as close as 30 to 50 feet from noise-generating activities within the Village Center.

Potential operational noise sources associated with the Village Center include heating, ventilation, and air-conditioning (HVAC) equipment, and exterior sound amplification (e.g., public address systems.

Mechanical HVAC equipment located on the ground or on rooftops of new buildings have the potential to generate noise levels which average 64 dBA CNEL at a distance of 50 feet. For a single point source such as a piece of mechanical equipment, the sound level normally decreases by about 6 dBA for each doubling of distance from the source under "hard-surface" conditions typical of a developed commercial site. Therefore, it is assumed that HVAC equipment would generate noise levels that exceed 50 dBA within approximately 250 feet of the equipment (50 dBA is the daytime limit [7 AM to 10 PM] for residential land uses). The distance from the middle of the Village Center site to the adjacent residences to the west, north, and east is approximately 250 feet. The exact location of buildings and HVAC equipment within the Village center is unknown, but it is possible HVAC equipment could be located closer than 250 feet from existing or proposed residences, which could result in a significant impact. Shielding of individual HVAC equipment with noise barriers (screen walls) would be feasible to address this impact. Refer to Section 4, Mitigation.

Noise levels from amplified sound systems vary considerably, and depend upon the size of the area intended to be served, the crowd size, and the nature of the amplified sound (i.e., music versus voice announcements). For voice announcements, a typical speaker level is 65 dBA L_{eq} at 21 feet; for gatherings such as weddings, where dancing is included, it is assumed sound levels could reach up to 85 dBA L_{eq} at 21 feet from the speakers, which would address reasonable

amplification for a general dance function (Sound System Design Reference Manual, JBL, 1999). Amplified sound for a wedding/dance would attenuate to 82 dBA L_{eq} at 30 feet, 77 dBA L_{eq} at 50 feet, and 63 dBA L_{eq} at 250 feet directly in front of the speakers. The location of proposed speakers, and their orientation, is not known at this time, but the potential exists for loudspeaker operation to exceed the 50 dBA L_{eq} limit at existing residences, constituting a potentially significant impact. Proper placement and orientation of speakers, and/or noise barriers between the loudspeaker use areas and adjacent residential properties are feasible measures to address this impact. Refer to Section 4, Mitigation.

3.5 Construction Noise

Construction of the development proposed in the project would generate noise that could expose nearby receptors to elevated noise levels that may disrupt communication and routine activities. The magnitude of the impact would depend on the type of construction activity, equipment, duration of the construction, distance between the noise source and receiver, and intervening structures. This section of the report discusses the noise levels calculated to result from construction of the project, at nearby sensitive receptors (i.e., existing residences).

As detailed in Section 1.1, the City restricts the times of day when construction may occur (i.e., 7 a.m. to 6 p.m. Mondays through Fridays, 9 a.m. to 5 p.m. on Saturdays, and not at all on Sundays or on public holidays) and has a maximum one-hour average construction noise limit of 75 dB at noise-sensitive land uses, unless a variance has been obtained in advance from the city manager.

The construction activities for the proposed project will be varied by component (i.e., roadway construction/street improvements, pad grading and foundation, and building construction) and location. The assemblage of equipment needed for roadway construction was provided by the applicant's construction management consultant (JTK); the most intensive sub-phase for street improvements (grading and aggregate base) was used to represent all road construction activity. Representative equipment for residential lot earthwork and for residential building construction was assembled from similar residential subdivision projects that Dudek has evaluated for construction noise. Table 6 summarizes the equipment list and distances to sensitive receptors used in the analysis of construction noise levels.

With the noise sources identified above and summarized in Table 6, a noise analysis was performed using a model developed under the auspices of the Federal Highway Administration (FHWA) called the Roadway Construction Noise Model (RCNM) (FHWA 2008). Input variables for RCNM consist of the receiver / land use types, the equipment type (i.e., backhoe, crane, truck, etc.), the number of equipment pieces, the duty cycle for each piece of equipment

(i.e., percentage of hours the equipment typically works per day), and the distance from the sensitive noise. The equipment list sources are described above.

Two different distances were used in the construction noise assessment. Within each of the conceptual development phases, the property boundary of the closest existing residence is approximately 50 feet from the edge of the construction area; this distance was used to represent worst case construction noise exposure for existing residences. Also in each of the conceptual phases, the average distance from the center of the construction area (also the acoustic center of construction noise generation) is located approximately 200 feet from the closest existing residential parcel boundary. This distance would represent the average noise levels from construction equipment operating within the entire construction area per phase, and also moving about to various locations within each phase. The reader is referred to Attachment 3, RCNM Input and Results Data Sheets, for the inputs used in the RCNM model, as well as results.

Table 6
Construction Equipment List and Distances to Sensitive Receptors

Roadway Construction		
Equipment Needed	(2) Scraper (2) Road Grader (1) Front End Loader (1) Roller (1) Dump Truck	Distances to Receivers: Closest Property Line: 50 Feet Acoustic Center to Property Line: 200 feet
Pad Earthwork / Foundation		
Equipment Needed	(1) Front End Loader (1) Dozer (1) Excavator (1) Compactor (2) Backhoe (1) Grader (2) Dump Truck (2) Pick-Up Trucks	Distances to Receivers: Closest Property Line: 50 Feet Acoustic Center to Property Line: 200 feet
Residential Structures		
Equipment Needed	(2) Scissor Lifts (2) Concrete Mixer Truck (1) Concrete Pump Truck (1) Flat Bed Truck (10) Compressors (2) Pneumatic Tools (2) Pick-Up Trucks	Distances to Receivers: Closest Property Line: 50 Feet Acoustic Center to Property Line: 200 feet

Table 7 presents the summary results of the construction noise analysis.

Table 7
Construction Noise Levels Summary of Results

Construction Component	Construction Noise Level @ 50 Feet (Closest Residence) dBA L_{eq}	Construction Noise Level @ 200 Feet (Acoustic Center) dBA L_{eq}
Road Building	87	75
Building Pad/Foundation	88	75
Residential Structures	90	78

Construction of the proposed project would take place within the hours specified in Section 17-234 of the City's Municipal Code. No special construction techniques (i.e., pile driving or blasting) are anticipated to be necessary for this project. As illustrated in Table 7, when the entire assemblage of equipment is working right at the edge of the construction zone in each phase, within 50 feet of existing residences, construction noise levels are anticipated to range from 87 to 90 dBA L_{eq}. Assuming relatively steady work, this would result in an exceedance of the City of Escondido construction noise limit of 75 dBA $L_{eq\ HOUR.}$ When equipment is working further away, up to 200 feet near the center of each of the conceptual construction phases, average noise levels at nearby residences would be anticipated to be in the 75 to 78 dBA L_{eq} range, essentially compliant with the City's construction noise limitation. However, in order to avoid potentially significant construction noise impacts upon existing residences in the project vicinity, mitigation would be required. Refer to Section 4, Mitigation.

3.6 Construction Vibration

The heavier pieces of construction equipment used at this site could include bulldozers, graders, loaded trucks, water trucks, and pavers. Groundborne vibration information related to construction activities has been collected by the California Department of Transportation (Caltrans) (Caltrans 2004). Based on published vibration data, the anticipated construction equipment would generate a peak particle velocity of approximately 0.09 inch/second or less at a distance of 25 feet (FTA 2006). Information from Caltrans indicates that continuous vibrations with a peak particle velocity of approximately 0.1 inch/second begin to annoy people. Groundborne vibration is typically attenuated over short distances. The closest existing residences are approximately 100 feet or more from the construction area. At this distance and with the anticipated construction equipment, the peak particle velocity would be approximately 0.006 inch/second. Therefore, construction activities are anticipated to result in continuous vibration below levels that typically annoy people, and well below damage criteria (approximately 3.0 inch/second or greater for buildings of

reinforced-concrete, steel or timber construction). Construction vibration impacts would be less than significant. No mitigation measures are required.

3.7 Blasting Noise (Construction)

The construction of the proposed Project will include blasting of hard rock areas, which is a major source of potential noise and vibration impacts to nearby residential receivers. At the time this noise study was prepared, the exact blasting locations were unknown. However, areas within the project site with known hard-rock conditions which could require blasting are illustrated on Figure 4.

The intensity of the noise and vibration impacts associated with rock blasting depends on location, size, material, shape of the rock, and the spacing of the charges determined to be necessary for successful fracturing. The noise produced by blasting activities is referred to as an air blast, or a pressure wave that is generated when explosive energy in the form of gases escape from the exploding blast holes. Sound from an air blasts behaves as a point source, radiating outward in a spherical pattern and attenuating at a rate of 6 dBA with each doubling of distance from the blast location.

Blasting activities generally include: the pre-drilling of holes in the hard rock area; preparation and placement of the charges in the drilled holes; a pre-blast horn signal; and the blast itself. The noise from the blast starts with a cracking sound from the detonator, and ends with the low crackling sound from each charge as they explode. No other construction equipment would be operating during the blast in the immediate area, but would commence once the blasting contractor indicates it is safe to do so.

At the time of this analysis, blasting materials were not yet specified. Worst-case assumptions are therefore used based on reference noise level measurements taken at a blasting site using bulk heavy ammonium nitrate/fuel oil (ANFO). The explosive ANFO charges are placed in multiple holes to fragment the rocks into smaller, crushable pieces. Further, the blasts will be single-event noise sources which occur over a few seconds, with multiple small blasts in each hole occurring milliseconds apart from each other. Once the blast is completed, normal construction activities would resume.

Noise measurements performed of blasting operations at a similar residential construction project in Chatsworth (Urban Crossroads, 2017) were used as a reference noise level to characterize blasting for the Proposed project. At a reference distance of 370 feet, the blasting noise levels reached 81.5 dBA L_{max} for one second over a total duration of 7 seconds for all blasts included in the event. The reference blast measurement was for an extensive blast program which probably used a greater amount of ANFO explosive material than what would be needed at the Project site.

Therefore, the reference noise level measurement may conservatively overstate the noise levels of the Project site blasting activities. The shortest distance between potential blast locations and existing residences is approximately 100 feet (property lines are as close as 50 feet, but the OSMRE standard is based upon distance to residence, rather than property line). This distance was used in determining the blast noise levels at the worst-case residential locations. Table 8 illustrates the noise level for blasting activity at the nearest residential structures to the potential blast areas.

Table 8
Blasting Noise Levels Summary at Closest Residences

Construction Activity	Blasting Noise Level @ 100 Feet (Closest Residence) dBA L_{eq}	Blasting Noise Level @ 200 Feet (Acoustic Center) dBA L_{eq}
Rock blasting	93	87

The Escondido General Plan and Municipal Code do not identify specific construction noise level limits for blasting activities. Therefore, the OSMRE and CFR lowest maximum *Air Blast Limit* (30 CFR 816.67(b)) of 129 dBA L_{max} at nearby sensitive uses is used in this analysis as an acceptable threshold for noise levels due to blasting activity at the Project site (refer to Section 1.4.2). Based on the reference blasting noise level, the closest residential receiver will experience noise levels approaching 93 dBA L_{max} over the course of the blast, which will likely occur for only a few seconds. While some blasting noise may be noticeable by nearby residents, the single-event, temporary noise levels generated by the blast will not exceed the OSMRE and the CFR standards for air blasts, and therefore, will result in a less than significant noise impact. However, in order to comply with the more general construction noise limit of 75 dBA $L_{eq\ 1\text{-}HOUR}$, blasting should be limited to no more than 3 minutes within any given hour. Refer to Section 4, Mitigation.

3.8 Blasting Vibration (Construction)

According to the California Department of Transportation's *Transportation and Construction Vibration Guidance Manual*, it is unusual for damage to be caused to residential structures from the vibrations caused by blasting activities, given the restrictions imposed under OSMRE (30 CFR 816.67). Steps to be followed under the OSMRE guidelines include:

- Identify potential problem areas surrounding the Project site.
- Determine the conditions that exist prior to commencement of construction.
- Inform the public about the Project and potential blasting-related consequences.

- Schedule the work to reduce adverse effects.
- Design the blast to reduce vibration and air over pressure.
- Use blast signals to notify nearby residents that blasting is imminent.
- Monitor and record the vibration and air overpressure effects of the blast.
- Respond to and investigate complaints.

The Caltrans *Transportation and Construction Vibration Guidance Manual* provides vibration velocity levels for various building materials susceptibility to damage. For residential structures, the threshold of damage for vibration is approximately 3.0 in/sec (PPV) for cosmetic cracking and damage. While determining the vibration levels from the blasting operations at the Project site is difficult due to the variability of conditions (e.g., soil types) at the site, it is possible that some minor structural damage to the closest residences (i.e., within 100 feet), could occur. In order to prevent damage to nearby residential structures from ground vibration due to blasting, an abatement plan is required. Refer to Section 4, Mitigation.

4 MITIGATION

4.1 Exterior Noise

To comply with the City's 60 dB CNEL exterior noise standard for single-family and duplex rear yards, noise barriers would be required for some home lots along West Country Club Way and Nutmeg Street. Based on future predicted traffic noise levels, the following barrier heights would be required along the rear yard boundary of the indicated residences (Table 9). Refer to Figure 5 for an illustration of the location of these required sound barriers.

Table 9
Barrier Heights at Rearyard Boundaries

Roadway	Distance from Road	Required Barrier
West Country Club Road	Yard boundary greater than 75 feet from road edge	No barrier required
West Country Club Road	Yard boundary between 74 feet and 55 feet from road edge	5.5-foot-high barrier along yard boundary facing road
West Country Club Road	Yard boundary between 54 feet and 30 feet from road edge	6-foot-high barrier along yard boundary facing road
West Country Club Road	Yard boundary less than 30 feet from road edge	8-foot-high barrier along yard boundary facing road
North Nutmeg Street	Yard boundary between 50 feet and 25 feet from road edge	6-foot-high barrier along yard boundary facing road (for the closest lot in row perpendicular to Nutmeg; other adjacent lots further away also protected)

Incorporation of the above noise barriers into the project design would reduce potentially significant exterior noise exposure impacts to less than significant levels.

4.2 Operational Noise

To comply with the City's 50 dBA daytime residential exposure standard, the following mitigation measures would be required for the Village Center developments.

- Prior to issuance of building permits for the commercial structures to be located in the Village Center, an acoustical analysis shall be conducted to evaluate sound levels from proposed HVAC equipment at the adjacent residential property lines, in order to ensure compliance with the City of Escondido daytime limit of 50 dBA L_{eq}. Shielding of equipment, selection of low noise generating equipment, or both shall be specified as necessary to achieve compliance with this standard.
- Prior to issuance of building permits for the commercial structures that include outdoor sound amplification systems, an acoustical analysis shall be conducted to evaluate sound levels from use of the proposed amplification systems at the adjacent residential property lines, in order to ensure compliance with the City of Escondido daytime limit of 50 dBA L_{eq}. Location and orientation of the speakers, volume governors, and/or sound barriers between the areas with sound amplification use and adjacent residences shall be specified, as necessary, to achieve compliance with this standard.

Adherence to the above mitigation would reduce potentially significant operational noise levels from the Village Center to less than significant levels.

4.3 Construction Noise

Construction noise levels are anticipated to exceed the applicable City noise restrictions when equipment is operating less than approximately 200 feet from existing residences in the project vicinity. The following mitigation is therefore required:

- Install temporary plywood noise barriers eight feet in height around the construction site to minimize construction noise to 75 dBA as measured at the applicable property lines of the adjacent uses, unless an acoustical engineer submits documentation that confirms that the barriers are not necessary to achieve the attenuation levels.
- All construction equipment employing an internal combustion engine shall be equipped with suitable exhaust and intake silencers which are in good working order.

- Stationary construction equipment such as generators or compressors shall be located on site as far away from adjacent residential property boundaries as is practicable.
- Minimize, to the extent practical, the number of pieces of construction equipment operating simultaneously.
- Strictly adhere to the City's construction schedule restrictions (i.e., 7 a.m. to 6 p.m. Mondays through Fridays, 9 a.m. to 5 p.m. on Saturdays, and not at all on Sundays or on public holidays).

Adherence to the above mitigation during construction would reduce potentially significant short-term construction noise exposure impacts to less than significant levels.

4.4 Blasting Noise (Construction)

While blasting, per se, is not specifically addressed under the General Plan or Municipal Code, it must comply with the general construction noise level restriction of 75 dBA L_{eq}. The following mitigation is required in order to ensure blasting noise is compliant with this standard:

- Restrict blasting operations to no more than 3 minutes of any given hour during allowable construction time periods.

Adherence to the above mitigation during construction blasting would reduce potentially significant short-term blasting-related noise exposure impacts to less than significant levels.

4.5 Blasting Vibration (Construction)

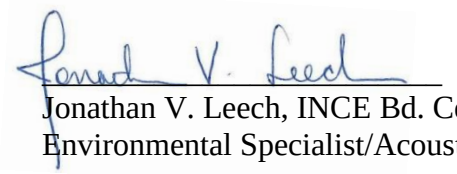
Blasting activity during construction could result in damage to the existing residential structures located in close proximity to the blast zone. The following mitigation measures are required:

- To reduce adverse effects, rock blasting shall strictly adhere to the City's construction schedule restrictions (i.e., between 7 a.m. to 6 p.m. Mondays through Fridays, 9 a.m. to 5 p.m. on Saturdays and not at all on Sundays or on public holidays).
- The blasting contractor shall design the blasts to reduce vibration velocity levels from each blast below the damage threshold of 3.0 in/sec. at the closest nearby residences (i.e., as close as 100 feet from the blast area).
- A blast signal (e.g. air horn) shall be used to notify nearby residents that blasting is about to occur per the California Code of Regulations, Title 8, Section 5291 Firing of Explosives regulations.
- All complaints shall be responded to and investigated as they occur.

With incorporation of the above mitigation measures, and to the ability of the blasting contractor to limit the ground-borne vibration levels, blast-related vibration levels would be reduced to less than significant.

This completes our Acoustical Assessment Report for the Villages at Escondido Country Club project.

Sincerely,



Jonathan V. Leech, INCE Bd. Cert.
Environmental Specialist/Acoustician

Att.:Figures 1–5
Attachment 1 – Definitions
Attachment 2 – FHWA Traffic Model Noise Calculation Worksheets
Attachment 3 – RCNM Input and Results Data Sheets

REFERENCES

Caltrans (California Department of Transportation). 1987. California Vehicle Noise Emission Levels. Report No. FHWA/CA/TL-87/03. January 1987. http://www.dot.ca.gov/hq/env/noise/pub/CA%20Vehicle%20Noise%20 Emission%20Levels.pdf.

Caltrans. 2002. *Transportation Related Earthborne Vibrations, Technical Advisory, Vibration TAV-02-01-R9601*. February 20, 2002.

Caltrans. 2008. *Transportation and Construction Vibration Guidance Manual*. May 2008.

Caltrans. 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September 2013.

City of Escondido. 2000. *Escondido General Plan Update Final Environmental Impact Report*. Prepared by Cotton/Beland/Associates Inc. August 2000.

City of Escondido. 2012. *City of Escondido General Plan Community Protection Element* (Section G, Noise). May 2012.

City of Escondido. 1990. City of Escondido Municipal Code Article 12, Noise Abatement and Control.

FHWA (Federal Highway Administration). 2008. FHWA Traffic Noise Model User's Guide (Version 2.5 Addendum). April 2008.

FTA (Federal Transit Administration). 2006. *Transit Noise and Vibration Impact Assessment, FTA-VA-90-1003-06*. May 2006.

JBL. 1999. *Sound System Design Reference Manual*.

Linscott, Law & Greenspan. 2017. *Villages at Escondido Country Club Project –Traffic Assessment*. May 19, 2017.

Office of Surface Mining Reclamation and Enforcement and Code of Federal Regulations, Section 30 CFR 816.67(b), Use of Explosives: Control of Adverse Effects lowest maximum noise level standard.

Urban Crossroads. 2017. *Meridian Business Park Noise Impact Analysis*. May 17, 2017.

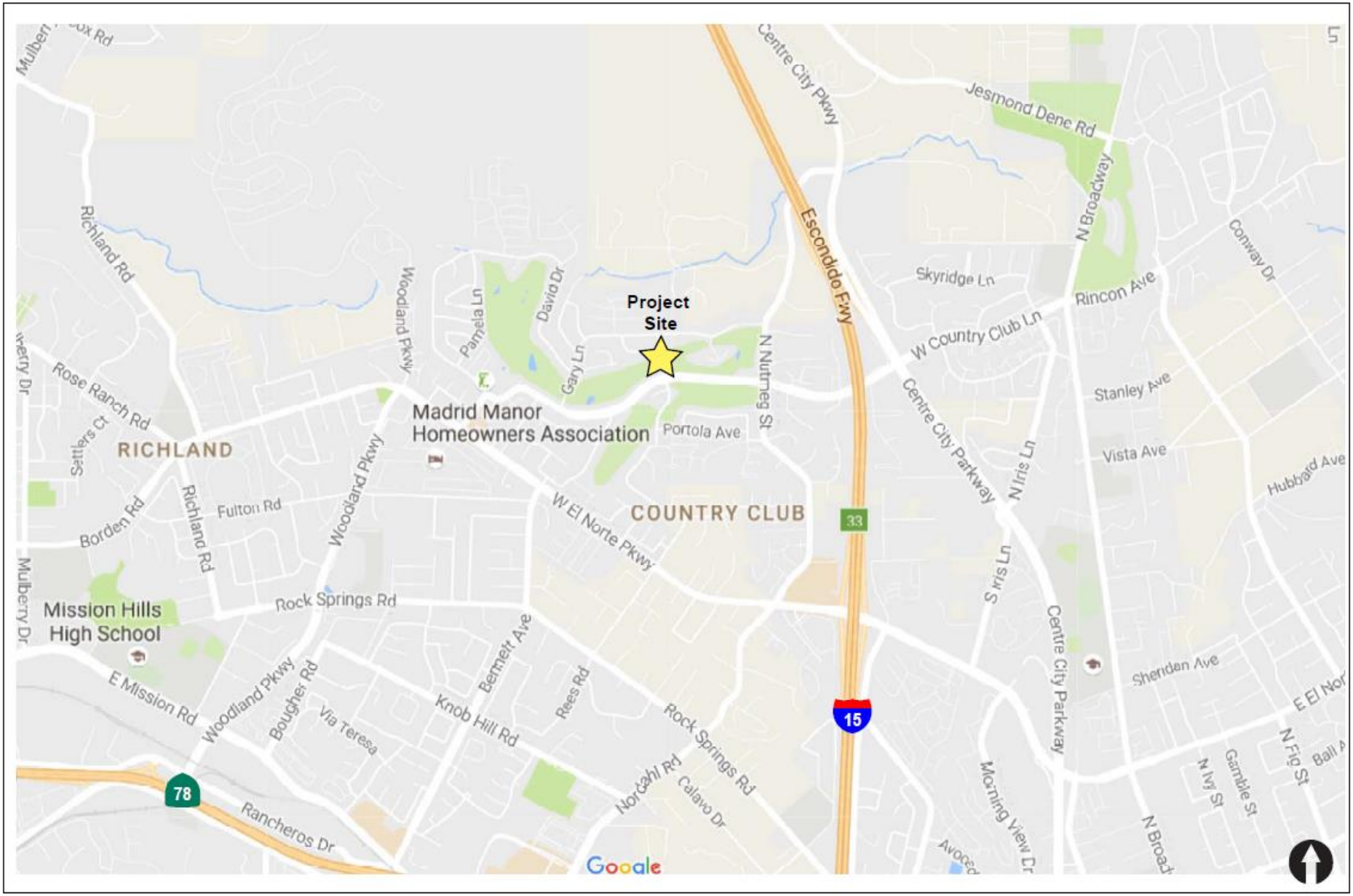


FIGURE 1
PROJECT LOCATION
Villages at Escondido Country Club Noise Assessment

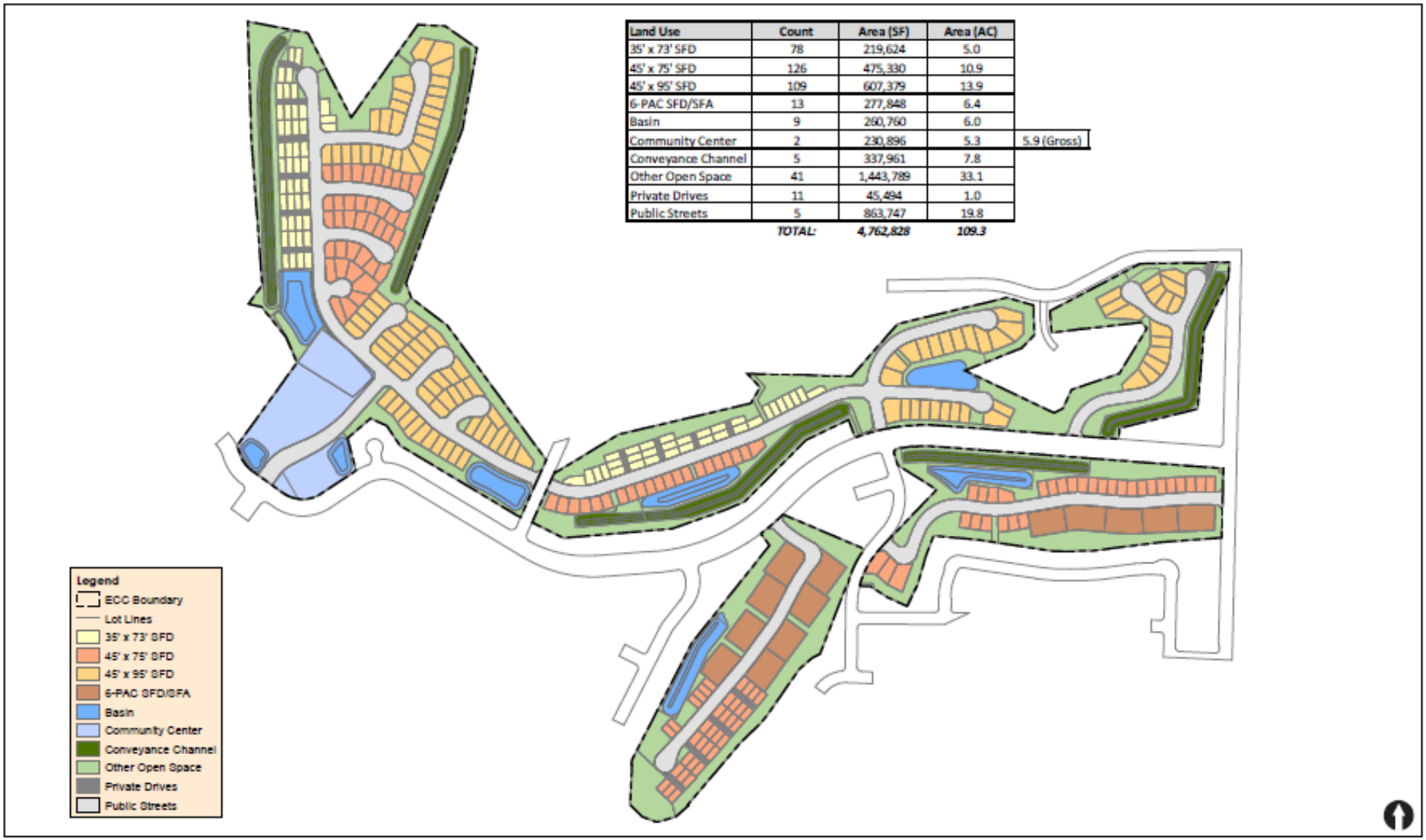


FIGURE 2
SITE PLAN
Villages at Escondido Country Club Noise Assessment

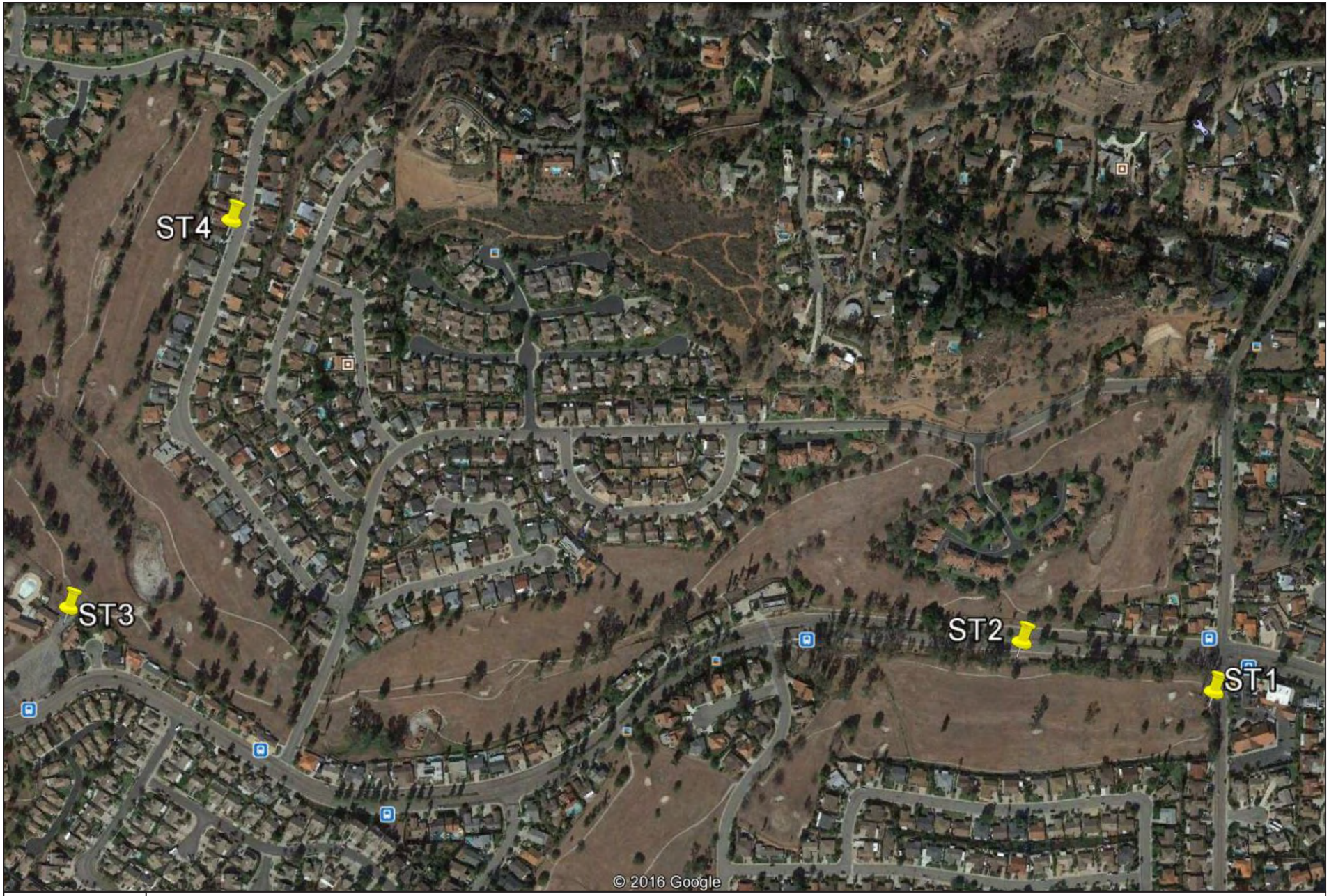


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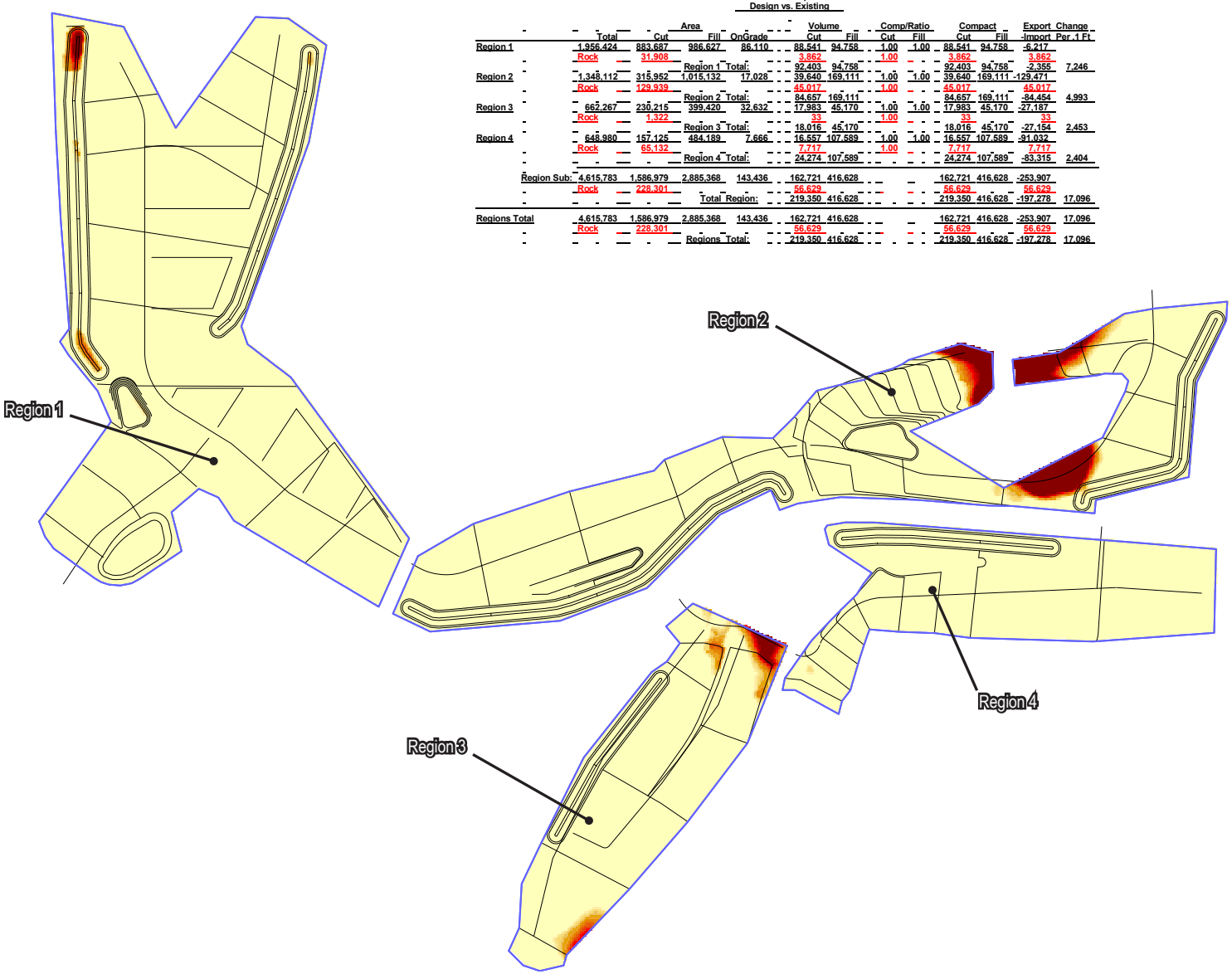
FIGURE 3
Noise Measurement Locations

Job: ECC
Units: Ft-CY
Thu May 26, 2016 15:40:25 Page 1

Volume Report
Design vs. Existing

		Area				Volume		Comp/Ratio		Compact		Export	Change
		Total	Cut	Fill	OnGrade	Cut	Fill	Cut	Fill	Cut	Fill	-Import	Per .1 Ft
Region 1		1,956,424	883,687	986,627	86,110	88,541	94,758	1.00	1.00	88,541	94,758	-6,217	
	Rock		31,908			3,862		1.00		3,862		3,862	
				Region 1 Total:		92,403	94,758			92,403	94,758	-2,355	7,246
Region 2		1,348,112	315,952	1,015,132	17,028	39,640	169,111	1.00	1.00	39,640	169,111	-129,471	
	Rock		129,939			45,017		1.00		45,017		45,017	
				Region 2 Total:		84,657	169,111			84,657	169,111	-84,454	4,993
Region 3		662,267	230,215	399,420	32,632	17,983	45,170	1.00	1.00	17,983	45,170	-27,187	
	Rock		1,322			33		1.00		33		33	
				Region 3 Total:		18,016	45,170			18,016	45,170	-27,154	2,453
Region 4		648,980	157,125	484,189	7,666	16,557	107,589	1.00	1.00	16,557	107,589	-91,032	
	Rock		65,132			7,717		1.00		7,717		7,717	
				Region 4 Total:		24,274	107,589			24,274	107,589	-83,315	2,404
Region Sub:		4,615,783	1,586,979	2,885,368	143,436	162,721	416,628			162,721	416,628	-253,907	
	Rock		228,301			56,629				56,629		56,629	
				Total Region:		219,350	416,628			219,350	416,628	-197,278	17,096
Regions Total		4,615,783	1,586,979	2,885,368	143,436	162,721	416,628			162,721	416,628	-253,907	17,096
	Rock		228,301			56,629				56,629		56,629	
				Regions Total:		219,350	416,628			219,350	416,628	-197,278	17,096



SOURCE: J.T. Kruer & Co. (2017)

FIGURE 4
Potential Blasting Locations

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The Villages - Escondido Country Club EIR

DUDEK

FIGURE 5
Noise Barrier Mitigation

ATTACHMENT 1

Definitions

ATTACHMENT 1
Definitions

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level, (dBA)	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 frequency response of the human ear and correlates well with subjective reactions to noise.
Community Equivalent	CNEL is the A-weighted equivalent continuous Sound Level (CNEL) sound exposure (CNEL) level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during the nighttime hours (10 p.m.–7 a.m.) and 5 dB added to the sound during the evening hours (7 p.m.–10 p.m.).
Decibel (dB)	A unit for measuring sound pressure level and is equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
Time-Averaged Sound Level	The sound level corresponding to a steady state level containing the same total energy as a time varying signal over a given sample period. TAV is designed to average all of the loud and quiet sound levels occurring over a time period.

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ATTACHMENT 2

FHWA Traffic Model
Noise Calculation Worksheets

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC	JN:	9993
ROADWAY:	Country Club Lane	DATE:	May 2017
LOCATION:	**West End - Existing**	BY:	J. Leech

ADT	4,400			PK HR VOL	440
SPEED	45				
PK HR %	10				
DIST CTL	105				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		101.9
DIST WALL	0		MED TRUCK SLE DIST		101.8
DIST W/OB	105		HVY TRUCK SLE DIST		101.8
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-10				
RT ANGLE	10				
DF ANGLE	20				

SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	54.3	52.4	50.6	44.6	53.8
MEDIUM TRUCKS	51.3	49.9	43.6	40.5	50.0
HEAVY TRUCKS	54.0	52.7	43.8	43.6	52.8
VEHICULAR NOISE	58.2	56.6	52.1	48.0	57.2

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC	JN:	9993
ROADWAY:	Country Club Lane	DATE:	May 2017
LOCATION:	**West End - Future**	BY:	J. Leech

ADT	10,370		PK HR VOL	1,037
SPEED	45			
PK HR %	10			
DIST CTL	105			
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	101.9
DIST WALL	0		MED TRUCK SLE DIST	101.8
DIST W/OB	105		HVY TRUCK SLE DIST	101.8
HTH WALL	0.0	********		
HTH OBS	5.0			
AMBIENT	45.0			
ROADWAY VIEW:				
LF ANGLE	-10			
RT ANGLE	10			
DF ANGLE	20			

SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	58.1	56.1	54.3	48.3	57.5
MEDIUM TRUCKS	55.0	53.6	47.3	44.2	53.7
HEAVY TRUCKS	57.8	56.5	47.5	47.3	56.5
VEHICULAR NOISE	61.9	60.4	55.8	51.7	61.0

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC	JN:	9993
ROADWAY:	Country Club Lane	DATE:	May 2017
LOCATION:	**Center - Existing**	BY:	J. Leech

ADT	5,210		PK HR VOL	521
SPEED	45			
PK HR %	10			
DIST CTL	130			
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	127.5
DIST WALL	0		MED TRUCK SLE DIST	127.4
DIST W/OB	130		HVY TRUCK SLE DIST	127.4
HTH WALL	0.0	********		
HTH OBS	5.0			
AMBIENT	45.0			
ROADWAY VIEW:				
LF ANGLE	-10			
RT ANGLE	10			
DF ANGLE	20			

SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	53.6	51.7	49.9	43.9	53.1
MEDIUM TRUCKS	50.6	49.2	42.8	39.8	49.3
HEAVY TRUCKS	53.3	52.0	43.1	42.8	52.0
VEHICULAR NOISE	57.5	55.9	51.4	47.3	56.5

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC	JN:	9993
ROADWAY:	Country Club Lane	DATE:	May 2017
LOCATION:	**Center - Future**	BY:	J. Leech

ADT	11,330		PK HR VOL	1,133
SPEED	45			
PK HR %	10			
DIST CTL	130			
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	127.5
DIST WALL	0		MED TRUCK SLE DIST	127.4
DIST W/OB	130		HVY TRUCK SLE DIST	127.4
HTH WALL	0.0	********		
HTH OBS	5.0			
AMBIENT	45.0			
ROADWAY VIEW:				
LF ANGLE	-10			
RT ANGLE	10			
DF ANGLE	20			

SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	57.0	55.1	53.2	47.3	56.5
MEDIUM TRUCKS	53.9	52.6	46.2	43.2	52.7
HEAVY TRUCKS	56.7	55.4	46.4	46.2	55.4
VEHICULAR NOISE	60.8	59.3	54.7	50.6	59.9

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC	JN:	9993
ROADWAY:	Country Club Lane	DATE:	May 2017
LOCATION:	**East - Existing**	BY:	J. Leech

ADT	5,330		PK HR VOL	533
SPEED	45			
PK HR %	10			
DIST CTL	65			
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	59.8
DIST WALL	0		MED TRUCK SLE DIST	59.6
DIST W/OB	65		HVY TRUCK SLE DIST	59.6
HTH WALL	0.0	********		
HTH OBS	5.0			
AMBIENT	45.0			
ROADWAY VIEW:				
LF ANGLE	-10			
RT ANGLE	10			
DF ANGLE	20			

SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	58.6	56.7	54.9	48.9	58.1
MEDIUM TRUCKS	55.6	54.2	47.9	44.8	54.3
HEAVY TRUCKS	58.3	57.1	48.1	47.9	57.1
VEHICULAR NOISE	62.5	60.9	56.4	52.3	61.5

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC	JN:	9993
ROADWAY:	Country Club Lane	DATE:	May 2017
LOCATION:	**East - Future**	BY:	J. Leech

ADT	12,130		PK HR VOL	1,213
SPEED	45			
PK HR %	10			
DIST CTL	65			
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	59.8
DIST WALL	0		MED TRUCK SLE DIST	59.6
DIST W/OB	65		HVY TRUCK SLE DIST	59.6
HTH WALL	0.0	********		
HTH OBS	5.0			
AMBIENT	45.0			
ROADWAY VIEW:				
LF ANGLE	-10			
RT ANGLE	10			
DF ANGLE	20			

SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	62.2	60.3	58.5	52.5	61.7
MEDIUM TRUCKS	59.2	57.8	51.4	48.4	57.9
HEAVY TRUCKS	61.9	60.6	51.7	51.4	60.6
VEHICULAR NOISE	66.1	64.5	60.0	55.9	65.1

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC	JN:	9993
ROADWAY:	North Nutmeg Street	DATE:	May 2017
LOCATION:	**South of W. Country Club - Existing**	BY:	J. Leech

ADT	7,550		PK HR VOL	755
SPEED	40			
PK HR %	10			
DIST CTL	50			
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE	43.0
DIST WALL	0		MED TRUCK SLE DIST	42.8
DIST W/OB	50		HVY TRUCK SLE DIST	42.8
HTH WALL	0.0	********		
HTH OBS	5.0			
AMBIENT	45.0			
ROADWAY VIEW:				
LF ANGLE	-10			
RT ANGLE	10			
DF ANGLE	20			

SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	60.9	58.9	57.1	51.1	60.3
MEDIUM TRUCKS	58.1	56.7	50.3	47.3	56.8
HEAVY TRUCKS	61.3	60.0	51.0	50.8	60.0
VEHICULAR NOISE	65.0	63.5	58.8	54.8	64.1

FHWA - HIGHWAY TRAFFIC NOISE PREDICTION MODEL

(modified for CNEL)

DUDEK

PROJECT:	Villages Escondido CC			JN:	9993
ROADWAY:	North Nutmeg Street			DATE:	May 2017
LOCATION:	**South of W. Country Club - Future**			BY:	J. Leech
ADT	9,790			PK HR VOL	979
SPEED	40				
PK HR %	10				
DIST CTL	50				
DIST N/F	52	(M=76,P=52,S=36,C=12)	AUTO SLE DISTANCE		43.0
DIST WALL	0		MED TRUCK SLE DIST		42.8
DIST W/OB	50		HVY TRUCK SLE DIST		42.8
HTH WALL	0.0	********			
HTH OBS	5.0				
AMBIENT	45.0				
ROADWAY VIEW:					
LF ANGLE	-10				
RT ANGLE	10				
DF ANGLE	20				
SITE CONDITIONS:		(10=HARD SITE, 15=SOFT SITE)			
AUTOM	15.0				
MED TR	15.0				
HVY TR	15.0				
BARRIER	0	(0=WALL,1=BERM)			
ELEVATIONS:					
PAD	0.0	AUTOMOBILES =	0.00		
ROAD	0.0	MEDIUM TRUCKS=	2.30		
		HEAVY TRUCKS =	8.01		
GRADE:	0.0 %	GRADE ADJUSTM=	0.0	(TO HEAVY TRUCKS)	

VEHICLE DISTRIBUTION:

	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.770	0.127	0.096	0.9360
MEDIUM TRUCKS	0.874	0.051	0.075	0.0370
HEAVY TRUCKS	0.891	0.028	0.081	0.0230

NOISE IMPACTS WITHOUT TOPO OR BARRIER SHIELDING:

	LEQ PK HR	LEQ DAY	LEQ EVE	LEQ NIGHT	CNEL
AUTOMOBILES	62.0	60.1	58.3	52.3	61.5
MEDIUM TRUCKS	59.2	57.8	51.5	48.4	57.9
HEAVY TRUCKS	62.4	61.1	52.2	51.9	61.1
VEHICULAR NOISE	66.2	64.6	59.9	55.9	65.2

ATTACHMENT 3

RCNM Input and Results Data Sheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/17/2017
Case Description: Road Construction

		---- Receptor #1 ----		
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Existing Single Family Residence	Residential	55	50	45

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Scraper	No	40		83.6	50	0
Scraper	No	40		83.6	50	0
Grader	No	40	85		50	0
Grader	No	40	85		50	0
Front End Loader	No	40		79.1	50	0
Roller	No	20		80	50	0
Dump Truck	No	40		76.5	50	0

		Results		
		Calculated (dBA)		
				Day
Equipment		*Lmax	Leq	Lmax
Scraper		83.6	79.6	N/A
Scraper		83.6	79.6	N/A
Grader		85	81	N/A
Grader		85	81	N/A
Front End Loader		79.1	75.1	N/A
Roller		80	73	N/A
Dump Truck		76.5	72.5	N/A
	Total	85	87	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Center Point to Residences	Residential	55	50	45

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Scraper	No	40		83.6	200	0
Scraper	No	40		83.6	200	0
Grader	No	40	85		200	0
Grader	No	40	85		200	0
Front End Loader	No	40		79.1	200	0
Roller	No	20		80	200	0
Dump Truck	No	40		76.5	200	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Scraper		71.5	67.6
Scraper		71.5	67.6
Grader		73	69
Grader		73	69
Front End Loader		67.1	63.1
Roller		68	61
Dump Truck		64.4	60.4
	Total	73	75

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/17/2017
Case Description: Site Grading and Site Infrastructure

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Nearest Receivers at 50 feet	Residential	55	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	50	0
Dozer	No	40		81.7	50	0
Excavator	No	40		80.7	50	0
Compactor (ground)	No	20		83.2	50	0
All Other Equipment > 5 HP	No	50	85		50	0
Backhoe	No	40		77.6	50	0
Backhoe	No	40		77.6	50	0
Grader	No	40	85		50	0
Dump Truck	No	40		76.5	50	0
Dump Truck	No	40		76.5	50	0
Pickup Truck	No	40		75	50	0
Pickup Truck	No	40		75	50	0

		Results		
		Calculated (dBA)		
Equipment		*Lmax	Leq	Day Lmax
Front End Loader		79.1	75.1	N/A
Dozer		81.7	77.7	N/A
Excavator		80.7	76.7	N/A
Compactor (ground)		83.2	76.2	N/A
All Other Equipment > 5 HP		85	82	N/A
Backhoe		77.6	73.6	N/A
Backhoe		77.6	73.6	N/A
Grader		85	81	N/A
Dump Truck		76.5	72.5	N/A
Dump Truck		76.5	72.5	N/A
Pickup Truck		75	71	N/A
Pickup Truck		75	71	N/A
	Total	85	87.6	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Case Description: Site Grading and Site Infrastructure

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Receivers at Ac Center	Residential	55	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	200	0
Dozer	No	40		81.7	200	0
Excavator	No	40		80.7	200	0
Compactor (ground)	No	20		83.2	200	0
All Other Equipment > 5 HP	No	50	85		200	0
Backhoe	No	40		77.6	200	0
Backhoe	No	40		77.6	200	0
Grader	No	40	85		200	0
Dump Truck	No	40		76.5	200	0
Dump Truck	No	40		76.5	200	0
Pickup Truck	No	40		75	200	0
Pickup Truck	No	40		75	200	0

		Results		
		Calculated (dBA)		
				Day
Equipment		*Lmax	Leq	Lmax
Front End Loader		67.1	63.1	N/A
Dozer		69.6	65.6	N/A
Excavator		68.7	64.7	N/A
Compactor (ground)		71.2	64.2	N/A
All Other Equipment > 5 HP		73	69.9	N/A
Backhoe		65.5	61.5	N/A
Backhoe		65.5	61.5	N/A
Grader		73	69	N/A
Dump Truck		64.4	60.4	N/A
Dump Truck		64.4	60.4	N/A
Pickup Truck		63	59	N/A
Pickup Truck		63	59	N/A
	Total	73	75.5	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/17/2017
Case Description: Residential Structure Construction

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Receivers at 50 feet	Residential	55	50	45

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
All Other Equipment > 5 HP	No	50	85		50	0
All Other Equipment > 5 HP	No	50	85		50	0
Concrete Mixer Truck	No	40		78.8	50	0
Concrete Mixer Truck	No	40		78.8	50	0
Concrete Pump Truck	No	20		81.4	50	0
Flat Bed Truck	No	40		74.3	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Compressor (air)	No	40		77.7	50	0
Pneumatic Tools	No	50		85.2	50	0
Pneumatic Tools	No	50		85.2	50	0
Pickup Truck	No	40		75	50	0
Pickup Truck	No	40		75	50	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
All Other Equipment > 5 HP	85	82
All Other Equipment > 5 HP	85	82
Concrete Mixer Truck	78.8	74.8
Concrete Mixer Truck	78.8	74.8
Concrete Pump Truck	81.4	74.4
Flat Bed Truck	74.3	70.3
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Compressor (air)	77.7	73.7
Pneumatic Tools	85.2	82.2
Pneumatic Tools	85.2	82.2
Pickup Truck	75	71
Pickup Truck	75	71
Total	85.2	90

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Receivers at Ac Cente	Residential	55	50	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
All Other Equipment > 5 HP	No	50	85		200	0
All Other Equipment > 5 HP	No	50	85		200	0
Concrete Mixer Truck	No	40		78.8	200	0
Concrete Mixer Truck	No	40		78.8	200	0
Concrete Pump Truck	No	20		81.4	200	0
Flat Bed Truck	No	40		74.3	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0
Pneumatic Tools	No	50		85.2	200	0
Pneumatic Tools	No	50		85.2	200	0
Pickup Truck	No	40		75	200	0
Pickup Truck	No	40		75	200	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
All Other Equipment > 5 HP	73	69.9
All Other Equipment > 5 HP	73	69.9
Concrete Mixer Truck	66.8	62.8
Concrete Mixer Truck	66.8	62.8
Concrete Pump Truck	69.4	62.4
Flat Bed Truck	62.2	58.2
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Compressor (air)	65.6	61.6
Pneumatic Tools	73.1	70.1
Pneumatic Tools	73.1	70.1
Pickup Truck	63	59
Pickup Truck	63	59
Total	73.1	78

*Calculated Lmax is the Loudest value.