NOISE ASSESSMENT

San Marcos Highlands
City of San Marcos

Prepared for:

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Project: 1319-07 San Marcos Highlands Noise

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GLOSSARY OF TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 µPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (Ldn): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for night time noise. Typically Ldn's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F,S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise and vibration impacts to and from the proposed San Marcos Highlands residential project. The project area is located on a vacant, unincorporated site that is proposed to be annexed into the City of San Marcos. The project is generally located north of Mission Road along Los Posas Road in the City of San Marcos.

Construction Noise

The grading equipment will be spread out over the Project site from distances near the occupied property lines to distances of 500 feet or more away. Based upon the site plan the majority of the grading operations, on average, will occur more than 500 feet from the property lines. At an average distance of 500 feet from the construction activities to the nearest property line, noise levels will comply with the 75 dBA Leq standard average over 8 hours at the property lines. Therefore, no impacts are anticipated and no mitigation is required during construction of the proposed Project. All equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away for the existing residence as possible.

Rock Crusher Noise

The project may utilize two Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher, or equivalent. Rock crushing will occur between the hours of 7:00 AM and 4:00 PM. The crushers would be located at two separate locations, one in Phase 1 and other in Phase 2. Two rock crushers operating at the same time could have a worst case 60 dBA noise contour extending 1,265 feet from the center of the two crushers. The noise contours do not take into account any shielding from topography, stockpiled materials or any barriers that may exist at the nearest residences.

Given this, the noise levels are anticipated to comply with the City's 60 dBA Leq standard at the property lines. Since the noise contours are relatively close to the existing residences, noise measurements of the rock crushing facilities, within the first week of operations, should be conducted during to ensure compliance with the City's thresholds. If noise levels are found to be above the established thresholds of 60 dBA at any existing single family residential use, then mitigation in the form of berms or temporary walls, crusher orientation or relocation will need to be incorporated into rock crusher operations.

Construction Vibration

The nearest vibration-sensitive uses are the residences located to the east, 200 feet or more from the proposed construction. The average vibration levels that would be experienced at the nearest vibration sensitive land uses to the east from temporary construction activities. Loaded trucks will be traveling along the western portion of the site and were assessed at a minimum distance of 200 feet to be conservative.

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.20 in/sec for the peak particle velocity (PPV). Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, Project construction activities would not result in vibration induced structural damage to residential buildings near the demolition and construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 82 VdB and 0.05 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided it can be minimized by following the City's blasting procedures.

Onsite Transportation Noise

Noise mitigation in the form of 7-foot barriers are necessary along the Lots adjacent to Las Posas Road along with a 4 foot barrier at the Lot in the south east corner in order to comply with the City of San Marcos Noise standards. The barriers can be constructed of a combination of landscape berms and sound walls. A final noise assessment is required prior to the issuance of the first building permit for all second floor areas of the Lots located adjacent to Los Posas Road since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and building plans to meet the City's established interior noise limit of 45 dBA CNEL.

Offsite Transportation Noise

The Project does create a direct and cumulative noise increase of more than 3 dBA CNEL on a segment of Los Posas Road just south of the Project's main access. The overall noise level is just below 65 dBA CNEL at a distance of 50 feet with no shielding. The existing residences along this segment of roadway are elevated above the roadway have a minimum of 5-foot barriers that will reduce the noise level at least 5 decibels or more depending on the elevation differences. The existing walls, elevations changes and increased distances from the centerline will reduce the roadway noise levels below the 60 dBA CNEL threshold. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Operational Noise from Park Activities

The anticipated noise levels from the proposed park and the associated activities were could to be below the property line thresholds. Therefore no operational park activities would result in impacts.

1.0 PROJECT INTRODUCTION

1.1 Purpose of this Study

The purpose of this Noise study is to determine potential noise impacts (if any) created from the proposed constriction operations and to determine potential noise impacts (if any) to the site generated from offsite sources. Should impacts be determined, the intent of this study would be to recommend suitable mitigation measures to bring those impacts to a level that would be considered less then significant.

1.2 Project Location

The Project site is located in the City of San Marcos, in the northern portion of San Diego County. A general project vicinity map is shown in Figure 1–A. The project area is located north of Mission Road along Los Posas Road in the City of San Marcos. Existing residential and commercial uses exist to the north, south, east and west of the site.

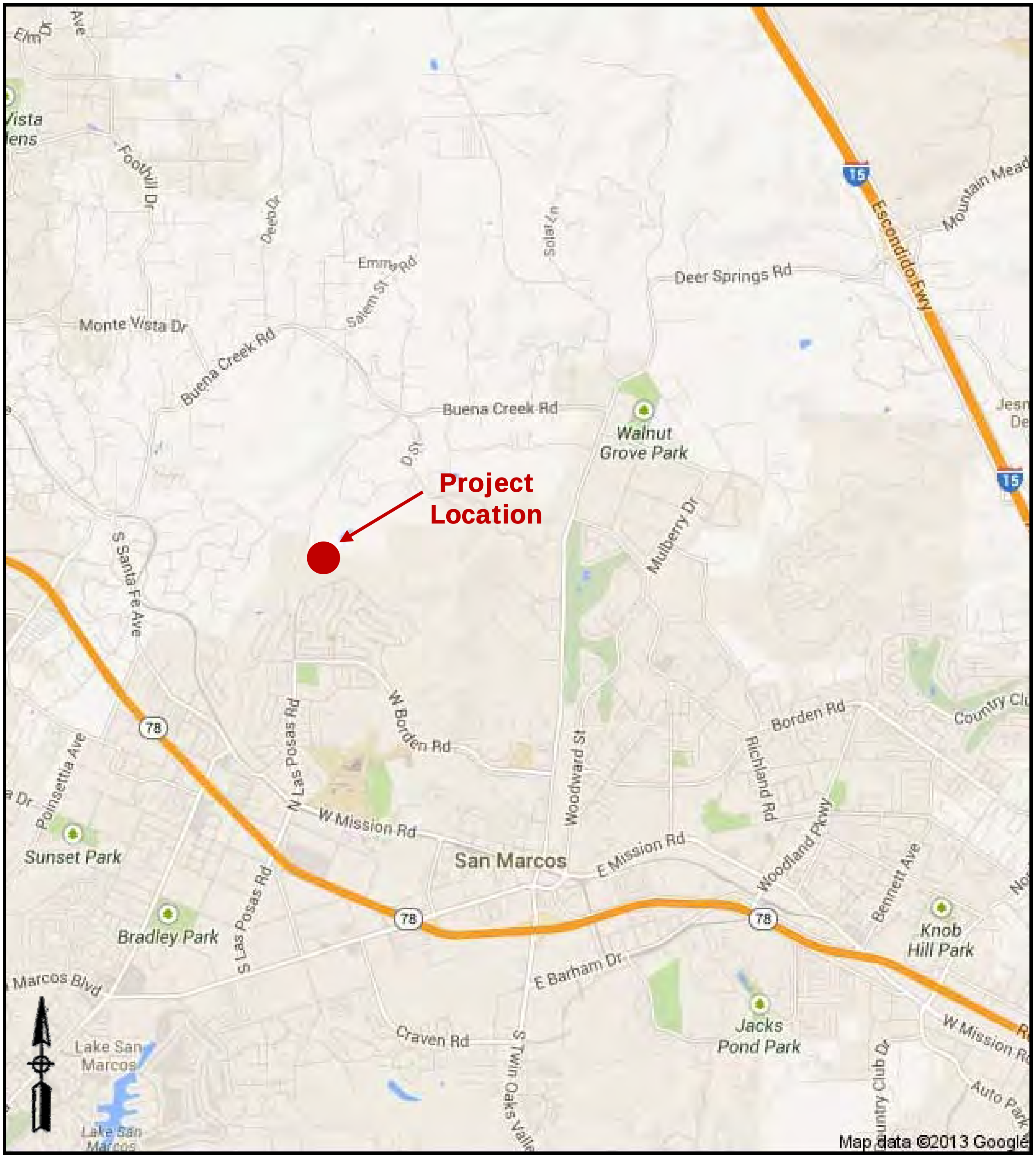
1.3 Project Description and Purpose

The proposed project will consist of 198 single-family dwelling units and a 23-acre passive park. The proposed Project site configuration is provided in Figure 1-B below. Due to the properties of the bedrock, some blasting is anticipated and rock crusher is needed as part of the Project. Due to the properties of the bedrock, a temporary rock crusher is needed as part of the project to prepare the site for the approved development.

1.4 Rock Crushing Operations

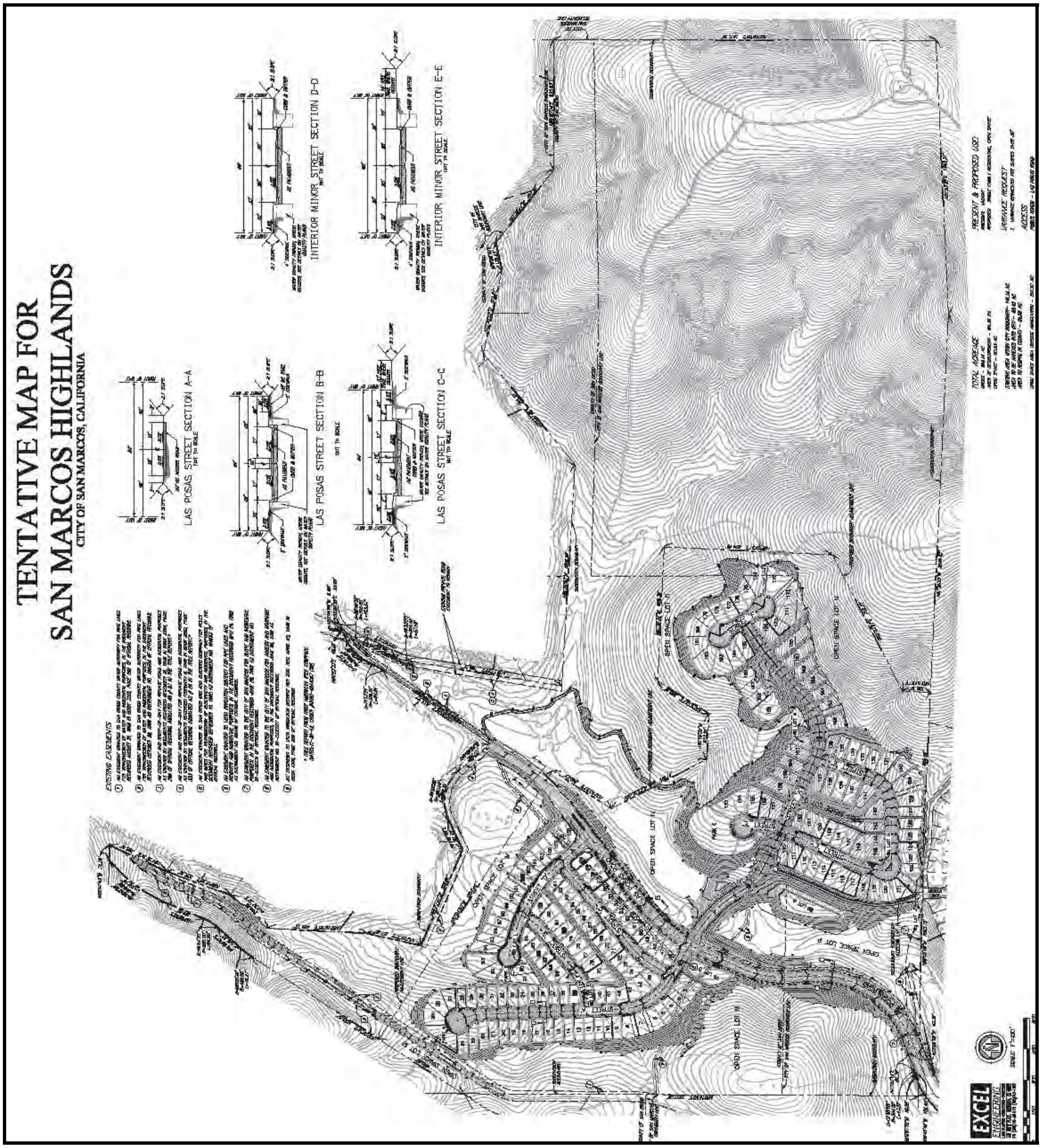
The project will utilize a Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher, or equivalent. Rock crushing will occur between the hours of 7:00 AM and 4:00 PM. The crusher may be located at two separate locations onsite, one during the grading of Phase 1 and then moved during the grading of Phase 2. The crusher would be located approximately 1,000 feet from the nearest residence during each Phase. The rock crushing equipment will be located in the central portion of the proposed residential layout to maximize the distance separation from adjacent residential uses. The rock crusher locations for Phase 1 and Phase 2 are shown in Figure 1-C on Page 4.

Figure 1-A: Project Vicinity Map



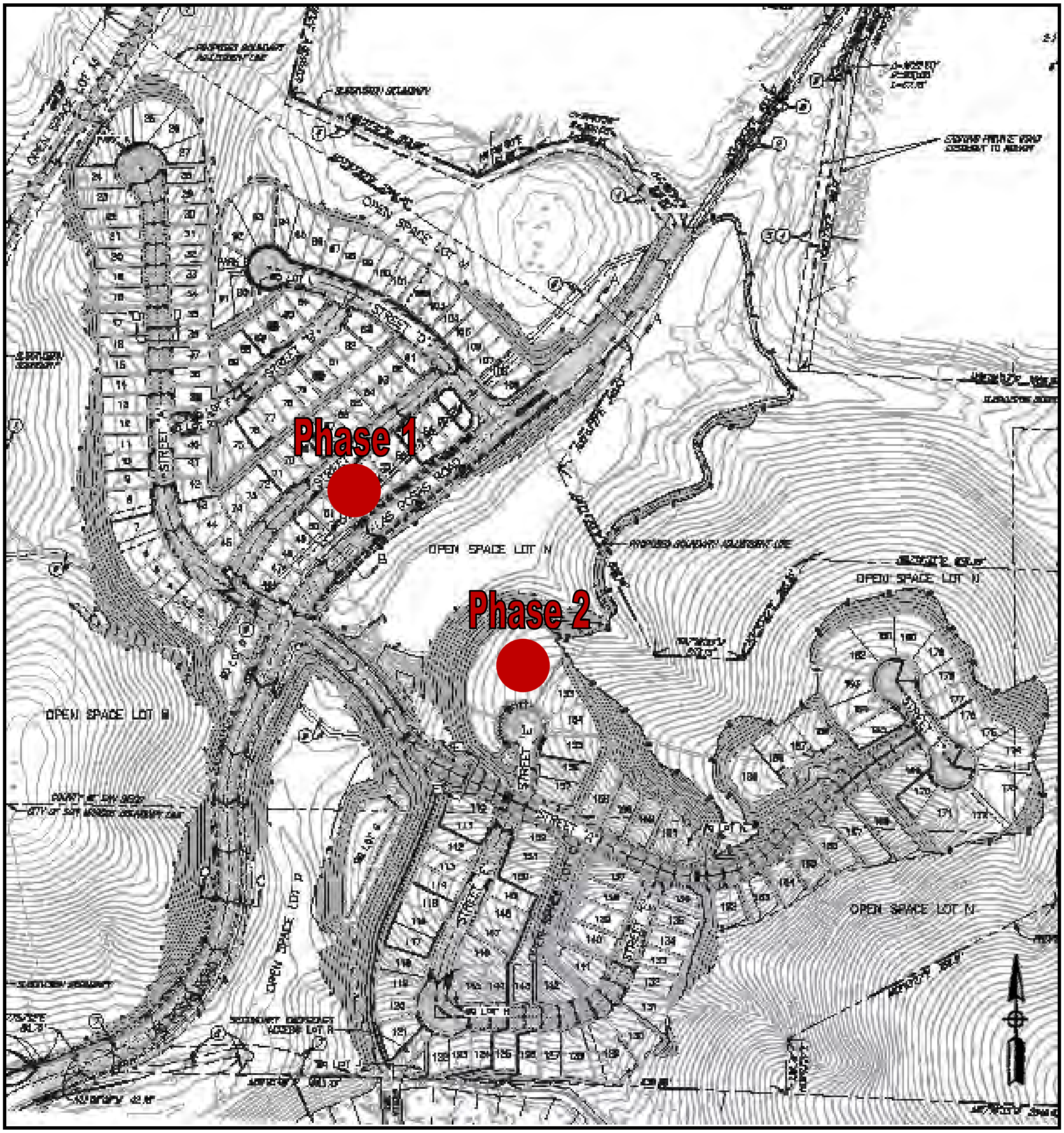
Source: Google Maps, 2013

Figure 1-B: Project Configuration



Source: Excel Engineering, 2014

Figure 1-C: Rock Crusher Locations



Source: Excel Engineering, 2014

2.0 FUNDAMENTALS

2.1 Acoustical Fundamentals

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs and when the noise occurs. Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24 hour A-weighted average for sound, with corrections or penalties for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sounds appears louder.

A vehicles noise level is from a combination of the noise produced by the engine, exhaust and tires. The cumulative traffic noise levels along a roadway segment are based on three primary factors: the amount of traffic, the travel speed of the traffic, and the vehicle mix ratio or number of medium and heavy trucks. The intensity of traffic noise is increased by higher traffic volumes, greater speeds and increased number of trucks.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiant in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. On the other hand, fixed/point sources radiate outward uniformly as it travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance.

The most effective noise reduction methods consist of controlling the noise at the source, blocking the noise transmission with barriers or relocating the receiver. Any or all of these methods may be required to reduce noise levels to an acceptable level.

2.2 Vibration Fundamentals

Vibration is a trembling or oscillating motion of the ground. Like noise, vibration is transmitted in waves, but in this case through the ground or solid objects. Unlike noise, vibration is typically felt rather than heard. Vibration can be either natural as in the form of earthquakes, volcanic eruptions; or manmade as from explosions, heavy machinery, or trains. Both natural and manmade vibration may be continuous, such as from operating machinery; or infrequent, as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways: displacement, velocity, and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration. Table 2-1 shows the human reaction to various levels of peak particle velocity.

Vibrations also vary in frequency and this affects perception. Typical construction vibrations fall in the 10 to 30 Hz range and usually occurring around 15 Hz. Traffic vibrations exhibit a similar range of frequencies; however, due to their suspension systems, it is less common, to measure traffic frequencies above 30 Hz.

Propagation of ground-borne vibrations is complicated and difficult to predict because of the endless variations in the soil through which the waves travel. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by dropping an object into water. P-waves, or compression waves, are waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and special voids. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Table 2-1: Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage
Source: Caltrans, Division of Environmental Analysis, *Transportation Related Earthborne Vibration, Caltrans Experiences*, Technical Advisory, Vibration, TAV-02-01-R9601, 2002.		

3.0 SIGNIFICANCE THRESHOLDS AND STANDARDS

3.1 Construction Noise

The City of San Marcos Municipal Code addresses the limits grading, extraction and construction activities between 7:00 a.m. and 4:30 p.m. Monday through Friday and no grading, extraction or construction is allowed on the weekends or holidays. The Municipal code does not set noise limits on construction activities. Commonly, the City has utilized the County of San Diego's Noise Ordinance noise limit of 75 dBA for other projects.

3.2 Rock Crushing Noise Limits

The City of San Marcos is requiring that noise levels from the proposed temporary rock crusher and off-site material truck haulage maintain noise levels of 60 dBA or less at surrounding single family residences, 65 dBA at multifamily uses and 70 dBA at all commercial uses.

3.3 Transportation Noise Standards

To control transportation related noise sources such as arterial roads, freeways, airports and railroads, the City of San Marcos has established guidelines for acceptable community noise levels in the Noise Element of the General Plan. For noise sensitive rural and single family residential uses, schools, libraries, parks and recreational areas the City Noise Element requires an exterior noise level of less than 60 dBA CNEL for outdoor usable areas. For multi-family developments the standard is 65 dBA CNEL and a standard of 70 dBA CNEL is typically applied to commercial uses.

3.4 Blasting and Vibration Standards

The City of San Marcos Title 17 of the City's Municipal Code states that all blasting operations within the City of San Marcos are prohibited unless a Certificate of Authorization is first obtained from the San Marcos Building Director and an Operations Permit issued by the Fire Chief. Additional relevant sections of the City's Code for Blasting are provided below:

- The general contractor or property owner/developer shall give reasonable notice in writing at the time of issuance of a building permit, grading permit or encroachment license to all residences or businesses within 600 feet of any potential blast location. The notice shall be in a form approved by the Building Director. Any resident or business receiving such notice may request of the Building Director that a notice of impending blasting be given by the blaster at the time of the 12 hour advance notice given to the Building Director. The general contractor or property owner/developer shall make all reasonable efforts to contact any and all parties requesting the second notice.

- The blaster shall file a written certification with the Building Director certifying that the general notice required by Section 17.60.060(b) has been given. The certificate shall include addresses and date(s) of notification. A copy shall be retained on file at the Building Division.

- Inspections of all structures within 300 feet of the blast site shall be made before blasting operations. The persons inspecting shall obtain the permission of the building owner to conduct an inspection. The inspections shall be done by a registered structural engineer employed by the blaster or project contractor. The inspection shall be only for the purpose of determining the existence of any visible or reasonably recognizable pre-existing defects or damages in any structure. Inspection refusal shall be at the discretion of the property owner.

- Blasting shall only be permitted between the hours of 9:00 a.m. and 4:00 p.m. during any weekday, Monday through Friday, exclusive of City recognized holidays unless special circumstances warrant another time or day and special approval is granted by the Building Director and Fire Chief.

The City of San Marcos has not yet adopted vibration criteria. The United States Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration. For purposes of identifying potential project-related vibration impacts, the FTA criteria will be used. The human reaction to various levels of vibration is highly subjective. The upper end of the range shown for the threshold of perception, or roughly 65 VdB, may be considered annoying by some people. Vibration below 65 VdB may also cause secondary audible effects, such as a slight rattling of doors, suspended ceilings/fixtures, windows, and dishes, any of which may result in additional annoyance. Table 3-1 on the following page, shows the FTA groundborne vibration and noise impact criteria for human annoyance.

In addition to the vibration annoyance standards presented above, the FTA also applies the following standards for construction vibration damage. As shown in Table 3-2 on the following page, structural damage is possible for typical residential construction when the peak particle velocity (PPV) exceeds 0.2 inch per second (in/sec). This criterion is the threshold at which there is a risk of damage to normal dwellings.

In the context of this analysis, the noise and vibration impacts associated with the construction, rock crushing operations and blasting operations will be conditioned to comply with the thresholds stated above. The potential noise and vibration impacts are analyzed separately below.

Table 3-1: Groundborne Vibration and Noise Impact Criteria (Human Annoyance)

	Groundborne Vibration Impact Levels (VdB re 1 microinch/second)			Groundborne Noise Impact Levels (dB re 20 micropascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.

1 "Frequent Events" are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

2 "Occasional Events" are defined as between 30 and 70 vibration events of the same source per day. Most commuter truck lines have this many operations.

3 "Infrequent Events" are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines

4 This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

5 Vibration-sensitive equipment is not sensitive to groundborne noise.

Table 3-2: Groundborne Vibration Impact Criteria (Structural Damage)

Building Category	PPV (in/sec)	VdB
I. Reinforced-concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* June 2006.

Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

4.0 CONSTRUCTION NOISE AND VIBRATION

4.1 Construction Noise Prediction Methodology

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction equipment includes haul trucks, water trucks, graders, dozers, loaders and scrapers can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

The U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy construction equipment can range from 60 dBA to in excess of 100 dBA when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 75 dBA measured at 50 feet from the noise source to the receptor would be reduced to 69 dBA at 100 feet from the source to the receptor, and reduced to 63 dBA at 200 feet from the source.

Using a point-source noise prediction model, calculations of the expected construction noise impacts were completed. The essential model input data for these performance equations include the source levels of each type of equipment, relative source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day, also referred to as the duty-cycle and any transmission loss from topography or barriers.

The equipment needed for the mass grading will consist of tractor/backhoes, a hydraulic crane, a loader/grader, a water truck, four haul trucks, a roller/compactor, three scrapers and four drill rigs and a rock breaker. During the final site preparation and home construction four concrete trucks, a concrete pump, a paver and several lift trucks may be needed. Based on the EPA noise emissions, empirical data and the amount of equipment needed, worst case noise levels from the construction equipment would occur during the mass grading operations. Additionally, the project will utilize a Thunderbird Hazemag Impact Crushing Plant Model CP300 rock crusher. The grading equipment and rock crusher(s) are required to meet different noise standards and therefore are analyzed separately in the following sections.

4.2 Grading Activities Noise Findings and Mitigation

The mass grading activities will consist of the preparation of internal roadways, utility installation and the preparation of the slopes and finished pads. The grading equipment will be spread out over the Project site from distances near the occupied property lines to distances over 1,000 feet. When grading operations are occurring near a property line the amount of equipment will be limited to a few pieces of equipment due to site constraints. Therefore, the anticipated grading operations with all equipment operational, on average, will occur more than 500 feet from the property lines. This means that most of the time the average distance from all the equipment to the nearest property line is over 500 feet. For example: the rock drills may be working in the eastern portion of the site while the dozers, tractors and scrapers are operating in the western or southern portions of the site. Some of the equipment will then be moved to bring the blasted material to areas where fill is needed. As can be seen in Table 4-1, at an average distance of 500 feet from the construction activities to the nearest property line would result in a noise attenuation of -20.0 dBA. It should be noted: this assumes that all the equipment is operating simultaneously and continuously throughout the day.

Table 4-1: Construction Noise Levels

Equipment Type	Quantity Used	Source @ 50 Feet (dBA)	Cumulative Noise Level @ 50 Feet (dBA)
Tractor/Backhoe	2	72	75.0
Dozer D9 Cat	2	74	77.0
Loader/Grader	1	73	73.0
Water Trucks	1	70	70.0
Dump Trucks	4	75	81.0
Paver/Blade	1	75	75.0
Roller/Compactor	1	74	74.0
Scraper	3	72	76.8
Drill Rig	4	88	94.0
Rock Breaker	1	85	85.0
		Cumulative Level	95.0
		Distance to Sensitive Use	500
		Noise Reduction due to Distance	-20.0
		Property Line Noise Level	**75.0**

Given this, the noise levels will comply with the 75 dBA Leq standard average over 8 hours at the property lines. Therefore, no impacts are anticipated and no mitigation is required during construction of the proposed Project. Additionally, all equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away for the existing residence as possible.

4.3 Rock Crushing Noise Findings and Mitigation

This section examines the potential noise source impacts associated with the operation of the proposed temporary rock crushing facilities. The project may utilize two Thunderbird Hazemag

Impact Crushing Plant Model CP300 rock crusher, or equivalent. Rock crushing will occur between the hours of 7:00 AM and 4:00 PM. The crushers would be located at two separate locations, one in Phase 1 and other in Phase 2. Each crusher would be located approximately 1,000 feet from the nearest residence. Based on empirical data collected at a material processing plant in the City of Upland and a crushing operation in the City of Escondido, noise levels from different rock crushers ranged between 80-86 dBA at 45 feet (Ldn, 2011-2012). A worst-case noise level of 86 dBA at 45 feet will be utilized for the analysis.

As can be seen in Table 4-2, in order to achieve the City's 60 dBA Leq standard, a single rock crusher needs to be 900 feet from the nearest residence. Two rock crushers operating at the same time could have a worst case 60 dBA noise contour extending 1,265 feet from the center of the two crushers. Figure 4-A shows the noise contours of each rock crushing operation and the cumulative noise level if operated together. The noise contours do not take into account any shielding from topography, stockpiled materials or any barriers that may exist at the nearest residences. Additionally, if a rock crusher of smaller size or capacity is utilized the overall noise may be lower. Given this, the noise levels are anticipated to comply with the City's 60 dBA Leq standard at the property lines.

Table 4-2: Single Rock Crusher Noise Levels

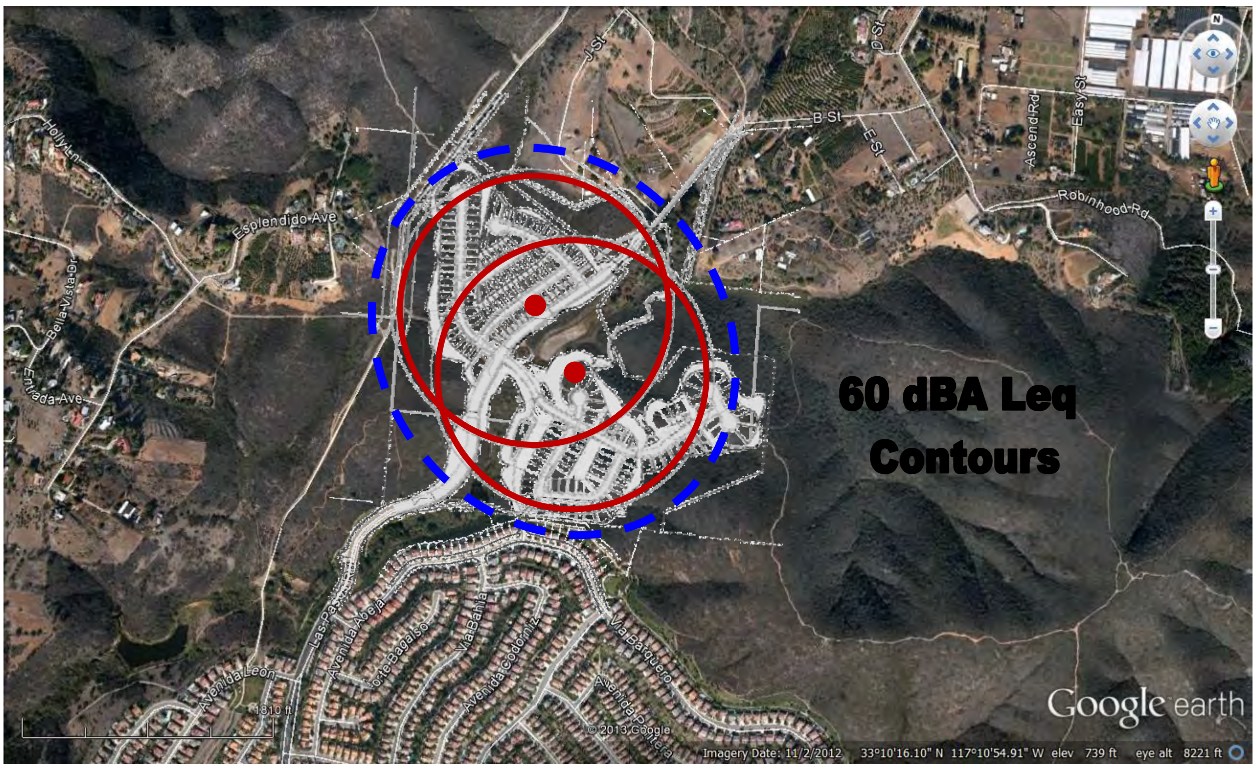
Equipment Type	Quantity Used	Source @ 45 Feet (dBA)	Cumulative Noise Level @ 45 Feet (dBA)
Thunderbird Hazemag Impact Crushing Plant Model CP300	1	86	86.0
		Distance to Sensitive Use	900
		Noise Reduction due to Distance	-26.0
		Property Line Noise Level	**60.0**

Table 4-3: Two Rock Crushers Noise Levels

Equipment Type	Quantity Used	Source @ 45 Feet (dBA)	Cumulative Noise Level @ 45 Feet (dBA)
Thunderbird Hazemag Impact Crushing Plant Model CP300	2	86	89.0
		Distance to Sensitive Use	1,265
		Noise Reduction due to Distance	-29.0
		Property Line Noise Level	**60.0**

Since the noise contours are relatively close to the existing residences and the anticipated noise cound be between 56-60 decibels at the nearest residence, noise measurements of the rock crushing facilities, within the first week of operations, should be conducted during to ensure compliance with the City's thresholds. If noise levels are found to be above the established thresholds of 60 dBA at any existing single family residential use, then mitigation in the form of berms or temporary walls, crusher orientation or relocation will need to be incorporated into rock crusher operations.

Figure 4-A: Rock Crusher Noise Contours



4.4 Construction Vibration Findings and Mitigation

The nearest vibration-sensitive uses are the residences located to the southeast, 200 feet or more from the proposed construction. Table 4-4 lists the average vibration levels that would be experienced at the nearest vibration sensitive land uses to the east from temporary construction activities. Loaded trucks will be traveling along the western portion of the site and were assessed at a minimum distance of 200 feet to be conservative.

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.20 in/sec for the peak particle velocity (PPV). Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, Project construction activities would not result in vibration induced structural damage to residential buildings near the demolition and construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Table 4-4: Vibration Levels from Construction Activities (Residential Receptors)

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS Velocity at 25 Feet (in/sec)	Approximate Velocity Level at 200 Feet (VdB)	Approximate RMS Velocity at 200 Feet (in/sec)
Small bulldozer	58	0.003	33.9	0.0001
Jackhammer	79	0.035	54.9	0.0015
Loaded trucks	86	0.076	61.9	0.0034
Large bulldozer	87	0.089	62.9	0.0039
		FTA Criteria	80	0.2
		Significant Impact?	**No**	**No**
[1] PPV at Distance D = PPVref x $(25/D)^{1.5}$				

4.5 Blasting Vibration Findings and Mitigation

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. As discussed above the smallest distance between an existing residence and the blasting activity was assumed to be 200 feet. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 82 VdB and 0.05 inch per second, respectively.

Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided but can be minimized by following the City's blasting procedures as stated above in Section 3.5 and with proper notice annoyances can be avoided.

<u>5.0 TRANSPORTATION NOISE</u>

5.1 Existing Noise Environment Onsite

Noise measurements were taken using a Larson-Davis Model Spark Type 2 precision sound level meters, programmed, in "slow" mode, to record noise levels in "A" weighted form. The sound level meters and microphones were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meters were calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 150. The long term ambient measurements were conducted for 48 hours from October 14-17, 2014. The measurements were taken near the northern portion of the site along the future roadway alignment and at the terminus of Los Posas Road at the entrance of the project site. The noise monitoring locations can be seen in Figure 5-A. The overall sound levels were found to be roughly 45-55 dBA. The noise levels at ML2 were slightly higher due to traffic along Los Posas Road. The results of the noise level measurements are presented in Table 5-1.

Figure 5-A: Ambient Monitoring Locations

Table 5-1: Measured Ambient Noise Levels

Measurement Identification	Description	Date	Noise Levels (dBA Leq)					
			Leq	Lmax	Lmin	L10	L50	L90
ML 1	Northern portion of the site	10/14/14-10/17/14	45.7	72.4	32.9	41.5	36.0	34.5
ML 2	Southern portion of the site		54.4	78.4	36.9	57.0	50.5	42.5

5.2 Future Onsite Noise Prediction

To determine the future noise environment and impact potentials the Sound32 model was utilized. The critical model input parameters, which determine the projected vehicular traffic noise levels, include vehicle travel speeds, the percentages of automobiles, medium trucks and heavy trucks in the roadway volume, the site conditions and the peak hour traffic volume. The peak hour traffic volumes range between 6-12% of the average daily traffic (ADT) and 10% is generally acceptable for noise modeling.

Table 5-2 presents the roadway parameters used in the analysis including the peak traffic volumes, vehicle speeds and the hourly traffic flow distribution (vehicle mix). The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the Sound32 Model. The Buildout conditions include the future traffic volume forecasts provided in the Project's Traffic Study (RBF Consulting, 2014).

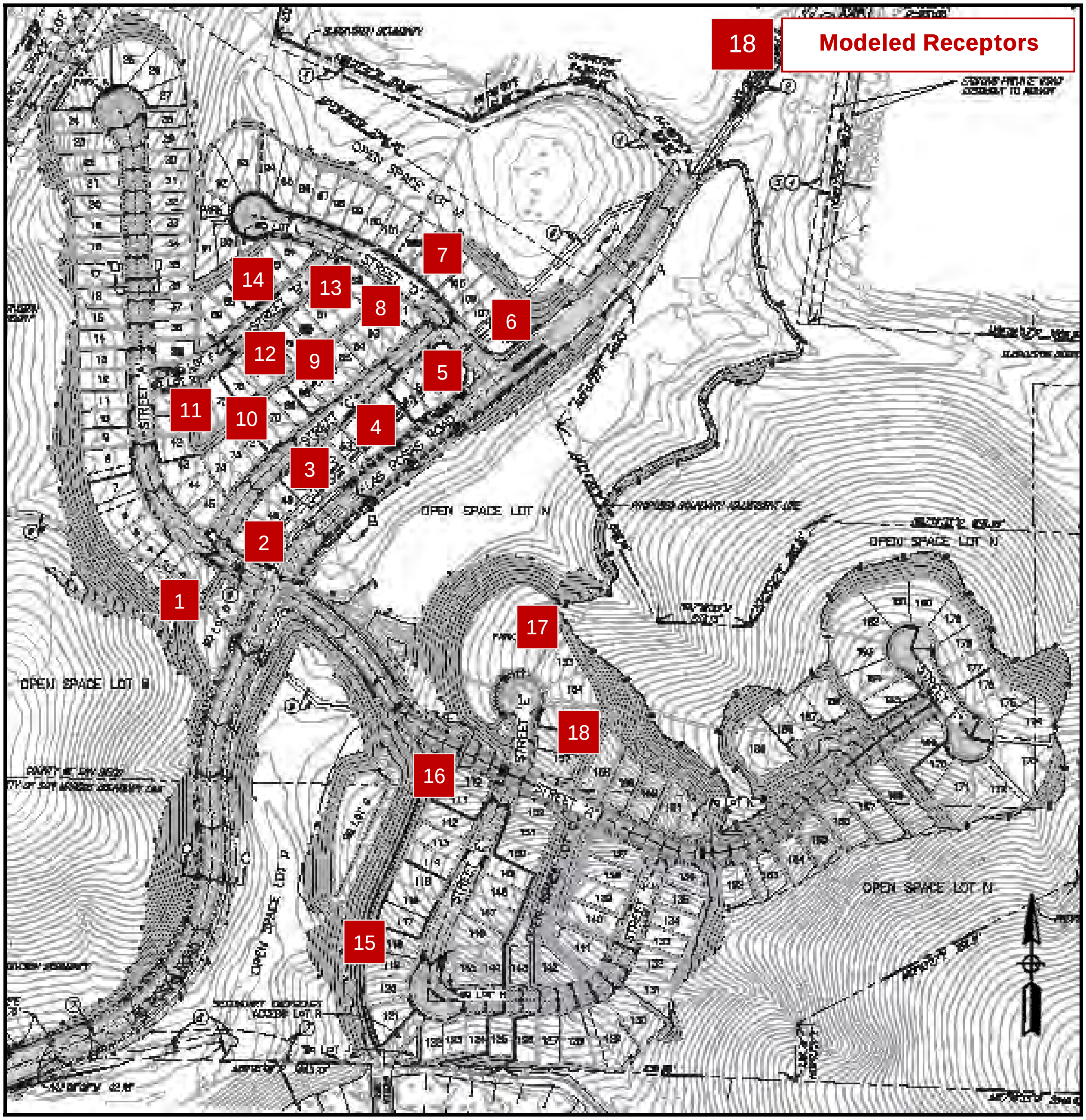
Table 5-2: Future Traffic Parameters

Roadway	Average Daily Traffic (ADT)[1]	Peak Hour Volumes[1]	Modeled Speeds (MPH)	Vehicle Mix %[2]		
				Auto	Medium Trucks	Heavy Trucks
Los Posas Road	14,698	1,470	45	96	2	2

[1] Source: RBF Consulting, 2014
[2] Typical vehicle mix

The required coordinate information necessary for the Sound32 model input was taken from the conceptual site plans provided by Excel Engineering dated 2014. The preliminary grading plans were used to identify the pad elevations, roadway elevations, and the relationship between the noise source(s) and the outdoor receptor areas. The modeled observer locations for the outdoor use areas are shown in Figure 5-B.

Figure 5-B: Modeled Receptor Locations



5.3 Onsite Noise Findings and Mitigation

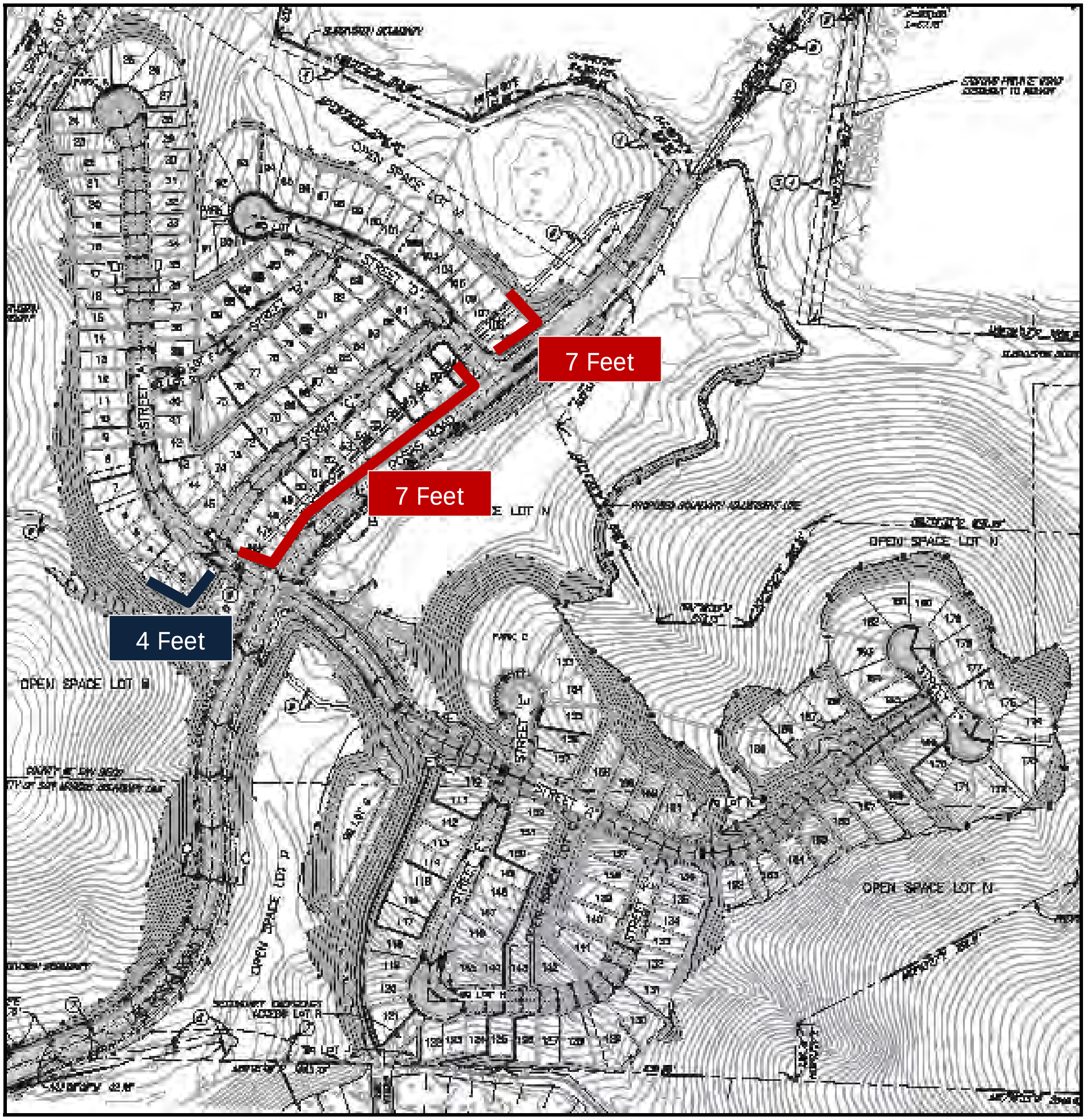
The modeling results are quantitatively shown in Table 5-3 below for the unmitigated and mitigated scenarios. Based upon these findings, noise mitigation in the form of 7-foot barriers are necessary along the Lots adjacent to Las Posas Road along with a 4 foot barrier at the Lot in the south east corner in order to comply with the City of San Marcos Noise standards. The barriers can be constructed of a combination of landscape berms and sound walls. The locations of barriers are provided in Figure 5-C on the following page. The modeling input and outputs are provided in ***Attachment A***.

Additionally, a final noise assessment is required prior to the issuance of the first building permit for all second floor areas of the Lots located adjacent to Los Posas Road since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and building plans to meet the City's established interior noise limit of 45 dBA CNEL. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g. air conditioning) for each building and upgraded windows for all sensitive rooms (e.g. bedrooms and living spaces).

Table 5-3: Future Exterior Noise Levels

Receptor Number	Unmitigated Noise Level (dBA CNEL)	Barrier Heights (Feet)	Mitigated Noise Level (dBA CNEL)	Second Floor Noise Level (dBA CNEL)
1	61	**4**	60	64*
2	67	**7**	60	68*
3	68	**7**	60	69*
4	67	**7**	60	68*
5	67	**7**	60	69*
6	66	**7**	60	67*
7	58	0	57	60
8	59	0	54	56
9	59	0	55	56
10	59	0	55	56
11	54	0	52	55
12	56	0	53	55
13	55	0	53	56
14	52	0	50	54
15	54	0	54	59
16	53	0	53	59
17	53	0	53	59
18	51	0	51	57
*Interior Noise assessment needed				

Figure 5-C: Noise Mitigation Measures



5.4 Project Related Offsite Transportation Noise

The off-site Project related roadway segment noise levels projected in this report were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December, 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections. The noise contours are then established by iterating the equivalent noise level over many distances until the distance to the desired noise contour(s) are found.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiant in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. Hard site conditions, to be conservative, were used to develop the noise contours and analyze noise impacts along all roadway segments. The future traffic noise model utilizes a typical, conservative vehicle mix of 96% Autos, 2% Medium Trucks and 2% Heavy Trucks for all analyzed roadway segments. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA Model.

Community noise level changes greater than 3 dBA are often identified as audible and considered potential significant, while changes less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change. There is no scientific evidence available to support the use of 3 dBA as the significance threshold. Community noise exposures are typically over a long time period rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely greater than 1 dBA and 3 dBA appears to be appropriate for most people. For the purposes for this analysis a direct and cumulative roadway noise impacts would be considered significant if the project increases noise levels for a noise sensitive land use by 3 dBA CNEL and if the project increases noise levels above an unacceptable noise level per the City's General Plan in the area adjacent to the roadway segment.

Direct Noise Impacts

To determine if direct off-site noise level increases associated with the development of the Project will create noise impacts. The noise levels for the existing conditions were compared with the noise level increase from the Project. Utilizing the Project's traffic assessment (Source: RBF Consulting 2014) noise contours were developed for the following traffic scenarios:

> Existing: Current day noise conditions without construction of the project.
>
> Existing Plus Project: Current day noise conditions plus the completion of the project.
>
> Existing vs. Existing Plus Project: Comparison of the direct project related noise level increases in the vicinity of the project site.

The noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 5-4 for the Existing Scenario and in Table 5-5 for the Existing Plus Project Scenario. Please note that the values given do not take into account the effect of any noise barriers or topography that may affect ambient noise levels. Table 5-6 presents the comparison of the Existing Year with and without Project related noise levels. The overall roadway segment noise levels will increase from 0.0 dBA CNEL to 3.6 dBA CNEL with the development of the Project.

Table 5-4: Existing Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Las Posas Road	Project Site to Avenida Arana	1,567	45	61.2	60
	Avenida Arana to Borden Road	3,814	45	65.1	109
	Borden Road to Camino Del Sol	11,199	45	69.7	223
	Camino Del Sol to Avenida Azul	13,274	45	70.5	249
	Avenida Azul to Mission Road	20,795	45	72.4	336
	Mission Road to SR-78 WB Ramps	34,839	45	74.7	474
	SR-78 WB Ramps to Grand Avenue	36,553	45	74.9	490
Grand Avenue	Las Posas Road to Via Vera Cruz	23,655	45	73.0	367
San Marcos Boulevard	Pacific Street to Las Posas Road	37,803	45	75.0	501
Borden Road	Las Posas Road to Twin Oaks Valley Road	11,312	40	68.6	188
	Twin Oaks Valley Road to Woodward Street	8,205	40	67.2	152
Mission Road	Rancho Santa Fe Road to Las Posas Road	13,988	45	70.7	258
	Las Posas Road to Knoll Road	20,215	45	72.3	330

[1] Source: Project Traffic study prepared by RBF Consulting 2014

Table 5-5: Existing + Project Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Las Posas Road	Project Site to Avenida Arana	3,565	45	64.8	104
	Avenida Arana to Borden Road	5,812	45	66.9	144
	Borden Road to Camino Del Sol	12,698	45	70.3	242
	Camino Del Sol to Avenida Azul	14,773	45	70.9	268
	Avenida Azul to Mission Road	22,294	45	72.7	352
	Mission Road to SR-78 WB Ramps	35,938	45	74.8	484
	SR-78 WB Ramps to Grand Avenue	37,322	45	75.0	497
Grand Avenue	Las Posas Road to Via Vera Cruz	24,105	45	73.1	371
San Marcos Boulevard	Pacific Street to Las Posas Road	38,003	45	75.0	503
Borden Road	Las Posas Road to Twin Oaks Valley Road	11,812	40	68.8	194
	Twin Oaks Valley Road to Woodward Street	8,405	40	67.4	155
Mission Road	Rancho Santa Fe Road to Las Posas Road	14,188	45	70.8	261
	Las Posas Road to Knoll Road	20,415	45	72.3	332
[1] Source: Project Traffic study prepared by RBF Consulting 2014					

Table 5-6: Existing vs. Existing + Project Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Project Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Las Posas Road	Project Site to Avenida Arana	61.2	64.8	3.6
	Avenida Arana to Borden Road	65.1	66.9	1.8
	Borden Road to Camino Del Sol	69.7	70.3	0.6
	Camino Del Sol to Avenida Azul	70.5	70.9	0.4
	Avenida Azul to Mission Road	72.4	72.7	0.3
	Mission Road to SR-78 WB Ramps	74.7	74.8	0.1
	SR-78 WB Ramps to Grand Avenue	74.9	75.0	0.1
Grand Avenue	Las Posas Road to Via Vera Cruz	73.0	73.1	0.1
San Marcos Boulevard	Pacific Street to Las Posas Road	75.0	75.0	0.0
Borden Road	Las Posas Road to Twin Oaks Valley Road	68.6	68.8	0.2
	Twin Oaks Valley Road to Woodward Street	67.2	67.4	0.2
Mission Road	Rancho Santa Fe Road to Las Posas Road	70.7	70.8	0.1
	Las Posas Road to Knoll Road	72.3	72.3	0.0

The Project does create a direct noise increase of more than 3 dBA CNEL on a segment of Los Posas Road between the Project site and Avenida Arana. The overall noise level is 64.8 dBA CNEL at 50 feet with no shielding. The existing residences along this segment of roadway are elevated above the roadway have a minimum of 5-foot barriers and that will reduce the noise level at least 5 decibels or more depending on the elevation differences. The existing wall will reduce the roadway noise levels below the 60 dBA CNEL threshold. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Cumulative Noise Impacts

To determine if cumulative off-site noise level increases associated with the development of the Project and other planned or permitted projects in the vicinity will create noise impacts. The noise levels for the near-term Project Buildout and other planned and permitted projects were compared with the existing conditions. Utilizing the Project's traffic assessment (Source: RBF Consulting 2014) noise contours were developed for the following traffic scenarios:

> Existing: Current day noise conditions without construction of the project.
>
> Existing Plus Cumulative Projects Plus Project: Current day noise conditions plus the completion of the project and the completion of other permitted, planned projects or approved ambient growth factors.
>
> Existing vs. Existing Plus Cumulative Plus Project: Comparison of the existing noise levels and the related noise level increases from the combination of the project and all other planned or permitted projects in the vicinity of the site.

The existing noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 5-4 above for the Existing Scenario. The near-term cumulative noise conditions are provided in Table 5-7. No noise barriers or topography that may affect noise levels were incorporated in the calculations.

Table 5-8 presents the comparison of the Existing Year and the Near-Term Cumulative noise levels. The overall roadway segment noise levels will increase from 0.4 dBA CNEL to 3.7 dBA CNEL with the development of the Project. The Project is a main contributor to a cumulative noise increase of more than 3 dBA CNEL on the segment of Los Posas Road, the same segment the Project creates a direct noise increase. The overall noise level is 64.9 dBA CNEL at 50 feet with no shielding. The existing residences along this segment of roadway are elevated above the roadway have a minimum of 5-foot barriers that will reduce the noise level below the 60 dBA CNEL threshold as described above.

Table 5-7: Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Las Posas Road	Project Site to Avenida Arana	3,696	45	64.9	106
	Avenida Arana to Borden Road	6,218	45	67.2	150
	Borden Road to Camino Del Sol	14,490	45	70.8	264
	Camino Del Sol to Avenida Azul	16,984	45	71.5	294
	Avenida Azul to Mission Road	26,177	45	73.4	392
	Mission Road to SR-78 WB Ramps	43,228	45	75.6	548
	SR-78 WB Ramps to Grand Avenue	45,109	45	75.8	564
Grand Avenue	Las Posas Road to Via Vera Cruz	28,310	45	73.8	413
San Marcos Boulevard	Pacific Street to Las Posas Road	42,999	45	75.6	546
Borden Road	Las Posas Road to Twin Oaks Valley Road	13,744	40	69.5	215
	Twin Oaks Valley Road to Woodward Street	9,176	40	67.7	164
Mission Road	Rancho Santa Fe Road to Las Posas Road	16,465	45	71.4	288
	Las Posas Road to Knoll Road	22,329	45	72.7	353

[1] Source: Project Traffic study prepared by RBF Consulting 2014

Table 5-8: Existing vs. Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Project Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Las Posas Road	Project Site to Avenida Arana	61.2	64.9	3.7
	Avenida Arana to Borden Road	65.1	67.2	2.1
	Borden Road to Camino Del Sol	69.7	70.8	1.1
	Camino Del Sol to Avenida Azul	70.5	71.5	1.0
	Avenida Azul to Mission Road	72.4	73.4	1.0
	Mission Road to SR-78 WB Ramps	74.7	75.6	0.9
	SR-78 WB Ramps to Grand Avenue	74.9	75.8	0.9
Grand Avenue	Las Posas Road to Via Vera Cruz	73.0	73.8	0.8
San Marcos Boulevard	Pacific Street to Las Posas Road	75.0	75.6	0.6
Borden Road	Las Posas Road to Twin Oaks Valley Road	68.6	69.5	0.9
	Twin Oaks Valley Road to Woodward Street	67.2	67.7	0.5
Mission Road	Rancho Santa Fe Road to Las Posas Road	70.7	71.4	0.7
	Las Posas Road to Knoll Road	72.3	72.7	0.4

5.5 Operational Noise from Park Activities

The Project includes several Parks that may have some recreational activities. These activities could include basketball courts or small sports related areas. The Parks are not large enough to accommodate a full sports field but could have some similar activities on a smaller scale. Based on noise surveys conducted at several fields and basketball courts, the hourly average sound levels ranged from 49 to 56 dBA at distances of 150 feet from the boundary of the playing field, or 200 feet from the center of the field. The maximum short term (less than one minute) noise levels from players cheers reached 70 dBA but this noise level diminished quickly. This is consistent with the findings of noise surveys conducted of sporting events for the San Rafael Airport Recreation Facility Environmental Noise Assessment (Source: Illingworth & Rodkin, Inc. - 2005). Those noise surveys found that for various larger fields the hourly average noise levels during an event were as high as 54 dBA at 180 feet from the center of the field.

The nearest Park on the project site is located approximately 1,000 feet from the nearest existing residences. At a distance of 1,000 feet, the hourly noise levels generated by outdoor sports activities would be 42 dBA hourly using a source level of 56 dBA at 200 feet. These noise levels are below the property line threshold and would comply with the City's standards. It should be noted: these noise levels are from surveys taken at larger park complexes and sporting events and are conservative for the proposed park uses.

5.6 Offsite Noise Findings and Mitigation

The Project does create a direct and cumulative noise increase of more than 3 dBA CNEL on a segment of Los Posas Road just south of the Project's main access. The overall noise level is just below 65 dBA CNEL at a distance of 50 feet with no shielding. The existing residences along this segment of roadway are elevated above the roadway have a minimum of 5-foot barriers that will reduce the noise level at least 5 decibels or more depending on the elevation differences. The existing walls, elevations changes and increased distances from the centerline will reduce the roadway noise levels below the 60 dBA CNEL threshold. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

The anticipated noise levels from the proposed park and the associated activities were could to be below the property line thresholds. Therefore no operational park activities would result in impacts.

6.0 CERTIFICATIONS

The contents of this report represent an accurate depiction of the noise environment and impacts within and surrounding the proposed San Marcos Highlands residential development. The information contained in this report was based on the best available data at the time of preparation. If you have any questions pertaining to this analysis please contact me directly at jlouden@ldnconsulting.net or (760) 473-1253.

Jeremy Louden, Principal   Date April 14, 2015

Ldn Consulting, Inc.

(760) 473-1253

jlouden@ldnconsulting.net

ATTACHMENT A

FUTURE EXTERIOR NOISE MODEL
INPUT AND OUTPUT FILES

San Marcos Highlands Unmitigated
T-Las Posas Road, 1
1153 , 45 , 24 , 45 , 24 , 45
L-Peak Hour, 1
N,580.,155,620,
N,848.,276,629,
N,1016.,484,640,
N,1054.,724,650,
N,1070.,980,660,
N,1218.,1318,670,
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N,1616.,1697,690,
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R, 7 , 67 ,500
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R, 15 , 67 ,500
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R, 16 , 67 ,500
1622,859,707.,
R, 17 , 67 ,500
1842,1208,712.,
R, 18 , 67 ,500
1714,636,720.,
D, 4.5
ALL,ALL
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
San Marcos Highlands Unmitigated

BASED ON FHWA-RD-108 AND
CALIFORNIA REFERENCE ENERGY MEAN EMISSION LEVELS

RECEIVER	LEQ
R-1	60.9
R-2	66.8
R-3	67.6
R-4	66.8
R-5	67.2
R-6	66.4
R-7	58.0
R-8	58.5
R-9	58.8
R-10	58.5
R-11	53.7
R-12	55.5
R-13	55.3
R-14	52.0
R-15	53.5
R-16	53.0
R-17	53.1
R-18	50.9

San Marcos Highlands Mitigated
T-Las Posas Road, 1
1153 , 45 , 24 , 45 , 24 , 45
L-Peak Hour, 1
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932.,1296,674,675,
B-Lot 46-62, 2 , 2 , 0 ,0
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1190.,1355,672,679,
1235.,1420,674,681,
1292.,1486,679,686,
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1713.,1845,698,705,
1670.,1906,698,705,
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1852.,1941,696,703,
1818.,1981,696,703,
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R, 2 , 67 ,500
1184,1382,677.,
R, 3 , 67 ,500
1306,1512,685.,
R, 4 , 67 ,500
1494,1686,694.,

R, 5 , 67 ,500
1633,1790,700.,
R, 6 , 67 ,500
1826,1954,701.,
R, 7 , 67 ,500
1702,2084,705.,
R, 8 , 67 ,500
1440,1851,697.,
R, 9 , 67 ,500
1313,1731,690.,
R, 10 , 67 ,500
1180,1622,684.,
R, 11 , 67 ,500
934,1651,683.,
R, 12 , 67 ,500
1263,1858,705.,
R, 13 , 67 ,500
1479,2049,713.,
R, 14 , 67 ,500
1381,2217,708.,
R, 15 , 67 ,500
1483,567,698.,
R, 16 , 67 ,500
1622,859,707.,
R, 17 , 67 ,500
1842,1208,712.,
R, 18 , 67 ,500
1714,636,720.,
D, 4.5
ALL,ALL
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
San Marcos Highlands Mitigated

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R-1	67.	500.	59.7
2	R-2	67.	500.	60.2
3	R-3	67.	500.	60.4
4	R-4	67.	500.	60.4
5	R-5	67.	500.	60.4
6	R-6	67.	500.	60.4
7	R-7	67.	500.	56.7
8	R-8	67.	500.	54.4
9	R-9	67.	500.	54.7
10	R-10	67.	500.	54.5
11	R-11	67.	500.	51.8
12	R-12	67.	500.	53.0
13	R-13	67.	500.	53.3
14	R-14	67.	500.	50.4
15	R-15	67.	500.	53.5
16	R-16	67.	500.	53.0
17	R-17	67.	500.	53.1
18	R-18	67.	500.	50.9

San Marcos Highlands Second Floor
T-Las Posas Road, 1
1153 , 45 , 24 , 45 , 24 , 45
L-Peak Hour, 1

N,580.,155,620,
N,848.,276,629,
N,1016.,484,640,
N,1054.,724,650,
N,1070.,980,660,
N,1218.,1318,670,
N,1304.,1431,675,
N,1508.,1611,685,
N,1616.,1697,690,
N,1859.,1883,694,
N,1958.,1984,694,
N,2054.,2077,690,
N,2189.,2287,682,
B-Lot 1-3, 1 , 2 , 0 ,0
1058.,1321,671,675,
1015.,1246,671,675,
932.,1296,674,675,
B-Lot 46-62, 2 , 2 , 0 ,0
1121.,1390,672,679,
1190.,1355,672,679,
1235.,1420,674,681,
1292.,1486,679,686,
1355.,1545,682,689,
1488.,1656,688,695,
1713.,1845,698,705,
1670.,1906,698,705,
B-Lot 116-117, 3 , 2 , 0 ,0
1790.,1890,696,703,
1852.,1941,696,703,
1818.,1981,696,703,
R, 1 , 67 ,500
1019,1265,686.,
R, 2 , 67 ,500
1184,1382,687.,
R, 3 , 67 ,500
1306,1512,695.,
R, 4 , 67 ,500
1494,1686,704.,
R, 5 , 67 ,500
1633,1790,710.,
R, 6 , 67 ,500
1826,1954,711.,
R, 7 , 67 ,500
1702,2084,715.,
R, 8 , 67 ,500
1440,1851,707.,
R, 9 , 67 ,500
1313,1731,700.,
R, 10 , 67 ,500
1180,1622,694.,
R, 11 , 67 ,500
934,1651,693.,
R, 12 , 67 ,500
1263,1858,715.,
R, 13 , 67 ,500
1479,2049,723.,
R, 14 , 67 ,500
1381,2217,718.,
R, 15 , 67 ,500
1483,567,708.,
R, 16 , 67 ,500
1622,859,717.,
R, 17 , 67 ,500
1842,1208,722.,
R, 18 , 67 ,500

1714,636,730.,
C,C

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TITLE:
San Marcos Highlands Second Floor

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R-1	67.	500.	64.0
2	R-2	67.	500.	68.3
3	R-3	67.	500.	68.9
4	R-4	67.	500.	67.8
5	R-5	67.	500.	68.5
6	R-6	67.	500.	66.8
7	R-7	67.	500.	60.2
8	R-8	67.	500.	56.4
9	R-9	67.	500.	56.4
10	R-10	67.	500.	56.2
11	R-11	67.	500.	54.6
12	R-12	67.	500.	55.3
13	R-13	67.	500.	56.4
14	R-14	67.	500.	54.2
15	R-15	67.	500.	58.9
16	R-16	67.	500.	58.7
17	R-17	67.	500.	58.7
18	R-18	67.	500.	57.0