NOISE ASSESSMENT

GREENHILLS RANCH PHASE 2

ASSESSOR PARCEL NUMBERS:
395-151-16, 60, 61 & 73
395-160-12, 398-400-08, 09, 10, 20 & 47

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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 impacts associated with the development of the proposed residential project. The project known as "Greenhills Ranch Phase 2" consists of a tentative map. The project is located in the unincorporated community of Lakeside in eastern San Diego County, CA.

- On-Site Noise Analysis

The results of the noise analysis indicate that future vehicle noise from Lake Jennings Park Road is the principal source of community noise that could impact the site. However, due to the distance separation and intervening topography the future noise levels were found to comply with the County's 60 dBA CNEL threshold for all proposed lots. Additionally, no second floor areas were found to be above the 60 dBA CNEL threshold. Therefore an interior noise assessment will not be required for this project prior to the approval of building plan permits.

- Off-Site Noise Analysis

The Project does not create a direct impact of more than 3 dBA CNEL on any roadway segment and no cumulative noise increase of 3 dBA CNEL or more was found. Therefore, the proposed Project's direct and cumulative contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

- Construction Noise Analysis

The grading equipment will be spread out over the project site from distances near the occupied property to distances of over 300 feet away. This means that most of the time the average distance from the equipment to the occupied property is 150-feet and in that situation less than significant impacts are anticipated. At distances closer than 128-feet the grading activities are anticipated to exceed the County's 75-dBA standard and a temporary 8-foot high noise barrier is required. The barrier would need to be located at the edge of the projects property line adjacent to the occupied residence. The barrier would only need to be utilized while grading activities consist of more than two pieces of equipment operating within 50-feet or more than four pieces of equipment are located within 100-feet of the occupied residences. The temporary barrier should be non-gapping, free of any cut-outs and be constructed of ¾ inch plywood or equivalent materials. With the incorporation of the 8-foot-high temporary barrier less than significant impacts are anticipated and no further mitigation is required for the proposed grading activities.

In the event that the rock drills are staged within 200 feet of any occupied noise sensitive land use, implusive noise may exceed the County Noise Ordinance Section 36.410 standard of 82 dBA. As stated above, the rock drill need to be 225 feet from any occupied noise sensitive land use to meet

the 75 dBA standard in the County Noise Ordinance Section 36.409. Therefore, if the rock drills are staged within 225 feet of any occupied noise sensitive land it is recommended that a specific mitigation plan based upon the location of the construction equipment, topography and construction schedule be identified by a County certified acoustical engineer. The mitigation plan may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height maybe needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the County's threshold. The mitigation plan can also restrict the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier, or equipment usage as necessary. Blasting operations must comply with the County's Consolidated Fire Code (2011) Section 3301.2 which establishes permitting and notification procedures.

- Vibration Analysis

There are no existing or proposed frequent activities on or near the proposed project site at this time which would cause any significant vibration levels to existing buildings near the project site. Blasting operations must comply with the County's Consolidated Fire Code (2011) Section 3301.2 which establishes permitting and notification procedures. Therefore, no additional analysis or mitigation is required.

1.0 INTRODUCTION

1.1 Project Description

This noise study was completed to determine the noise impacts associated with the development of the proposed Greenhills Ranch Phase 2 Residential Project. The project is located at 32° 51′ 04″ N and 116° 53′ 51″ W, west of Lake Jennings Park Road and north of Audubon Road in the unincorporated community of Lakeside in eastern San Diego County, CA.

The proposed project site is currently designated Specific Plan Area 1.6 by the General Plan as shown on the Lakeside Community Plan Map. The site is predominately zoned S88, allowing a density of 1.6 per acre. The project is asking for approval of a 74-lot subdivision to include 63 residential units, six street lots, 3 open space lots and 2 HOA lots. The project's 63 residential units are on lots ranging from 5,119 to 16,122 square-feet in size.

The proposed on-site noise sensitive land uses (NSLU) located on the project site is the 63 single family homes. The site is surrounded by similar residential uses and shares a property line with the Helix Treatment Plant to the north, which is located well below grade of any proposed residences. The general location of the project is shown on the Vicinity Map, Figure 1-A. The site plan used for this analysis is shown on Figure 1-B.

1.2 Environmental Settings & Existing Conditions

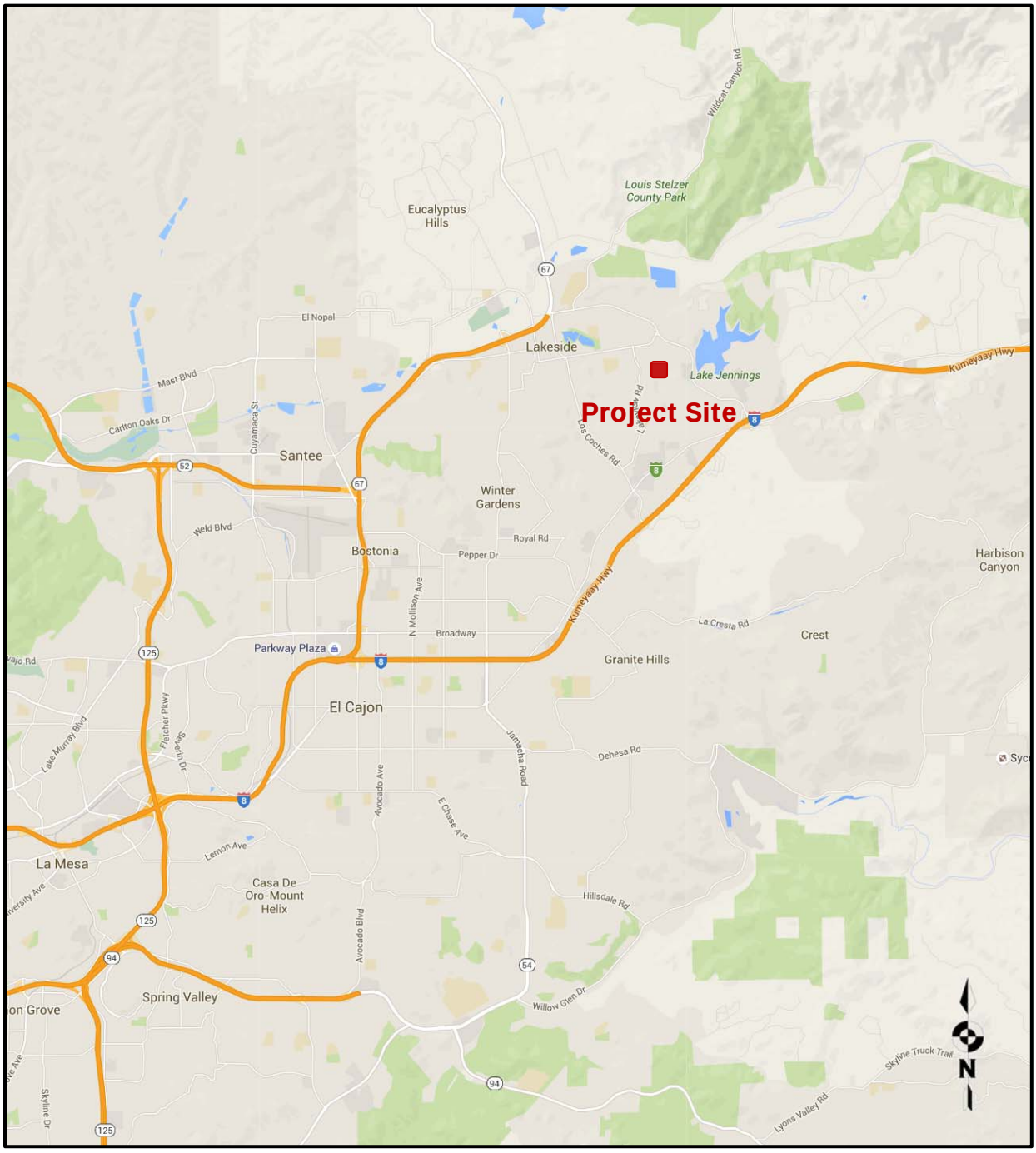
a) Settings & Locations

The project is located west of the Lake Jennings Park Road at the end of Audubon Road and Adlai Road in the community of Lakeside. Land use surrounding the site is primarily residential, open space and the Helix Water District Treatment Plant located to the north approximately 70-feet down slope. Adjacent to the subject property along the south and southwest boundaries are similar residential dwelling units.

b) Existing Noise Conditions

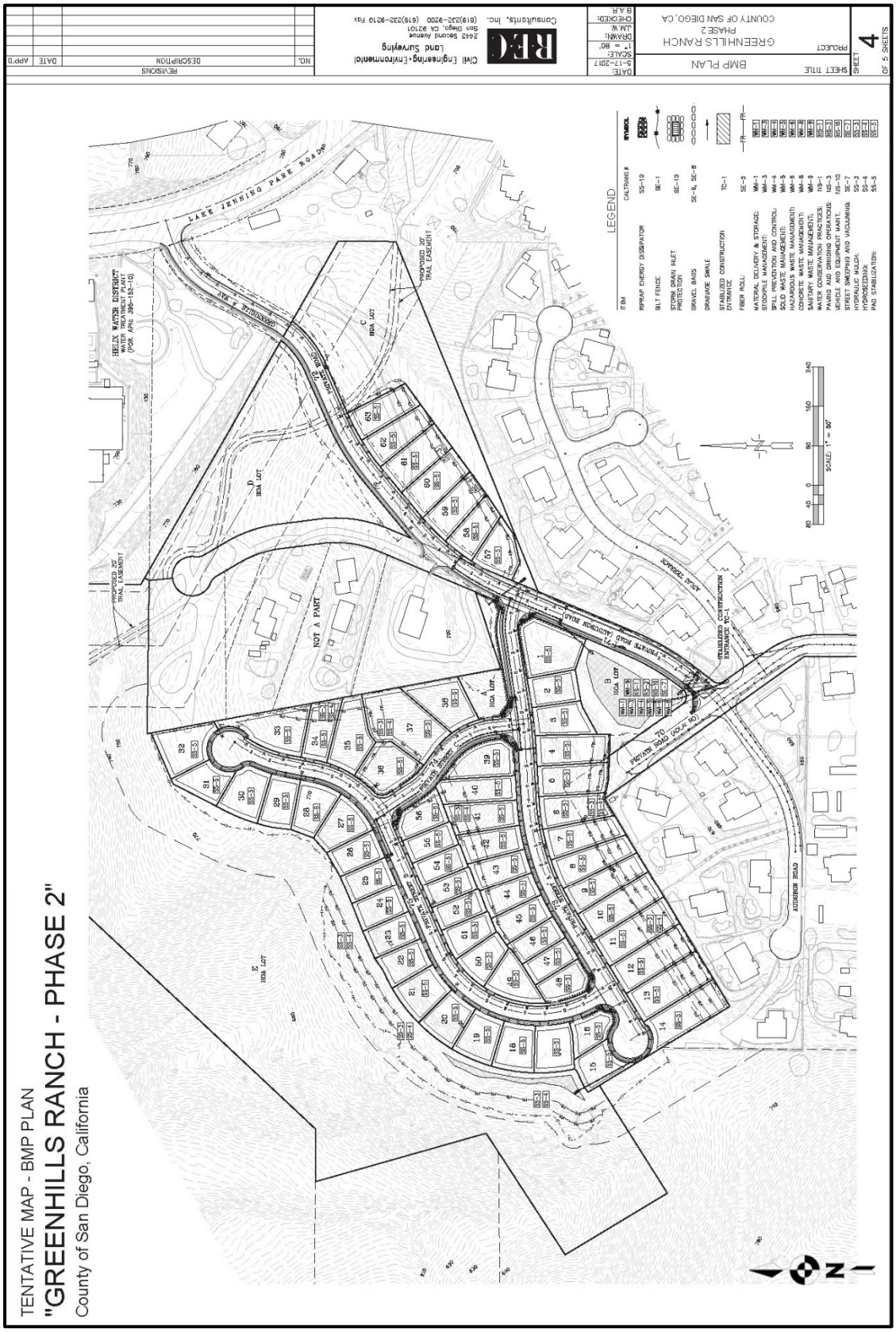
The project is located adjacent to Lake Jennings Park Road, described as a major roadway in the County of San Diego's Circulation Element and north of Audubon Road (and residential roadway). Existing noise occurs mainly from traffic traveling on Lake Jennings Park Road.

Figure 1-A: Project Vicinity Map



Source: Google Maps

Figure 1-B: Proposed Project Site Layout



1.3 Methodology and Equipment

a) Noise Measuring Methodology and Procedures

To determine the existing noise environment and to assess potential noise impacts, measurements were taken along the eastern portion of the site having a direct line of site to Lake Jennings Park Road. This was done to determine the worst case conditions at the proposed NSLU. The noise measurements were recorded on June 22, 2009 by Ldn Consulting, Inc. between approximately 1:15 p.m. and 1:30 p.m.

The noise measurements were taken using a Quest Sound Pro DL-2 Type 2 precision sound level meter. The meter was programmed, in "slow" mode and set to record noise levels in an "A" weighted form. The sound level meter, preamp and microphone were mounted on a tripod, raised five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring period on site using a Quest calibrator, Model QC-10.

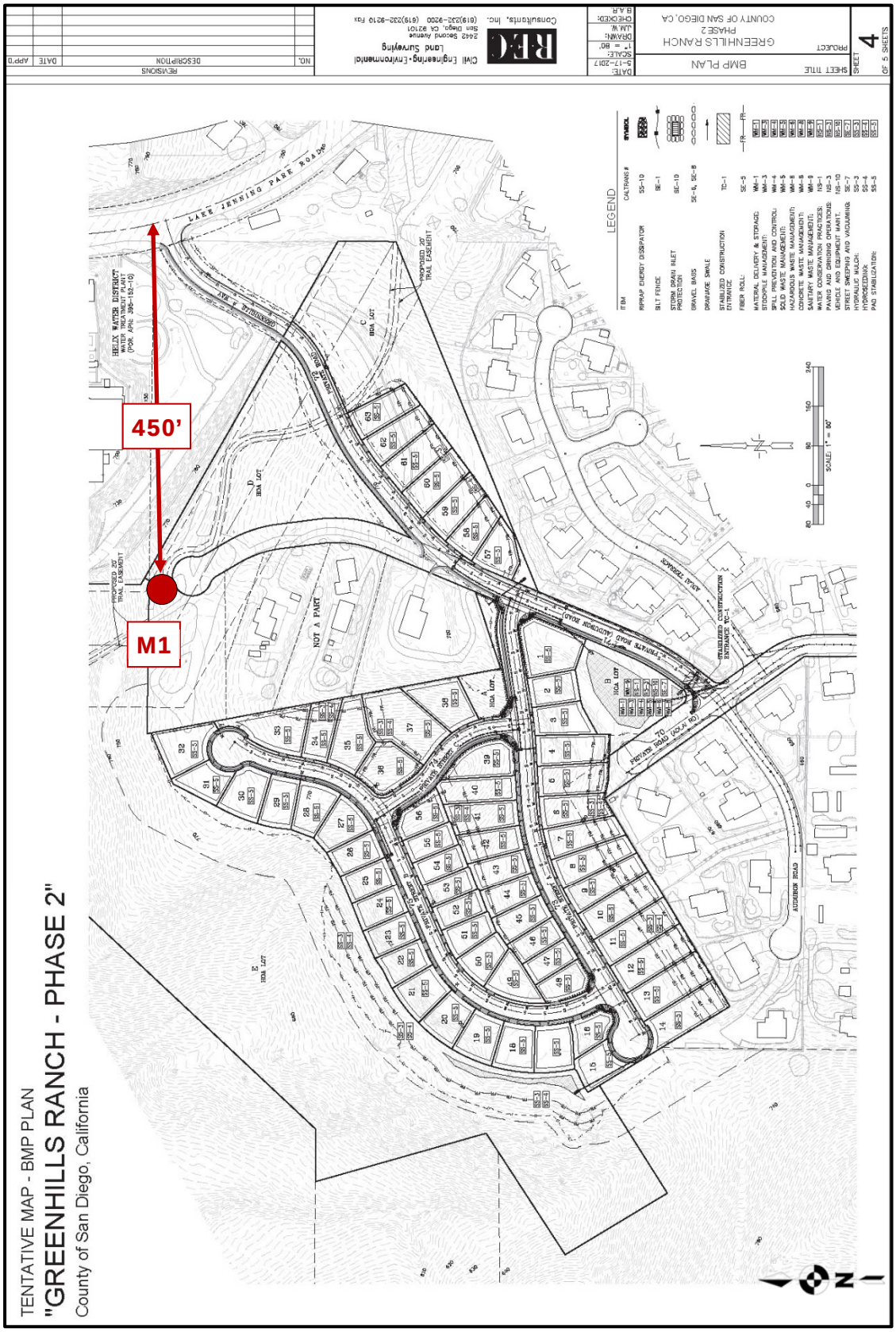
The noise measurement location was determined based on site access and noise impact potential. Monitoring location 1 was located along the fence line of the project site adjacent to the Helix Water District Treatment Plant roughly 450-feet from Lake Jennings Park Road within proposed Lot 68 (open space). The noise monitoring location is provided graphically in Figure 1-C on the following page.

The results of the noise level measurements are presented in Table 1-1. The noise measurements were monitored for a time period of 15 minutes. The ambient Leq noise levels measured in the area of the project during the afternoon hour was found to be 45.2 dBA Leq at measurement location 1. The existing noise levels in the project area consisted primarily of traffic on Lake Jennings Park Road.

Table 1-1: Existing Noise Levels

Location	Time	One Hour Noise Levels (dBA)					
		Leq	Lmin	Lmax	L10	L50	L90
ML1	1:15–1:30 p.m.	45.2	38.0	61.3	46.9	42.3	39.4
Source: Ldn Consulting, Inc. June 22, 2009							

Figure 1-C: Noise Measurement Locations



b) Noise Modeling Software

The expected roadway noise levels from Lake Jennings Park Road were projected using Caltrans Sound32 Traffic Noise Prediction Model. Sound32 is a peak hour based traffic noise prediction model. The results of this analysis are based on the California Vehicle Noise Emission Levels (CALVENO). The Sound 32 model was calibrated in accordance with the FHWA Highway Traffic Noise Prediction Manual (Report RD-77-108) and in accordance with Caltrans Technical Noise Supplement (TeNS) section N-5400. 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 ("hard" or "soft") 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 purposes. The required coordinate information necessary for the Sound32 traffic noise prediction model input was taken from the preliminary site plans provided by REC Consultants received 2019. To predict the future noise levels the preliminary site plans were used to identify the pad elevations, the roadway elevations, and the relationship between the noise source(s) and the NSLU areas. Traffic was consolidated into a single lane located along the centerline of each roadway. Longer roadway segments were subdivided into a series of adjoining segments for analysis. For this analysis, the roadway segments were extended a minimum of 300 feet beyond the observer locations. No grade correction or calibration factor (according to Caltrans Policy TAN-02-01 dated January 17, 2002) was included as part of the Sound32 traffic noise prediction model analysis.

To evaluate the potential noise impacts on the proposed development, outdoor observers were located in NSLU areas and placed five feet above the pad elevation and near the center of the rear yard a minimum of ten feet from the top/bottom of slope. All second floor observers were located fifteen feet above the proposed pad elevation at the anticipated building facades.

c) Noise Calculations and Factors

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 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 sound appears louder.

A vehicle's 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 radiate 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 sound 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.

2.0 NOISE SENSITIVE LAND USES (NSLU)

2.1 Guidelines for the Determination of Significance

The County's General Plan Chapter 8 Noise Element uses the Noise Compatibility Guidelines listed in Table N-1 of the General Plan Noise Element (provided below) to determine the compatibility of land use when evaluating proposed development projects. The Noise Compatibility Guidelines indicate ranges of compatibility and are intended to be flexible enough to apply to a range of projects and environments. For example, a commercial project would be evaluated differently than a residential project in a rural area or a mixed-use project in a more densely developed area of the County.

TABLE N-1: NOISE COMPATIBILITY GUIDELINES (CNEL)

Table N-1 Noise Compatibility Guidelines

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

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

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

Note: For projects located within an Airport Influence Area of an adopted Airport Land Use Compatibility Plan (ALUCP), additional Noise Compatibility Criteria restrictions may apply as specified in the ALUCP.

A land use located in an area identified as "acceptable" indicates that standard construction methods would attenuate exterior noise to an acceptable indoor noise level and that people can carry out outdoor activities with minimal noise interference. Land uses that fall into the "conditionally acceptable" noise environment should have an acoustical study that considers the type of noise source, the sensitivity of the noise receptor, and the degree to which the noise source may interfere with sleep, speech, or other activities characteristic of the land use. For land uses indicated as "conditionally acceptable," structures must be able to attenuate the exterior noise to the indoor noise level as indicated in the Noise Standards listed in Table N-2 of the General Plan Noise Element (provided below). For land uses where the exterior noise levels fall within the "unacceptable" range, new construction generally should not be undertaken.

TABLE N-2: NOISE STANDARDS

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

Note: Exterior Noise Level compatibility guidelines for Land Use Categories A-H are identified in Table N-1, Noise Compatibility Guidelines.

2.2 Potential Noise Impacts

It is expected that the primary source of noise impacts to the project site will occur from traffic noise along Lake Jennings Park Road. The proposed project will also experience some background traffic noise impacts from the project's internal roads. Due low traffic volumes and speeds, traffic noise from these internal roads will not make a significant contribution to the noise environment.

To determine the future noise environment and impact potentials the Sound32 model first needs to be calibrated using the ambient noise measurements results. The existing conditions were modeled to compare against the noise measurements described in Section 1.3.a of this report. Section N-5440 of the Caltrans Technical Noise Supplement provides detailed procedures for calibrating the Sound32 traffic noise prediction model. The comparison is made to ensure that predicted traffic noise levels accurately reflect the actual measured noise levels. Section N 5460 suggests that model calibration should not be performed when calculated and measured noise levels are within 1 dBA. Differences of 3.0 to 4.0 dBA are routinely calibrated to adjust for site conditions the Sound32 model did not account for including topographic features, soft site conditions and existing structures or barriers.

During the aforementioned ambient noise measurements, traffic counts were taken to determine the existing vehicle mix for the model calibration. Based on the results, the existing traffic noise model utilizes a vehicle mix of 92.8% Autos, 2.9% Medium Trucks and 4.3% Heavy Trucks for Lake Jennings Park Road. Table 2-1 presents the roadway parameters used in the analysis including the average daily traffic volumes, vehicle speeds and the hourly traffic flow distribution (vehicle mix) for both the existing and future conditions. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the Sound32 Model.

The ambient measurement location was modeled in Sound32 to compare with the noise monitoring locations presented previously in Table 1-1. The modeled existing noise level comparison is provided in Table 2-2. The model is over predicting the noise levels 3.7 dBA using soft-site conditions. This over prediction is due to the prevailing topography, roadway grade changes and existing structures that are located between the project site and Lake Jennings Park Road. Therefore, the roadway was modeled with soft site conditions for the future noise environment and no calibration factor was applied to predict a conservative worst case for the first/ground floor areas. Second floor areas were modeled using hard site conditions based upon Caltrans Protocol. The existing model input parameters for calibration and output file are provided as ***Attachment A*** to this report.

Table 2-1: Traffic Parameters

Roadway	Year	Average Daily Traffic (ADT)	Peak Hour Volume	Modeled Speeds (MPH)	Vehicle Mix %		
					Auto	Medium Trucks	Heavy Trucks
Lake Jennings Park Road	2009	5,660	566[1]	40[2]	92.8[1]	2.9[1]	4.3[1]
	2050	21,800	2,180	55	92.8	2.9	4.3

[1] Observed during the ambient noise measurement period.
[2] Trucks were observed traveling at lower speeds due to the roadway grade.

Table 2-2: Model Calibration

Receptor	Location	Calibration Results (dBA)		
		Measured Noise Levels	Modeled Noise Levels	Difference
ML1	~450-Feet from Lake Jennings Park Road	45.2	48.9	+3.7[1]

[1] Model is over predicting based on topographic conditions not incorporated in the model.

a) Potential Build Out Noise Conditions

The Buildout scenario includes the future year 2030 traffic volume forecasts provided by SANDAG Series 13 Traffic Prediction Model and the peak hour traffic volumes as shown in Table 2-1. To assess the peak hour traffic noise conditions for Lake Jennings Park Road, 10% of the ADT was utilized. Lake Jennings Park Road is considered a Major Arterial with a traffic design speed of 55 mph based on the County of San Diego Department of Public Works Public Road Standards. The future traffic noise model also utilizes the same observed vehicle mix of for Lake Jennings Park Road.

b) Potential Noise Impact Identification

Noise contours are lines that when drawn around a noise source indicate a continuous or equivalent level of noise exposure. Noise contour lines are generally used as a planning tool to assess potential impacts and the need for additional analysis.

The noise contour lines that may affect the project site were developed for the unmitigated and unshielded future Buildout conditions. No barriers or structures were included as part of the

noise contour analysis. The Sound32 traffic noise prediction model was used to calculate the noise contours perpendicular to Lake Jennings Park Road. The model input parameters and results for the first and second floor contours are provided in Attachment B. Figure 2-A provides the location of the future first and second floor 75 and 60 dBA CNEL noise contours.

The noise contours provided in Figure 2-A show that the 75 dBA CNEL contours are all located along the edge of roadway approximately 60 to 90 feet from the centerline. Due to the topography, the existing and proposed areas are below grade at least 20-feet, the first and second level 60 dBA CNEL contours only extend approximately 350-feet from the centerline of Lake Jennings Park Road. The proposed residential lots are located at least 420-feet from the roadway centerline. Based on this finding, outdoor NSLU areas are anticipated to be below the County of San Diego 60 dBA CNEL threshold with no mitigation measures and no additional exterior noise analysis is required.

2.3 Off-site Noise Impacts

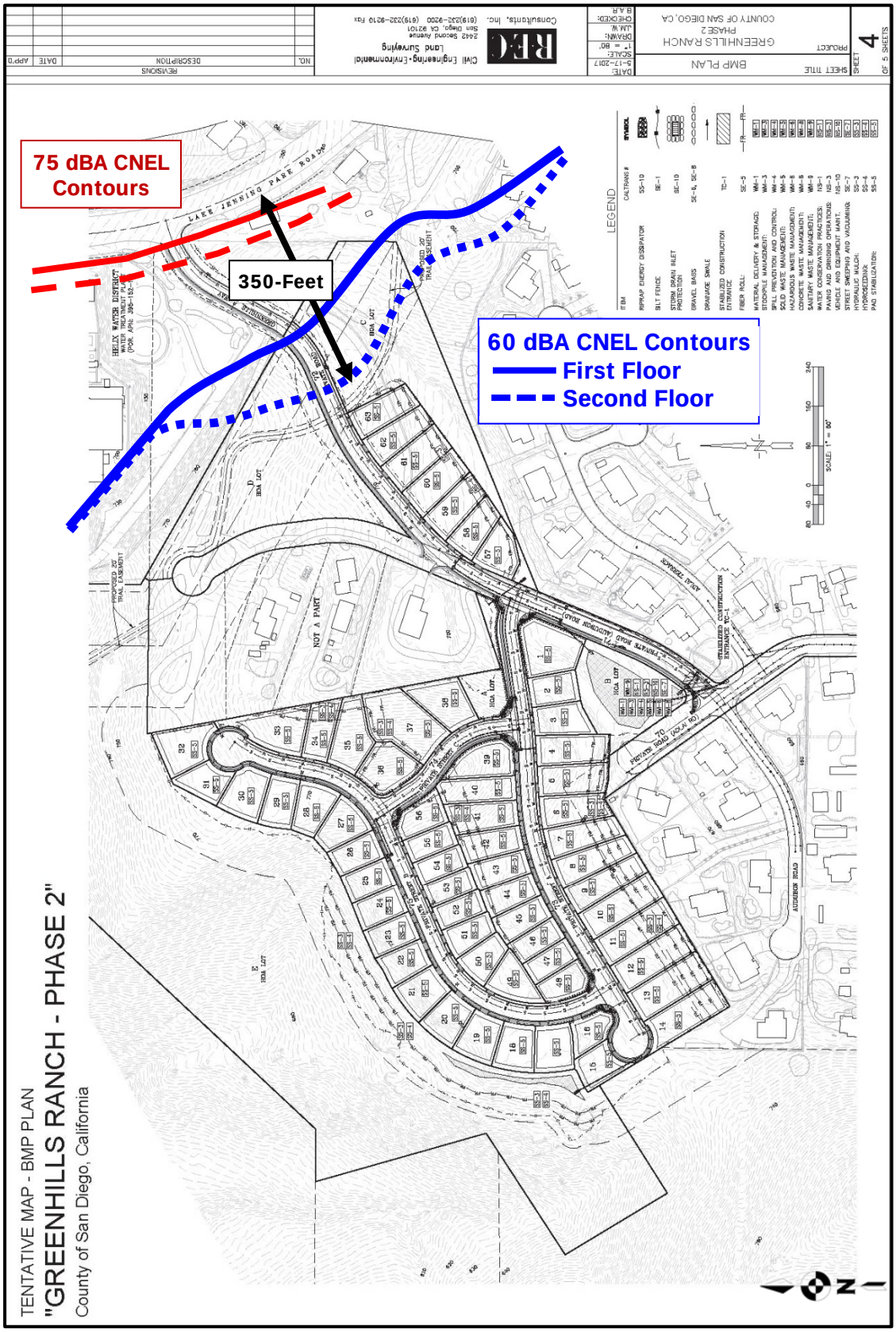
To determine if direct or cumulative off-site noise level increases associated with the development of the proposed project would create noise impacts, the traffic volumes for the existing conditions were compared with the traffic volume increase of existing plus the proposed project. The project is estimated to only generate 128 average daily traffic (ADT) trips along Adlai Road and 512 ADT along Lake Jennings Park Road. The existing (ADT) volumes on the roadways are 1,244 along Adlai Road and 14,587 along Lake Jennings Park Road. Typically it requires a project to double (or add 100%) the traffic volumes to have a direct impact of 3 dBA CNEL or be a major contributor to the cumulative traffic volumes. The project will add approximately a 10% increase to the exiting roadway volumes along Adlai Road and less than 4% along Lake Jennings Park Road and no direct or cumulative impacts are anticipated.

2.4 Conclusions

The future first and second level 60 dBA CNEL contours will be approximately 350-feet from the roadway centerline. The proposed residential lots are located at least 420-feet from the roadway centerline of Lake Jennings Park Road. Therefore no impacts are anticipated and mitigation measures are not necessary to meet the County of San Diego exterior or interior standards.

The Project does not create a direct impact of more than 3 dBA CNEL on any roadway segment and no cumulative noise increase of 3 dBA CNEL or more was found. Therefore, the proposed Project's direct and cumulative contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Figure 2-A: Future Noise Contour Locations



3.0 CONSTRUCTION ACTIVITIES

3.1 Guidelines for the Determination of Significance

Construction Noise: Noise generated by construction activities related to the project will exceed the standards listed in San Diego County Code Sections as follows.

SEC. 36.408: HOURS OF OPERATION OF CONSTRUCTION EQUIPMENT

Except for emergency work, it shall be unlawful for any person to operate or cause to be operated, construction equipment:

a. Between 7 p.m. and 7 a.m.

b. On a Sunday or a holiday. For purposes of this section, a holiday means January 1st, the last Monday in May, July 4th, the first Monday in September, December 25th and any day appointed by the President as a special national holiday or the Governor of the State as a special State holiday. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10 a.m. and 5 p.m. at the person's residence or for the purpose of constructing a residence for himself or herself, provided that the operation of construction equipment is not carried out for financial consideration or other consideration of any kind and does not violate the limitations in sections 36.409 and 36.410.

SEC. 36.409: SOUND LEVEL LIMITATIONS ON CONSTRUCTION EQUIPMENT

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

SEC. 36.410: SOUND LEVEL LIMITATIONS ON IMPULSIVE NOISE

In addition to the general limitations on sound levels in section 36.404 and the limitations on construction equipment in section 36.409, the following additional sound level limitations shall apply:

(a) Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 36.410A (provided below), when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 36.410A are as described in the County Zoning Ordinance.

TABLE 36.410A: MAXIMUM SOUND LEVEL (IMPULSIVE) MEASURED AT OCCUPIED PROPERTY IN DECIBELS (dBA)

OCCUPIED PROPERTY USE	DECIBELS (dBA)
Residential, village zoning or civic use	82
Agricultural, commercial or industrial use	85

(b) Except for emergency work, no person working on a public road project shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 36.410B, when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 36.410B are as described in the County Zoning Ordinance.

TABLE 36.410B: MAXIMUM SOUND LEVEL (IMPULSIVE) MEASURED AT OCCUPIED PROPERTY IN DECIBELS (dBA) FOR PUBLIC ROAD PROJECTS

OCCUPIED PROPERTY USE	dB(A)
Residential, village zoning or civic use	85
Agricultural, commercial or industrial use	90

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

3.2 Potential Property Line Noise Impacts

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.

According to the project applicant, the project site will be graded in one phase using a total of one loader, two dozers, two excavators, two scrapers, a dump truck and one water truck during grading activities. The noise levels utilized in this analysis based upon the anticipated list of equipment are shown in Table 3-1. Project construction activities also include blasting that will require two rock drills. The blasting operations are anticipated to control the material size so that the excess rock and grading debris will be manageable and utilized onsite in the areas that fill material is needed using a portable rock crushing machine. As mass grading is completed, underground trenching would occur and then the utility construction phases and paving of internal roadways would be completed.

The anticipated equipment will be spread out over the site working in different areas for 1-4 weeks and then relocating to a different portion of the site as cut or fill material is needed. 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 portion of the site. Some of the equipment will then move to bring the blasted material to areas where fill is needed. Due to the size of the site and the need to bring cut and blasted material from the one area to where fill in needed, none of the equipment is anticipated to be operating more than 30 days in the same location.

Table 3-1: Grading Operation Noise Levels

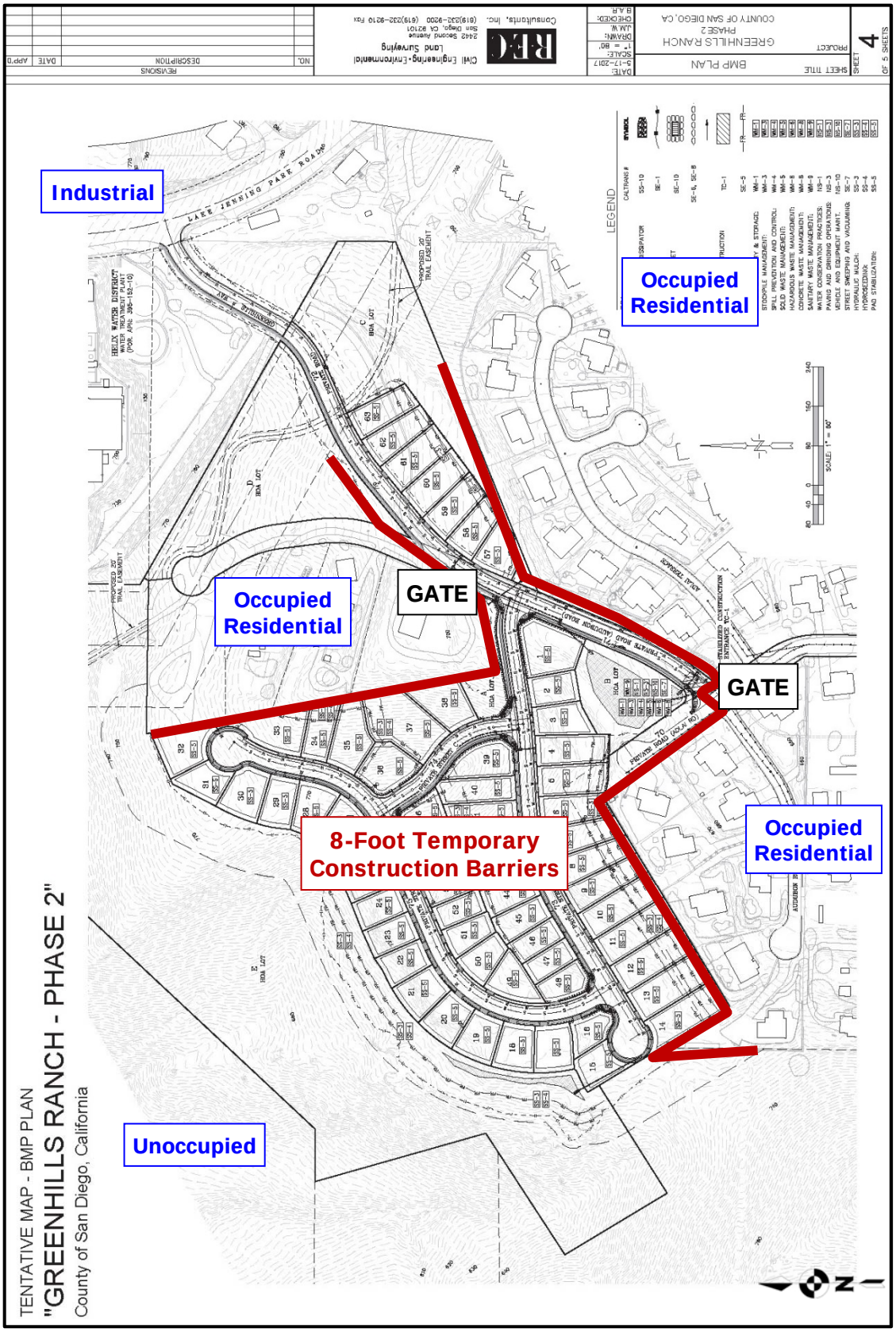
Construction Equipment	Quantity	Source Level @ 50-Feet (dBA)[1]	Duty Cycle (Hours/Day)	Cumulative Noise Level @ 50-Feet (dBA)
Loader	1	70	8	70
Dozer	2	75	8	78
Excavator	2	72	8	75
Dump Truck	1	75	8	75
Water Truck	1	70	8	70
Scraper	2	75	8	78
			Cumulative Levels @ 50 Feet	83.2
			Distance To Property Line (Feet)	128
			Noise Reduction Due To Distance	-8.2
			NEAREST PROPERTY LINE NOISE LEVEL	**75.0**

[1] Source: U.S. Environmental Protection Agency (U.S. EPA), 1971 and Empirical Data

The grading equipment will be spread out over the project site from distances near the occupied property to distances of over 300 feet away. This means that most of the time the average distance from the equipment to the occupied property is 150-feet and in that situation less than significant impacts are anticipated. At distances closer than 128-feet the grading activities are anticipated to exceed the County's 75-dBA standard without any mitigation measures. As can been seen in Table 3-1 above, the cumulative property line noise levels at 50-feet would be a worst-case 83.2 dBA and an additional 8.2 decibel reduction would be needed to comply with Section 36.409 of the County of San Diego Noise Ordinance. This would result in an unmitigated impact at the occupied residence. The properties surrounding the Project site are mostly occupied with the exception of a few open space parcels to the northwest and the treatment facility to the northeast as can be seen in Figure 3-A on the following page.

The Fresnel Diffraction Method was utilized for determining the relative noise reduction associated with a temporary wooden mitigation wall. The proposed mitigation wall would need to be 8-foot-high and located at the property line to break the line of sight from the equipment at the adjacent property. The temporary mitigation wall would reduce octave-band (250-Hz and 500-Hz) sound levels associated with typical construction activities between 8.5 dB and 10.1 dB. The reduction is dependent upon the source elevation and the topography between the source and receptor. The effective mitigated sound level at the nearest occupied residential area is therefore anticipated to be at or below 75 decibels (83.2 dB minus 8.5 dB). With the incorporation of the 8-foot-high temporary barrier, less than significant impacts are anticipated and no further mitigation is required for the proposed grading activities. The Fresnel model output is provided as ***Attachment C*** to this letter report.

Figure 3-A: Temporary Construction Barrier Location



The barrier would need to be located at the edge of the projects property line adjacent to the occupied residence. The barrier would only need to be utilized while grading activities consist of more than two pieces of equipment operating within 50-feet of the occupied residences due to the cumulative noise level slightly exceeding the 75 dBA threshold. For example: if a scrapper and water truck are working together the noise level would be 76.2 dBA (75 dBA plus 70 dBA) at 50 feet and the barrier would be needed to reduce the noise below the 75 dBA threshold. Additionally, if more than four pieces of equipment are located within 100-feet of the occupied residences the cumulative noise level is anticipated to be slightly above the 75 dBA threshold and the barrier would be required. The temporary barrier should be non-gapping, free of any cut-outs and be constructed of ¾ inch plywood or equivalent materials. The location of the temporary construction barriers and access gates are shown in Figure 3-A.

3.3 Potential Impulsive Noise Impacts

Areas of the project site that require deeper cuts and where the native material is not easily ripable (graded) may require blasting and the use of rock drills. The two rock drills would be moved around the site on an as needed basis dependent upon the site characteristics. The use of two rock drills would occur independently of all other proposed equipment. The drilling and blasting activities would occur in one area then the grading equipment would relocate or remove the debris. To determine the worst-case noise levels from the drilling operations both rock drills were assumed to be placed in the same location on the site, which is not physically possible. The cumulative noise level from the equipment would be 88.0 dBA at 50 feet. Utilizing a 6 dBA reduction per doubling of distance, at distances of 225 feet from any property line, the noise levels will comply with the County of San Diego's 75 dBA standard as shown in Table 3-2.

Table 3-2: Construction Noise Levels from Rock Drills

Construction Equipment	Quantity	Source Level @ 50 Feet (dBA)	Duty Cycle (Hours/Day)	Cumulative Noise Level @ 50 Feet (dBA)
Rock Drill	2	85	8	88.0
			Noise Reduction Needed To Comply	-13.0
			Distance Required to Reduce Noise Levels	225
			NEAREST PROPERTY LINE NOISE LEVEL	**75.0**

Rock drilling and blasting will occur on an as-needed basis on site. In the event that the rock drills are staged within 225 feet of any occupied noise sensitive land use, it is recommended that a specific mitigation plan based upon the location of the construction equipment, topography and construction schedule be identified by a County certified acoustical engineer. A mitigation

plan should be developed that may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height maybe needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the County's threshold. The mitigation plan can also incorporate the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier, if one is necessary.

Additionally, the County Noise Ordinance Section 36.410, states that except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown of 82 dBA (at residential uses), when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period. The maximum sound level and uses are shown above in Table 36.410A as described in the County Zoning Ordinance.

The rock drills can produce impulsive noise. Based upon normal procedures the two rock drills are anticipated to be separated but working in the same area on the site. Rock drills can produce maximum noise levels (Lmax) of 87-91 dBA at a distance of 50 feet based on the orientation of the equipment (Source: Rancho Cielo Rock Drill Measurements, Ldn Consulting March 2011). Typically, a rock drill is not continuously operating at full power; this is referred to as the usage factor. The usage factor is the percentage of time that a piece of construction equipment is operating at full power. Since the maximum noise level from a rock drive exceeds the County's maximum noise level threshold of 82 dBA, the following recommendations are presented. To reduce the maximum noise level of 94 dBA (cumulative noise level from both rock drills) to 82 dBA, the rock drills would need to be located 200 feet from the nearest occupied residential property line or only operate 25% of the hourly or daily duration (15 minutes of any hour and 2 hours of a 8 hour work day) when located within that distance.

In the event that the rock drills are within 200 feet of any occupied noise sensitive land use, implusive noise may exceed the County Noise Ordinance Section 36.410 standard of 82 dBA. As stated above, the rock drills need to be 225 feet from any occupied noise sensitive land use to meet the 75 dBA standard in the County Noise Ordinance Section 36.409. Therefore, if the rock drills are staged within 225 feet of any occupied noise sensitive land it is recommended that a specific mitigation plan based upon the location of the construction equipment, topography and schedule be identified by a County certified acoustical engineer. The mitigation plan may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height maybe needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the County's threshold. The mitigation plan can also restrict the usage of the

equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier, or equipment usage as necessary. Blasting operations must comply with the County's Consolidated Fire Code (2011) Section 3301.2 which establishes permitting and notification procedures.

3.4 Conclusions

The grading equipment will be spread out over the project site from distances near the occupied property to distances of over 300 feet away. This means that most of the time the average distance from the equipment to the occupied property is 150-feet and in that situation less than significant impacts are anticipated. At distances closer than 128-feet the grading activities are anticipated to exceed the County's 75-dBA standard and a temporary 8-foot high noise barrier is required. The barrier would need to be located at the edge of the projects property line adjacent to the occupied residence.

The barrier would only need to be utilized while grading activities consist of more than two pieces of equipment operating within 50-feet or more than four pieces of equipment are located within 100-feet of the occupied residences. The temporary barrier should be non-gapping, free of any cut-outs and be constructed of ¾ inch plywood or equivalent materials. The effective mitigated sound level at the nearest occupied residential area is therefore anticipated to be at or below 75 decibels (83.2 dB minus 8.5 dB). With the incorporation of the 8-foot-high temporary barrier, less than significant impacts are anticipated and no further mitigation is required for the proposed grading activities.

In the event that the rock drills are staged within 200 feet of any occupied noise sensitive land use, implusive noise may exceed the County Noise Ordinance Section 36.410 standard of 82 dBA. Additionally, the rock drill need to be 225 feet from any occupied noise sensitive land use to meet the 75 dBA standard in the County Noise Ordinance Section 36.409. Therefore, if the rock drills are staged within 225 feet of any occupied noise sensitive land it is recommended that a specific mitigation plan based upon the location of the construction equipment, topography and schedule be identified by a County certified acoustical engineer. The mitigation plan may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height maybe needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the County's threshold. The mitigation plan can also restrict the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier, or equipment usage as necessary. Blasting operations must comply with the County's Consolidated Fire Code (2011) Section 3301.2 which establishes permitting and notification procedures.

4.0 GROUND-BORNE VIBRATION AND NOISE IMPACTS

4.1 Guidelines for the Determination of Significance

Project implementation will expose uses to ground-borne vibration or noise levels equal to or in excess of the levels listed in Table 4 of the County of San Diego Guidelines for the Determination of Significance. For simplicity, the pertaining Table 4 is shown below.

Table 4
Guideline for Determining the Significance of
Ground-borne Vibration and Noise Impacts

Land Use Category	Ground-Borne Vibration Impact Levels (inches/sec rms)		Ground-Borne Noise Impact Levels (dB re 20 micro Pascals)	
	Frequent Events[1]	Occasional or Infrequent Events[2]	Frequent Events[1]	Occasional or Infrequent Events[2]
Category 1: Buildings where low ambient vibration is essential for interior operations. (research & manufacturing facilities with special vibration constraints)	0.0018 [3]	0.0018 [3]	Not applicable[5]	Not applicable[5]
Category 2: Residences and buildings where people normally sleep. (hotels, hospitals, residences, & other sleeping facilities)	0.0040	0.010	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use. (schools, churches, libraries, other institutions, & quiet offices)	0.0056	0.014	40 dBA	48 dBA

Source: U.S Department of Transportation, Federal Transit Administration, "Transit Noise and Vibration Impact Assessment," May 2006.

Notes to Table 4:

1. "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
2. "Occasional or Infrequent Events" are defined as fewer than 70 vibration events per day. This combined category includes most commuter rail systems.
3. 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 acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
4. Vibration-sensitive equipment is not sensitive to ground-borne noise.
5. There are some buildings, such as concert halls, TV and recording studios, and theaters that can be very sensitive to vibration and noise but do not fit into any of the three categories. Table 5 gives criteria for acceptable levels of ground-borne vibration and noise for these various types of special uses.
6. For Categories 2 and 3 with occupied facilities, isolated events such as blasting are significant when the peak particle velocity (PPV) exceeds one inch per second. Non-transportation vibration sources such as impact pile drivers or hydraulic breakers are significant when their PPV exceeds 0.1 inch per second. More specific criteria for structures and potential annoyance were developed by Caltrans (2004) and will be used to evaluate these continuous or transient sources in San Diego County.

4.2 Potential Impacts & Conclusions

There are no existing or proposed frequent activities on or near the proposed project site at this time which would cause any significant vibration levels to existing buildings near the project site. Blasting operations must comply with the County's Consolidated Fire Code (2011) Section 3301.2 which establishes permitting and notification procedures. Therefore, no additional analysis or mitigation is required.

5.0 SUMMARY OF PROJECT IMPACTS, MITIGATION & CONCLUSIONS

- On-Site Noise Analysis

  This noise study has been completed to determine the noise impacts associated with the development of the proposed Greenhills Ranch project. The results of this analysis indicate that future vehicle noise from Lake Jennings Park Road is the principal source of community noise that could impact the site. However, due to distance separation and the intervening topography between the proposed residences and the roadway, the project will be below the 60 dBA CNEL standard for all Lots.

- Off-Site Noise Analysis

  The Project does not create a direct impact of more than 3 dBA CNEL on any roadway segment and no cumulative noise increase of 3 dBA CNEL or more was found. Therefore, the proposed Project's direct and cumulative contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

- Construction Noise Analysis

  The grading equipment will be spread out over the project site from distances near the occupied property to distances of over 300 feet away. This means that most of the time the average distance from the equipment to the occupied property is 150-feet and in that situation less than significant impacts are anticipated. At distances closer than 128-feet the grading activities are anticipated to exceed the County's 75-dBA standard and a temporary 8-foot high noise barrier is required. The barrier would need to be located at the edge of the projects property line adjacent to the occupied residence.

  The barrier would only need to be utilized while grading activities consist of more than two pieces of equipment operating within 50-feet or more than four pieces of equipment are located within 100-feet of the occupied residences. The temporary barrier should be non-gapping, free of any cut-outs and be constructed of ¾ inch plywood or equivalent materials. The effective mitigated sound level at the nearest occupied residential area is therefore anticipated to be at or below 75 decibels (83.2 dB minus 8.5 dB). With the incorporation of the 8-foot-high temporary barrier less than significant impacts are anticipated and no further mitigation is required for the proposed grading activities.

  In the event that the rock drills are staged within 200 feet of any occupied noise sensitive land use, implusive noise may exceed the County Noise Ordinance Section 36.410 standard of 82 dBA. As stated above, the rock drill need to be 225 feet from any occupied noise sensitive land use to meet the 75 dBA standard in the County Noise Ordinance Section 36.409. Therefore, if

the rock drills are staged within 225 feet of any occupied noise sensitive land it is recommended that a specific mitigation plan based upon the location of the construction equipment, topography and schedule be identified by a County certified acoustical engineer. The mitigation plan may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height maybe needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the County's threshold. The mitigation plan can also restrict the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier, or equipment usage as necessary. Blasting operations must comply with the County's Consolidated Fire Code (2011) Section 3301.2 which establishes permitting and notification procedures.

- Vibration Analysis

  There are no existing or proposed frequent activities on or near the proposed project site at this time which would cause any significant vibration levels to existing buildings near the project site. Blasting operations must comply with the County's Consolidated Fire Code (2011) Section 3301.2 which establishes permitting and notification procedures. Therefore, no additional analysis or mitigation is required.

6.0 CERTIFICATIONS

The contents of this report represent an accurate depiction of the future acoustical environment and impacts within and surrounding the Greenhills Ranch Phase 2 residential development. The report was prepared by Jeremy Louden; a County approved CEQA Consultant for Acoustics.

Jeremy Louden, Principal
Ldn Consulting, Inc.
760-473-1253
jlouden@ldnconsulting.net

Date September 28, 2020

ATTACHMENT A

MODEL CALIBRATION INPUT AND OUTPUT FILES

Greenhills Ranch - Calibration
T-Peak Hour, 1
516 , 35 , 16 , 25 , 24 , 25
L-Lake Jennings Park Road, 1
Y,2952.,596,825,
Y,2616.,785,820,
Y,2087.,1084,780,
Y,1879.,1261,762,
Y,1791.,1383,750,
Y,1696.,1616,730,
Y,1670.,1896,710,
Y,1674.,2064,700,
B-Roadedge of LJPR, 1 , 1 , 0 ,0
2898.,568,825,825,
2553.,764,820,820,
2274.,922,800,800,
1995.,1084,780,780,
1714.,1265,762,762,
1726.,1397,750,750,
1657.,1639,730,730,
1638.,1909,710,710,
1650.,2066,700,700,
R, 1 , 67 ,500
1102,1540,779.,ML1
D, 4.5
ALL,ALL
C,C

SOUND32 - RELEASE 07/30/91

TITLE: Greenhills Ranch - Calibration

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	ML1	67.	500.	48.9

ATTACHMENT B

FUTURE NOISE CONTOUR MODEL INPUT AND OUTPUT FILES

Greenhills Ranch - First Level Contours
T-Peak Hour, 1
2023 , 55 , 63 , 55 , 94 , 55
L-Lake Jennings Park Road, 1
Y,2952.,596,825,
Y,2616.,785,820,
Y,2087.,1084,780,
Y,1879.,1261,762,
Y,1791.,1383,750,
Y,1696.,1616,730,
Y,1670.,1896,710,
Y,1674.,2064,700,
B-Roadedge of LJPR, 1 , 1 , 0 ,0
2898.,568,825,825,
2553.,764,820,820,
2274.,922,800,800,
1995.,1084,780,780,
1714.,1265,762,762,
1726.,1397,750,750,
1657.,1639,730,730,
1638.,1909,710,710,
1650.,2066,700,700,
R, 1 , 67 ,500
1355,991,703.,
R, 2 , 67 ,500
1355,1046,697.,
R, 3 , 67 ,500
1355,1100,705.,
R, 4 , 67 ,500
1355,1154,714.,
R, 5 , 67 ,500
1355,1209,725.,
R, 6 , 67 ,500
1355,1264,735.,
R, 7 , 67 ,500
1355,1319,743.,
R, 8 , 67 ,500
1355,1374,751.,
R, 9 , 67 ,500
1470,1370,734.,
R, 10 , 67 ,500
1488,1323,727.,
R, 11 , 67 ,500
1509,1279,721.,
R, 12 , 67 ,500
1529,1232,715.,
R, 13 , 67 ,500
1550,1186,722.,
R, 14 , 67 ,500

1570,1140,730.,
R, 15 , 67 ,500
1589,1096,741.,
R, 16 , 67 ,500
1609,1050,753.,
R, 17 , 67 ,500
1630,1004,761.,
R, 18 , 67 ,500
1831,1084,755.,
R, 19 , 67 ,500
1792,1132,755.,
R, 20 , 67 ,500
1771,1176,755.,
R, 21 , 67 ,500
1752,1223,751.,
R, 22 , 67 ,500
1731,1268,747.,
R, 23 , 67 ,500
1711,1313,750.,
R, 24 , 67 ,500
1670,1405,750.,
D, 4.5
ALL,ALL
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Greenhills Ranch - First Level Contours

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R-1	67.	500.	52.4
2	R-2	67.	500.	52.4
3	R-3	67.	500.	53.2
4	R-4	67.	500.	54.2
5	R-5	67.	500.	55.5
6	R-6	67.	500.	57.1
7	R-7	67.	500.	58.5
8	R-8	67.	500.	59.3
9	R-9	67.	500.	59.5
10	R-10	67.	500.	57.5
11	R-11	67.	500.	56.3
12	R-12	67.	500.	54.9
13	R-13	67.	500.	55.1
14	R-14	67.	500.	55.5
15	R-15	67.	500.	56.3
16	R-16	67.	500.	57.2
17	R-17	67.	500.	57.6
18	R-18	67.	500.	57.2
19	R-19	67.	500.	57.4
20	R-20	67.	500.	57.1
21	R-21	67.	500.	52.8
22	R-22	67.	500.	69.8
23	R-23	67.	500.	58.7
24	R-24	67.	500.	68.8

Greenhills Ranch - Second Level Contours
T-Peak Hour, 1
2023 , 55 , 63 , 55 , 94 , 55
L-Lake Jennings Park Road, 1
Y,2952.,596,825,
Y,2616.,785,820,
Y,2087.,1084,780,
Y,1879.,1261,762,
Y,1791.,1383,750,
Y,1696.,1616,730,
Y,1670.,1896,710,
Y,1674.,2064,700,
B-Roadedge of LJPR, 1 , 1 , 0 ,0
2898.,568,825,825,
2553.,764,820,820,
2274.,922,800,800,
1995.,1084,780,780,
1714.,1265,762,762,
1726.,1397,750,750,
1657.,1639,730,730,
1638.,1909,710,710,
1650.,2066,700,700,
R, 1 , 67 ,500
1355,991,713.,
R, 2 , 67 ,500
1355,1046,707.,
R, 3 , 67 ,500
1355,1100,715.,
R, 4 , 67 ,500
1355,1154,724.,
R, 5 , 67 ,500
1355,1209,735.,
R, 6 , 67 ,500
1355,1264,745.,
R, 7 , 67 ,500
1355,1319,753.,
R, 8 , 67 ,500
1355,1374,761.,
R, 9 , 67 ,500
1470,1370,744.,
R, 10 , 67 ,500
1488,1323,737.,
R, 11 , 67 ,500
1509,1279,731.,
R, 12 , 67 ,500
1529,1232,725.,
R, 13 , 67 ,500
1550,1186,732.,
R, 14 , 67 ,500

1570,1140,740.,
R, 15 , 67 ,500
1589,1096,751.,
R, 16 , 67 ,500
1609,1050,763.,
R, 17 , 67 ,500
1630,1004,772.,
R, 18 , 67 ,500
1831,1084,765.,
R, 19 , 67 ,500
1792,1132,765.,
R, 20 , 67 ,500
1771,1176,765.,
R, 21 , 67 ,500
1752,1223,761.,
R, 22 , 67 ,500
1731,1268,757.,
R, 23 , 67 ,500
1711,1313,760.,
R, 24 , 67 ,500
1670,1405,760.,
D, 4.5
ALL,ALL
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Greenhills Ranch - Second Level Contours

REC	REC ID	DNL	PEOPLE	LEQ(CAL)
1	R-1	67.	500.	53.0
2	R-2	67.	500.	53.0
3	R-3	67.	500.	53.9
4	R-4	67.	500.	54.9
5	R-5	67.	500.	56.3
6	R-6	67.	500.	57.9
7	R-7	67.	500.	58.9
8	R-8	67.	500.	59.5
9	R-9	67.	500.	61.1
10	R-10	67.	500.	59.0
11	R-11	67.	500.	57.4
12	R-12	67.	500.	56.1
13	R-13	67.	500.	56.3
14	R-14	67.	500.	56.6
15	R-15	67.	500.	57.5
16	R-16	67.	500.	58.4
17	R-17	67.	500.	58.8
18	R-18	67.	500.	60.6
19	R-19	67.	500.	61.4
20	R-20	67.	500.	62.5
21	R-21	67.	500.	60.2
22	R-22	67.	500.	69.9
23	R-23	67.	500.	70.0
24	R-24	67.	500.	70.7

ATTACHMENT C

FRESNEL BARRIER REDUCTION CALCULATIONS

FRESNEL BARRIER REDUCTION CALCULATIONS

Elevated Point Source
Source to Receiver Horizontal Distance (ft) = 60.00
Source to Barrier Horizontal Distance (ft) = 50.00
Barrier to Receiver Horizontal Distance (ft) = 10.00
Source Height (ft) = 8.00
Receiver Height (ft) = 5.00
Barrier Height (ft) = 8.00
Distance Source to Receptor (ft) d = 60.07
Distance Source to Barrier top (ft) d1 = 50.00
Distance Barrier top to Receiver (ft) d2 = 10.44

Frequency (Hz) = 8000 Attenuation (db) = 20.0 Fresnel N = 5.187
Frequency (Hz) = 4000 Attenuation (db) = 17.1 Fresnel N = 2.593
Frequency (Hz) = 2000 Attenuation (db) = 14.3 Fresnel N = 1.297
Frequency (Hz) = 1000 Attenuation (db) = 11.9 Fresnel N = 0.648
Frequency (Hz) = 500 Attenuation (db) = 10.1 Fresnel N = 0.324
Frequency (Hz) = 250 Attenuation (db) = 8.5 Fresnel N = 0.162
Frequency (Hz) = 125 Attenuation (db) = 7.3 Fresnel N = 0.081
Frequency (Hz) = 63 Attenuation (db) = 6.2 Fresnel N = 0.041