APPENDIX J

Environmental Noise Assessment

PARKSIDE TRAILS PROJECT
ENVIRONMENTAL NOISE ASSESSMENT
CUPERTINO, CALIFORNIA

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INTRODUCTION

This report presents the results of the environmental noise assessment completed for the Parkside Trails Project in Cupertino, California. The 42.4-acre project site is located off of Stevens Canyon Road, immediately south of the existing residences on Ricardo Road. The project proposes to subdivide the 42.4-acre site into three parcels, the Residential (8.5 acres), Corridor (4.0 acres), and Park (29.8 acres) parcels, change the General Plan land use designation and zoning on each of these parcels, and construct 18 single-family dwelling units on the Residential parcel. No other development is proposed by the project. The General Plan amendments and rezonings proposed on the Corridor and Park parcels would restrict the use of these parcels to open space. The proposed project also includes several off-site components, including land dedication, trail easements, and a land trade.

This report evaluates the project's potential to result in significant noise impacts with respect to applicable CEQA guidelines. The report is divided into two sections. The Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions. The Impacts and Mitigation Measures Section evaluates noise impacts resulting from the project in terms of noise and land use compatibility, temporary noise level increases resulting from project construction, and permanent noise level increases resulting from the operation of the project.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A decibel (dB) is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to

which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous vibration levels produce.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess ground-borne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, November 2009.

TABLE 3 Reaction of People and Damage to Buildings From Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Criteria

The State of California and the City of Cupertino establish guidelines, regulations, and policies designed to limit noise exposure at noise sensitive land uses. These plans and policies include: (1) the State CEQA Guidelines, Appendix G; (2) the City of Cupertino General Plan; and (3) the City of Cupertino Municipal Code.

State CEQA Guidelines. The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. CEQA asks the following applicable questions. Would the project result in:

(a) Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies?

(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

(e) For a project located within an airport land use plan or, where such a plan has not been adopted within two miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels?

(f) For a project within the vicinity of a private airstrip, exposure of people residing or working in the project area to excessive noise levels?

Of these guidelines, items (a), (b), (c), and (d) are applicable to the proposed project. Guidelines (e) and (f) are not applicable because the project is not located in the vicinity of public airports or private airstrips.

City of Cupertino General Plan. The Health and Safety Element of the City of Cupertino General Plan identifies noise and land use compatibility standards for various land uses. Goal L identifies the need to provide a compatible noise environment for existing and future land uses. Residential land uses are considered "normally acceptable" in noise environments of 60 dBA CNEL or less, and conditionally acceptable in noise environments between 60 dBA CNEL and 70 dBA CNEL. Goal N of the noise section is to protect residential areas from intrusive non-traffic noise. Under Goal N, Policy 6-61 restricts non-emergency construction by enforcing the noise regulations in the Municipal Code. Policy 6-62 regulates construction and maintenance activities by establishing reasonable allowable construction periods and requiring construction contractors to use equipment incorporating the best available noise control technology. Goal O of the noise section is to design buildings to diminish noise. Interior noise levels at residences are to be maintained at or below 45 dBA CNEL.

City of Cupertino Municipal Code. The City of Cupertino regulates noise within the community in Chapter 10.48 (Community Noise Control) of the Municipal Code. Noise from grading, construction, and demolition is limited as follows:

A. Grading, construction and demolition activities shall be allowed to exceed the noise limits of Section 10.48.040 during daytime hours (7:00 a.m. to 8:00 p.m. on weekdays, and 9:00 a.m. to 6:00 p.m. on weekends); provided, that the equipment utilized has high-quality noise muffler and abatement devices installed and in good condition, and the activity meets one of the following two criteria:

1. No individual device produces a noise level more than eighty-seven dBA at a distance of twenty-five feet (7.5 meters); or

2. The noise level on any nearby property does not exceed eighty dBA.

B. Notwithstanding Section 10.48.053A, it is a violation of this chapter to engage in any grading, street construction, demolition or underground utility work within seven hundred fifty feet of a residential area on Saturdays, Sundays and holidays, and during the nighttime period, except as provided in Section 10.48.030.

C. Construction, other than street construction, is prohibited on holidays, except as provided in Sections 10.48.029 and 10.48.030.

D. Construction, other than street construction, is prohibited during nighttime periods unless it meets the nighttime standards of Section 10.48.040.

E. The use of helicopters as a part of a construction and/or demolition activity shall be restricted to between the hours of nine a.m. and six thirty p.m. Monday through Friday only, and prohibited on the weekends and holidays. The notice shall be given at least twenty-four hours in advance of said usage. In cases of emergency, the twenty-four hour period may be waived. (Ord. 1871, (part), 2001)

Existing Noise Environment

The project site is located off of Stevens Canyon Road, immediately south of the existing residences on Ricardo Road. Residential land uses along Canyon Vista Court border the site to the east, and Stevens Creek County Park bounds the site to the south. Figure 1 shows the project site and vicinity.

Noise monitoring was completed at the site between January 14, 2014 and January 17, 2014 in order to quantify existing ambient noise levels. The noise monitoring survey included one long-term noise measurement (LT-1) along Stevens Canyon Road and three short-term measurements (ST-1 through ST-3), as shown in Figure 1. The existing noise environment at the site and in the vicinity results primarily from traffic on Stevens Canyon Road.

Long-term noise measurement LT-1 was along the westernmost boundary of the site approximately 70 feet from the centerline of Stevens Canyon Road. Noise levels measured at this site were primarily the result of automobile and heavy-duty truck traffic along Stevens Canyon Road. Hourly average noise levels ranged from 52 to 64 dBA L_{eq} during the day, and from 32 to 62 dBA L_{eq} at night. The CNEL at this location was 63 dBA on Wednesday, January 15, 2014 and 62 dBA on Thursday, January 16, 2014. The daily trends in noise levels at LT-1 are shown on Figures 2-5. As shown on these figures, the time period between approximately 6:00 a.m. and approximately 3:00 p.m. typically has the highest maximum instantaneous noise levels and hourly average noise levels because of heavy truck traffic associated with Stevens Canyon Quarry.

Short-term noise measurements ST-1 through ST-3 were made at various locations throughout the project site and vicinity representative of existing and proposed noise-sensitive residential land uses. Table 4 summarizes the data collected at the short-term measurement locations.

TABLE 4 Summary of Short-Term Noise Measurement Data

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}	CNEL
ST-1: ~ Approximately 475 feet east of the center of Stevens Canyon Road. (1/14/2014, 12:00-12:10 p.m.)	60	52	47	43	40	45	45
ST-1: ~ Same location as above. (1/14/2014, 12:10-12:20 p.m.)	59	52	47	43	39	45	
ST-2: ~ Approximately 50 feet east of the center of Stevens Canyon Road. (1/14/2014, 12:40-12:50 p.m.)	72	71	64	47	39	59	63
ST-2: ~ Same location as above. (1/14/2014, 12:50-1:00 p.m.)	78	75	67	51	41	63	
ST-3: ~ End of Ricardo Road. (1/17/2014, 11:50 a.m.-12:00 p.m.)	57	55	50	46	42	47	45
ST-3: ~ Same location as above. (1/17/2014, 12:00-12:10 p.m.)	62	59	53	43	38	44	
ST-3: ~ Same location as above. (1/17/2014, 12:10-12:20 p.m.)	52	51	49	44	40	45	

Note: CNEL approximated by correlating to corresponding period at long-term site.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Paraphrasing from Appendix G of the CEQA Guidelines, a project would normally result in significant noise impacts if noise levels generated by the project conflict with adopted environmental standards or plans, if the project would generate excessive ground-borne vibration levels, or if ambient noise levels at sensitive receivers would be substantially increased over a permanent, temporary, or periodic basis. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

- A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.3 in/sec PPV (peak particle velocity) would have the potential to result in cosmetic damage to normal buildings.

- A significant impact would be identified if traffic generated by the project would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA CNEL or greater, with a future noise level of less than 60 dBA CNEL, or b) the noise level increase is 3 dBA CNEL or greater, with a future noise level of 60 dBA CNEL or greater.

- A significant noise impact would be identified if construction related noise would temporarily increase ambient noise levels at sensitive receivers. Hourly average noise levels intermittently exceeding 60 dBA $L_{eq,}$ and the ambient by at least 5 dBA L_{eq}, for a a period of one year or more, would constitute a significant temporary noise increase at adjacent residential land uses.

Impact 1: **Noise and Land Use Compatibility.** Residential land uses proposed at the project site would be exposed to exterior noise levels greater than 60 dBA CNEL, which exceeds the "normally acceptable" noise level standard presented in the City of Cupertino General Plan. **This is a significant impact.**

Future Exterior Noise Environment

Vehicular traffic along Stevens Canyon Road, particularly quarry trucks, would continue to be the predominant source of noise affecting the noise environment at the project site. The residential pads of Lots 1-3 would be graded to elevations ranging from 449 to 458 feet above mean sea level (msl), approximately 12 to 14 feet below the elevation of adjacent sections of Stevens Canyon Road. Exterior noise levels at the outdoor use areas of Lots 1-3 are calculated to range from approximately 54 to 59 dBA CNEL assuming the acoustical shielding provided by the proposed six-foot solid landscape wall constructed at the top of the graded slope and adjacent to Stevens Canyon Road. The future exterior noise environment at outdoor use areas nearest Stevens Canyon Road would be considered "normally acceptable" for proposed residential land uses assuming the acoustical shielding provided by the terrain and landscape wall. Outdoor use areas at the remaining residential lots (Lots 4-18) would also be considered "normally acceptable" due to additional attenuation with distance from Stevens Canyon Road and acoustical shielding provided by the intervening residential buildings.

Future Interior Noise Environment

Where there would be direct line-of-sight to the traffic, the CNEL at a distance of 70 feet from the center of Stevens Canyon Road is calculated to range from 63 to 64 dBA assuming a future 1 dBA CNEL noise increase. This noise level would be expected at the second story facades of residential units proposed on Lots 1-3. The City of Cupertino requires that interior noise levels within new residential units be maintained at or below 45 dBA CNEL. In buildings of typical construction, with the windows partially open, interior noise levels are generally 15 dBA lower than exterior noise levels. With the windows closed, standard residential construction typically provides about 20 to 25 decibels of noise reduction. For example, a unit exposed to exterior noise levels of 64 dBA CNEL would be 49 dBA CNEL inside with the windows partially open and would range from 39 to 44 dBA CNEL with the windows shut. Interior noise levels would exceed the maximum allowable interior sound level of 45 dBA CNEL inside residential units on Lots 1-3 when windows are open for ventilation. Attaining the necessary noise reduction from exterior to interior spaces is possible with proper wall construction techniques, the selection of proper windows and doors, and the incorporation of a forced-air mechanical ventilation system to allow the occupant the option of controlling noise by closing the windows.

Mitigation 1: The following measures shall be required to reduce interior noise levels to 45 dBA CNEL or less:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for units proposed on Lots 1-3, so that windows could be kept closed at the occupant's discretion to control noise and achieve the 45 dBA CNEL interior noise standard.

- Confirm the final specifications for noise insulation treatments during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the City along with the building plans and approved prior to issuance of a building permit.

The implementation of the above measures would reduce interior noise to 45 dBA CNEL or less, resulting in a less-than-significant impact.

Although not required as mitigation, it is recommended that maximum instantaneous noise levels (L_{max}) resulting from quarry truck passbys be reduced indoors to meet a design guideline of 50 dBA L_{max} in bedrooms and 55 dBA L_{max} in other rooms. The design guideline is intended to reduce the potential for sleep disturbance and activity interference indoors. As noted in the setting section, heavy truck traffic associated with Stevens Canyon Quarry begins at approximately 6:00 a.m. and produces typical maximum instantaneous noise levels of 78 dBA L_{max} measured 70 feet from the center of Stevens Canyon Road. Therefore, building facades nearest Stevens Canyon Road would need to reduce single event noise by approximately 30 dBA at bedrooms and 25 dBA in other rooms to achieve the interior noise goal of 50 dBA L_{max} in bedrooms and 55 dBA L_{max} in other rooms with an adequate margin of safety.

Proposed residences on Lots 1-3 would meet the interior standard (45 dBA CNEL) assuming standard California construction methods and the incorporation of forced-air mechanical ventilation, satisfactory to the local building official, to allow occupants to keep the windows closed to control noise, as noted in the mitigation measure above. It is further recommended that all west, north, and south facing facades of the three residential buildings nearest the Stevens Canyon Road achieve an outdoor to indoor noise reduction of at least 30 dBA in bedrooms and 25 dBA in other rooms. Windows and doors of these building facades should be sound rated. The final determination of specific noise control treatments would be done during final design.

Impact 2: **Construction Vibration.** Vibration levels generated during demolition and construction activities may at times be perceptible at neighboring land uses, but vibration levels would not be excessive causing cosmetic or structural damage to buildings. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams, etc.) are used. Construction activities would include demolition, excavation, grading, site preparation work, foundation work, and new building framing and finishing.

The California Department of Transportation recommends a vibration limit of 0.5 inches/second, peak particle velocity (in/sec, PPV) for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec, PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec, PPV for ancient buildings or buildings that are documented to be structurally weakened. No ancient buildings or buildings that are documented to be structurally weakened adjoin the project site. Therefore, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact.

Table 5 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Vibration levels from typical construction activities would be expected to be 0.2 in/sec PPV or less at a distance of 25 feet, below the 0.3 in/sec PPV significance threshold. Vibration generated by construction activities near the common property line with Ricardo Street residential land uses would at times be perceptible, however, would not be expected to result in cosmetic damage to these buildings. This is a less-than-significant impact.

TABLE 5 Vibration Source Levels for Construction Equipment[1]

Equipment		**PPV at 25 ft. (in/sec)**	**Approximate L_v at 25 ft. (VdB)**
Pile Driver (Impact)	upper range	1.158	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

Mitigation 2: None required.

[1] Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

Impact 3: **Project-Generated Noise:** Noise resulting from project generated traffic or the proposed stormwater pump station or the proposed lift station would not substantially increase ambient noise levels in the area. **This is a less-than-significant impact.**

A noise impact would be identified at noise-sensitive land uses where the project would result in a noise level increase of 3 dBA CNEL or more.

Project Generated Traffic

Existing traffic volumes along Stevens Canyon Road would have to double in order for the project to result in a 3 dBA CNEL noise increase above existing conditions. The Focused Transportation Impact Analysis prepared by *Fehr & Peers* estimates 215 daily trips as a result of the project with a total of 22 trips occurring during both the AM and PM Peak Hours. Project-generated traffic noise level increases would be negligible when compared to the existing traffic noise levels attributable to existing automobiles and quarry trucks along Stevens Canyon Road. Traffic noise levels along Stevens Canyon Road are calculated to not measurably increase (0 dBA CNEL) as a result of the project, and the impact is less-than-significant.

Stormwater Pump Station/Lift Station

The stormwater wet well is planned to be an 8-foot diameter pre-cast concrete manhole that is approximately 10-feet deep. The 20 horsepower (HP) stormwater pumps will be two submersible solids-handling pumps capable of pumping the stormwater that has been filtered through a manual trash rack on the inlet pipe. The lift station wet well is planned to be 4-foot inside diameter pre-cast concrete or fiberglass structure that is approximately 8.6-feet deep. The 1 HP pumps will be submersible grinder pumps capable of pumping the wastewater. Grinder pumps were required due to the small flow rate from this development. A trailer-mounted diesel backup generator (Brand: Magnum; Model: MMG 25 A; KW: 23 KVA; Amp 240) will be tested weekly adjacent to the sanitary sewer lift station.

The pumps and their associated piping would be installed below grade and submersed in water. The sound of the submersible pumps would be attenuated at the water/air interface because the acoustical characteristics of water and air are different given that the density of water is so much greater than the density of air. The sound pressure level resulting from the operation of the backup generator is 66 dBA at a distance of 23 feet according to manufacturer's noise data. This noise level would be similar to that of an auto or truck engine idling in the residential neighborhood. The noise from the new pumps and intermittent noise from the backup generator would not make a measureable contribution to overall noise levels at the nearest receptors and the impact is less-than-significant.

Mitigation 3: None required.

Impact 4: **Construction Noise.** Noise levels generated by project construction activities would temporarily elevate ambient noise levels at sensitive land uses in the vicinity. Major noise generating construction activities would be limited to one construction season or less; however, due to the proximity of existing residential land uses, there is a potential that construction noise levels would exceed the quantitative noise limits contained in the Municipal Code, and the impact would be considered **potentially significant.**

Construction activities can generate high noise levels, especially during the construction of project infrastructure when heavy equipment is used. Table 6 presents a summary of typical maximum instantaneous noise levels resulting from various types of construction equipment. Maximum instantaneous noise levels from the majority of construction equipment ranges from about 73 dBA L_{max} to 85 dBA L_{max} at a distance of 50 feet. Demolition tools such as concrete saws and hoe rams can result in maximum instantaneous noise levels of about 90 dBA L_{max} at a distance of 50 feet from the noise source. Typical hourly average construction generated noise levels are about 81 dBA to 88 dBA L_{eq} measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction noise impacts primarily occur when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time. Typically, significant noise impacts do not result when standard construction noise control measures are enforced at the project site and when the duration of the noise generating construction period is limited to one construction season (typically one year) or less. A review of the construction information supplied by the project applicant shows that all exterior construction activities occurring during the demolition, mass grading, trenching, paving, and building exteriors phases would be completed within 12 months. Once construction moves indoors, minimal noise would be generated at off-site locations.

Construction activities will be conducted in accordance with the provisions of the City of Cupertino Municipal Code. The Municipal Code allows construction and demolition activities during daytime hours; provided, that the equipment utilized has high-quality noise muffler and abatement devices installed and in good condition, and the activity meets one of the following two criteria:

1. No individual device produces a noise level more than eighty-seven dBA at a distance of twenty-five feet (7.5 meters); or

2. The noise level on any nearby property does not exceed eighty dBA.

Although noise generated by construction activities would be conducted in accordance with the provisions of the City of Cupertino Municipal Code, noise levels from some activities could exceed the quantitative noise limits contained in the Municipal Code and listed in Items 1 and 2, above. This would be a significant impact.

Mitigation 4: Develop a construction noise mitigation plan, including, but not limited to, the following available controls:

- Construct a minimum 8-foot high temporary noise barrier to shield Ricardo Street residences from activities occurring on the project site.

- All equipment driven by internal combustion engines shall be equipped with mufflers, which are in good condition and appropriate for the equipment.

- The construction contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists.

- Unnecessary idling of internal combustion engines shall be prohibited.

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

- Locate stationary noise sources as far from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) will be used. Any enclosure openings or venting will face away from sensitive receptors.

- Locate material stockpiles as well as maintenance/equipment staging and parking areas as far as feasible from residential receptors.

- Neighbors located adjacent to the construction site shall be notified of the construction schedule in writing.

- Designate a project liaison that will be responsible for responding to noise complaints during the construction phase. The name and phone number of the liaison will be conspicuously posted at construction areas and on all advanced notifications. This person will take steps to resolve complaints, including periodic noise monitoring, if necessary. Results of noise monitoring will be presented at regular project meetings with the project contractor, and the liaison will coordinate with the contractor to modify any construction activities that generated excessive noise levels to the extent feasible.

- Require a reporting program that documents complaints received, actions taken to resolve problems, and effectiveness of these actions.

- Hold a preconstruction meeting with the job inspectors and the general contractor/on-site project manager to confirm that noise mitigation and practices (including construction hours, construction schedule, and noise coordinator) are completed.

The implementation of the reasonable and feasible controls outlined above would reduce construction noise levels emanating from the site by 5 to 10 dBA in order to minimize disruption and annoyance. With the implementation of these controls, as well as the Municipal Code limits on allowable construction hours, and considering the relatively short duration of the noise generating construction period, the substantial temporary increase in ambient noise levels would be less-than-significant.

TABLE 6
CONSTRUCTION EQUIPMENT 50-FOOT NOISE EMISSION LIMITS

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

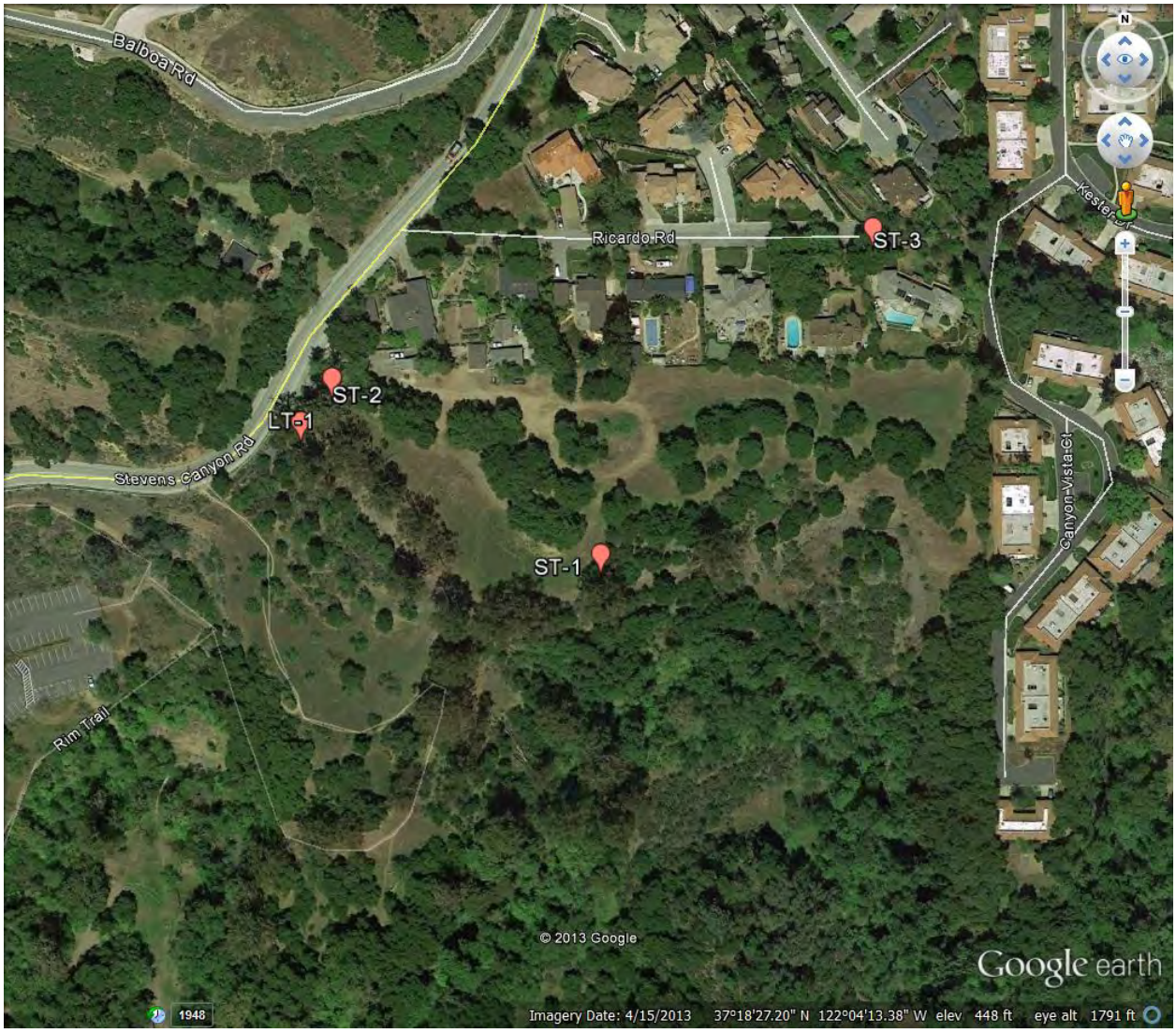
Notes:

1 Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

2 Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

3 Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

Figure 1 Aerial Photo Showing Noise Monitoring Locations



Noise Levels at Noise Measurement Site LT-1
~ 70 feet from the Center of Stevens Canyon Road
Tuesday, January 14, 2014

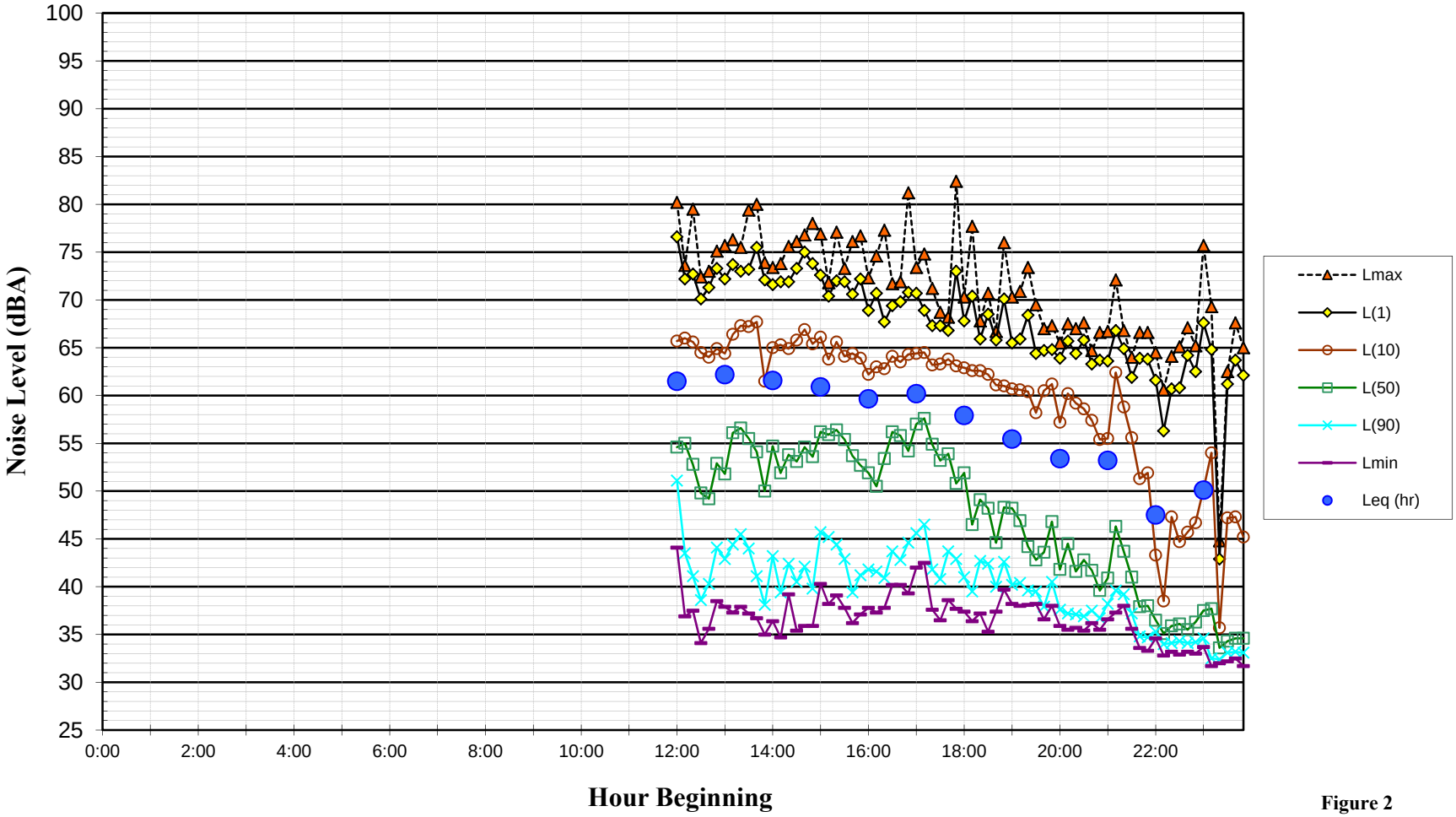
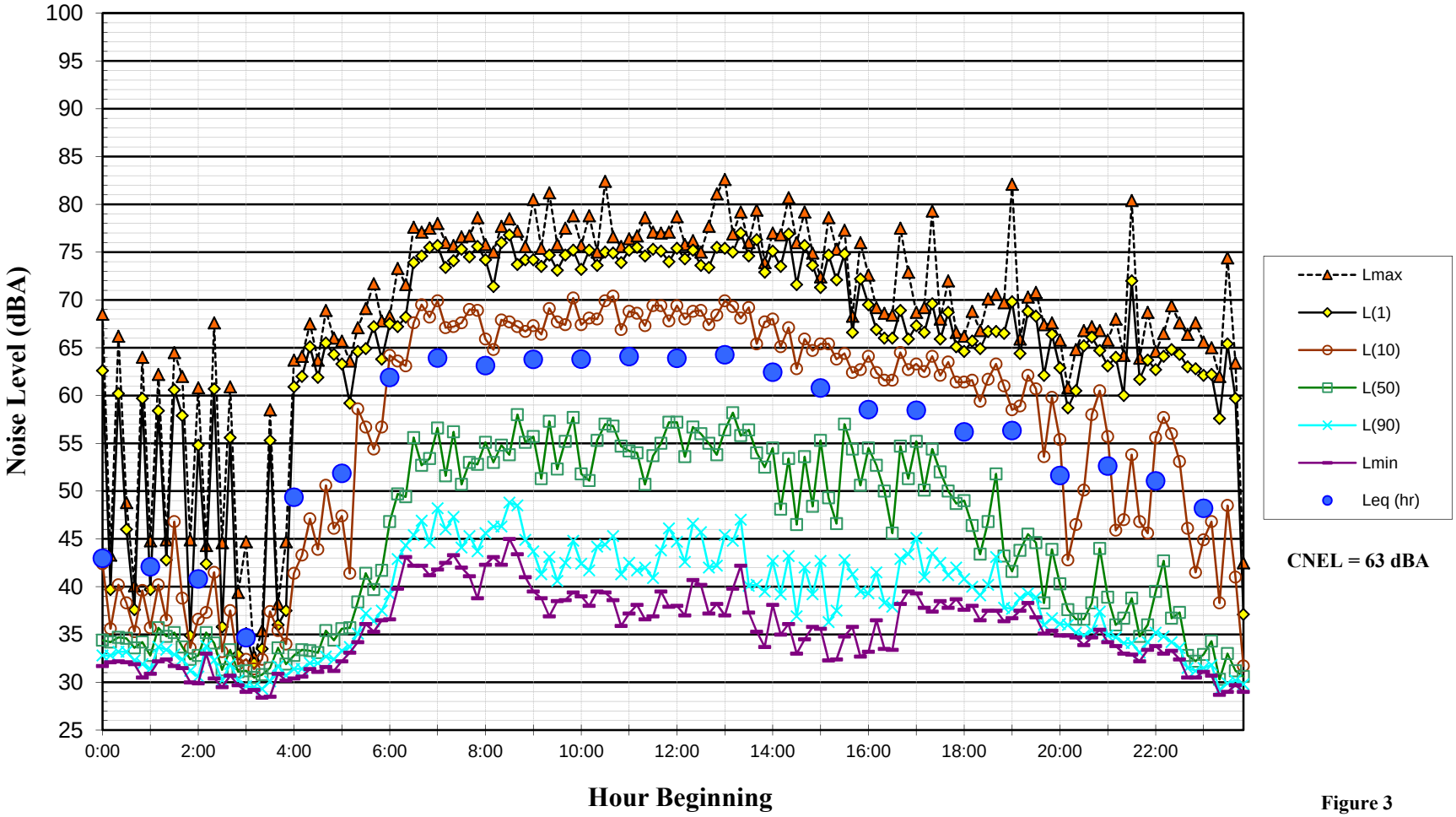


Figure 2

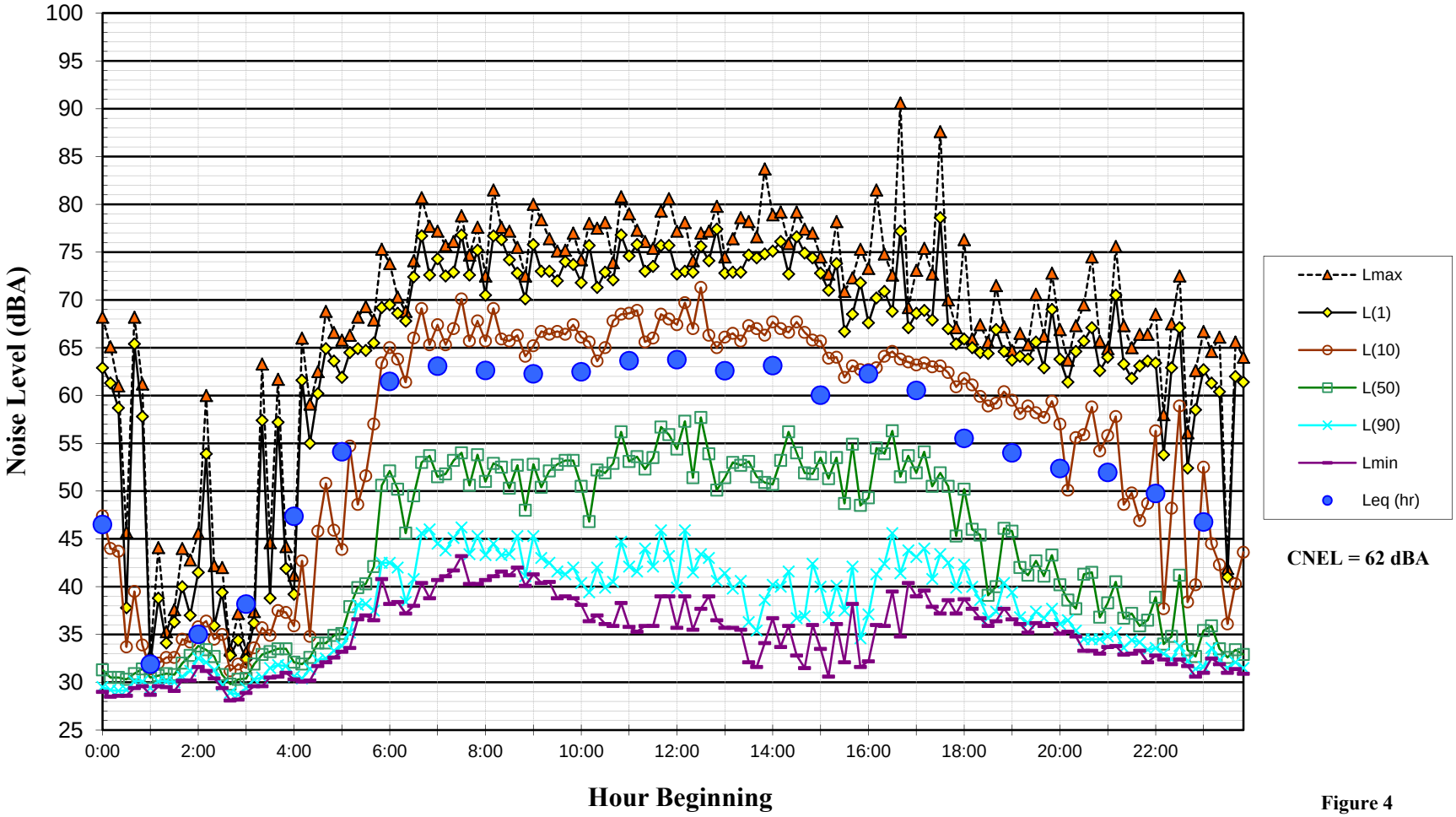
Noise Levels at Noise Measurement Site LT-1
~ 70 feet from the Center of Stevens Canyon Road
Wednesday, January 15, 2014



CNEL = 63 dBA

Figure 3

Noise Levels at Noise Measurement Site LT-1
~ 70 feet from the Center of Stevens Canyon Road
Thursday, January 16, 2014



CNEL = 62 dBA

Figure 4

Noise Levels at Noise Measurement Site LT-1
~ 70 feet from the Center of Stevens Canyon Road
Friday, January 17, 2014

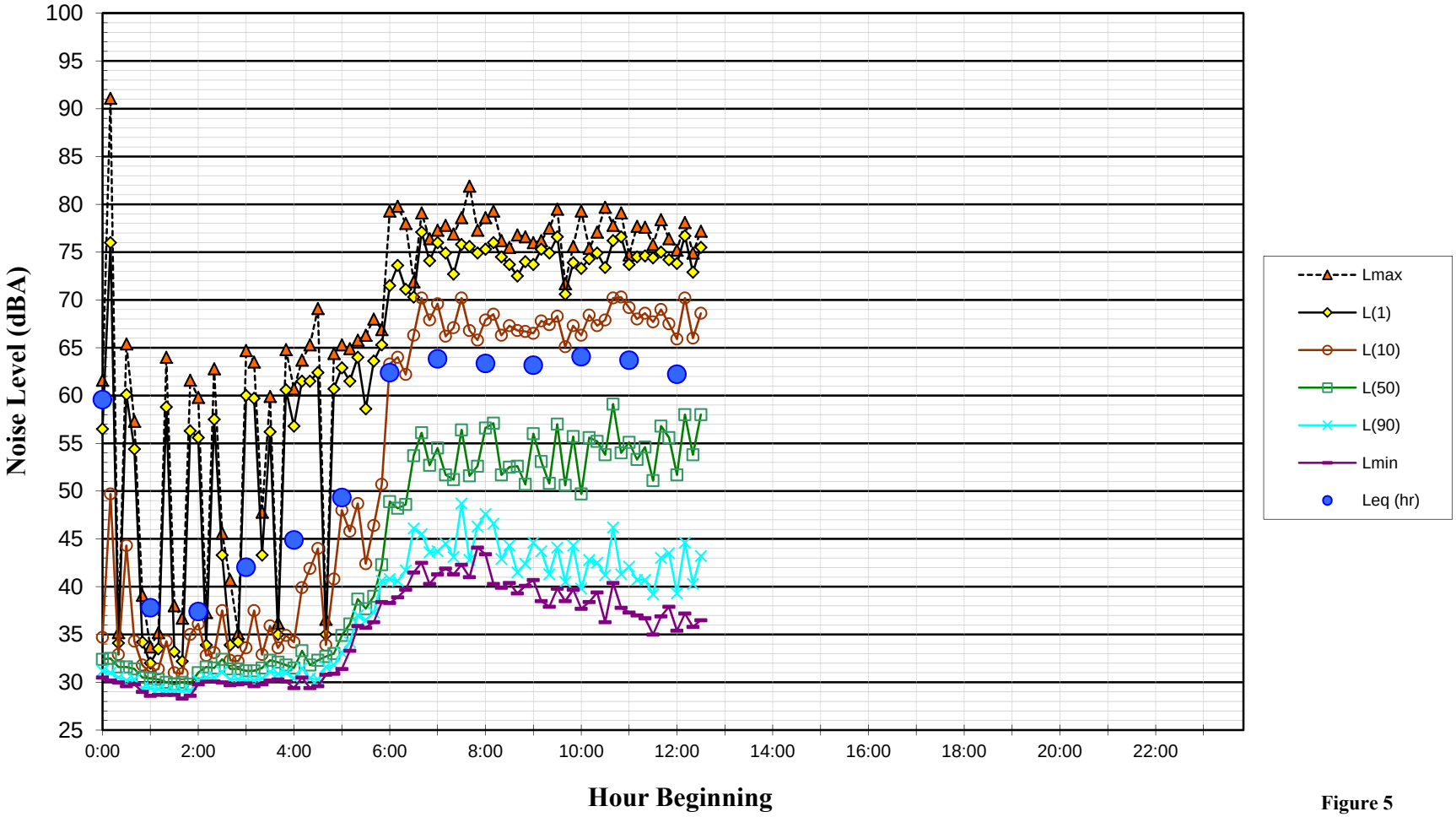


Figure 5