# *Copperleaf Subdivision*
# *Environmental Noise Assessment*

## *San Juan Bautista, California*

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Project: 15-055

## INTRODUCTION

This report addresses noise issues associated with the proposed Copperleaf Subdivision Project in San Juan Bautista, California. The project proposes the development of a 45-unit subdivision situated on the north side of San Juan-Hollister Road, 300 feet east from the intersection with the Alameda/Old San Juan Hollister Road and south of State Route (SR) 156.

This report evaluates the project's potential to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) Guidelines. The report is divided into two sections: 1) 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; and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

## 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* (*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.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level (CNEL)* is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level ($L_{dn}$* or *DNL)* is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

**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 concert |
| Jet fly-over at 1,000 feet | | |
| Locomotive horn at 100 feet | 100 dBA | |
| Gas lawn mower at 3 feet | 90 dBA | Loud stereo |
| Diesel truck at 50 feet at 50 mph | | Food blender |
| | 80 dBA | Garbage disposal |
| Noisy urban area, daytime | | |
| Gas lawn mower, 30 feet | 70 dBA | Vacuum cleaner |
| Commercial area | | Normal speech face to face |
| 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 (background) |
| | 20 dBA | |
| | | Broadcast/recording studio |
| Threshold of hearing | 10 dBA | |

Source: Technical Noise Supplement (TeNS), Caltrans, November 2009, Illingworth & Rodkin, Inc.

## Regulatory Background

The State of California and the City of San Juan Bautista have established regulatory criteria that are applicable in this assessment. The State's CEQA Guidelines, Appendix G, are used to assess the potential significance of noise or vibration impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

***State CEQA Guidelines.*** The CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would 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, if the project would expose people residing or working in the project area to excessive noise levels; or

(f) For a project within the vicinity of a private airstrip, if the project would expose people residing or working in the project area to excessive noise levels.

Of these guidelines, items (e) and (f) are not applicable because the project is not located within an airport land use plan or in the vicinity of a private airstrip. Therefore, checklist items (e), and (f) are not carried forward for further analysis.

CEQA does not define what noise level increase would be considered substantial. Typically, project-generated noise level increases of 3 dBA $L_{dn}$/CNEL or greater would be considered significant where exterior noise levels would exceed the normally acceptable noise level standard (60 dBA $L_{dn}$/CNEL for residential land uses). Where noise levels would remain at or below the normally acceptable noise level standard with the project, noise level increases of 5 dBA $L_{dn}$/CNEL or greater would be considered significant.

***City of San Juan Bautista General Plan.*** The City of San Juan Bautista General Plan[1] is in the process of being updated and the General Plan 2035 Administrative Draft was posted on their web page on December 8, 2014 and was revised on November 1, 2015. The General Plan

[1] *San Juan Bautista General Plan 2035, November 1, 2015*

establishes noise and land use compatibility standards that are used to evaluate a project's compatibility with the noise environment. Residential/low density single family land uses are considered "normally acceptable" in noise environments of 60 dBA $L_{dn}$ or less. The City of San Juan Bautista also establishes policies in the Noise Element of the General Plan in order to achieve the goal of maintaining an acceptable community noise level. The following policies and programs are applicable to the proposed project:

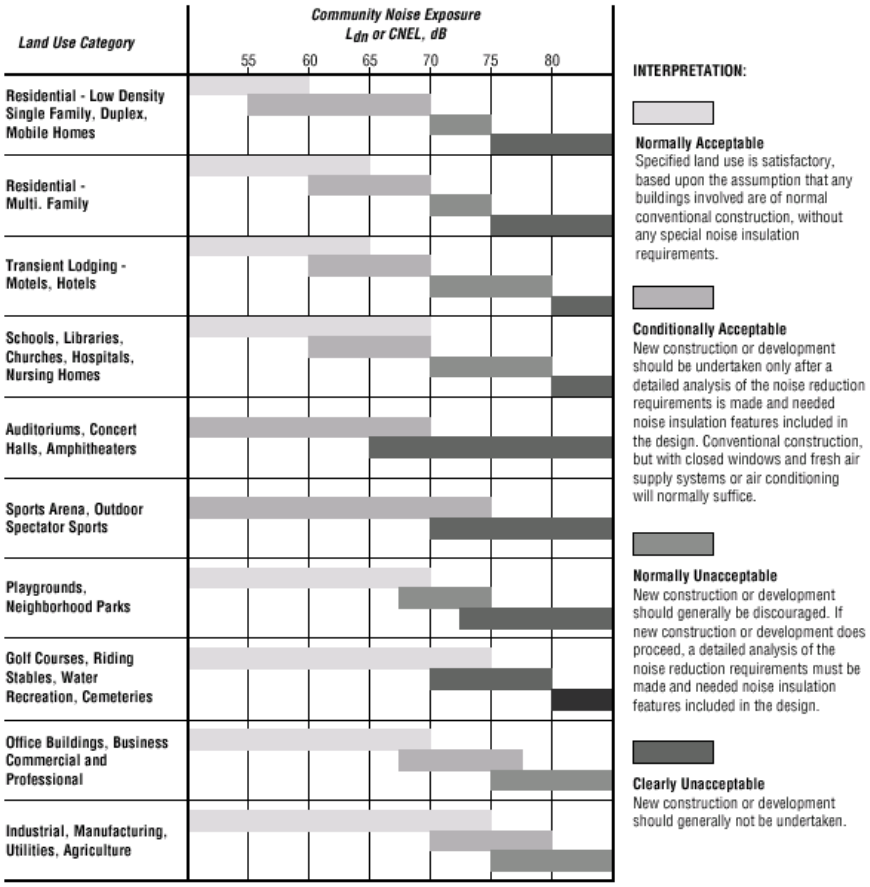
Policy N 1.2.1 All interior noise levels for new development will be no greater than 45 dB and all exterior noise levels will be mitigated to a normally acceptable noise level as displayed in Table 12.1. (shown as Table 3).

Program N1.2.1.1 Require new developments along State Route 156 to mitigate noise impacts to acceptable range shown in Table 12.1. (shown in Table 3).

Policy N 1.4.1 Adopt regulations that limit construction activity to daylight hours.

Program N 1.4.1.1 Require restrictions on hours of construction activity when issuing construction permits.

**Table 3** - Proposed Land Use Changes[1]




[1] Data from Table 12.1in the 2035 San Juan Bautista General Plan Dated November 1, 2015

**Existing Noise Environment**

A noise monitoring survey was conducted in April 2015 to quantify the existing noise environment at representative residential receiver locations. Six noise measurements were made to complete the noise monitoring survey including two long-term 24-hour measurements and four short-term 10-minute measurements (See Figure 1). Vehicular traffic along SR 156 was the predominant noise source affecting the project site.

Long-term noise measurement site LT-1 was located approximately 30 feet from the centerline of San Juan-Hollister Road. The microphone was positioned on a joint use pole approximately 12 feet above the ground. Hourly average noise levels ranged from about 52 dBA to 64 dBA $L_{eq}$. The calculated day-night average noise level on April 15, 2015 was 65 dBA $L_{dn}$ (See Figure 2).

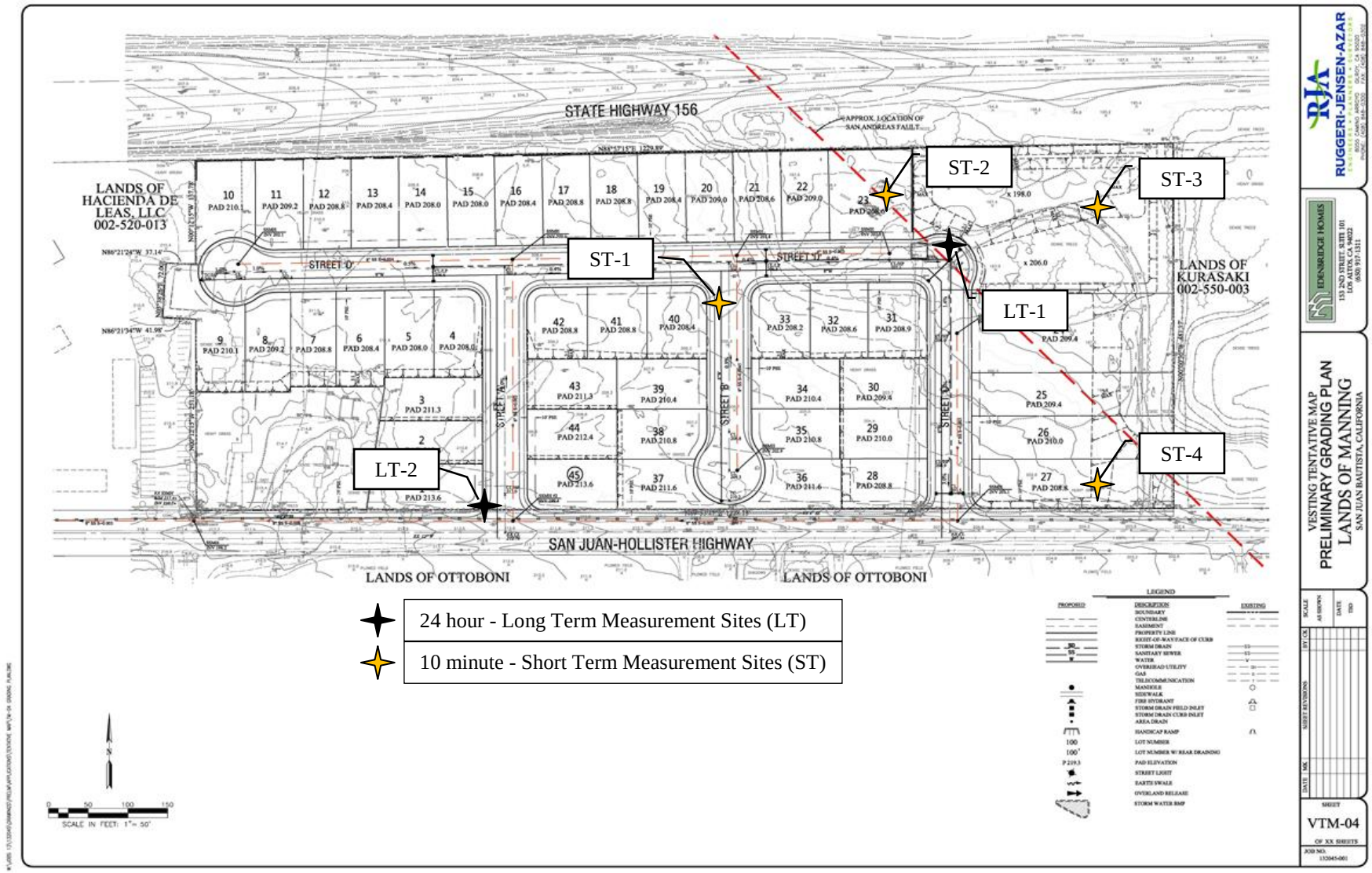
Long-term noise measurement site LT-2 was located approximately 230 feet from the centerline of SR 156. The microphone was positioned on a chain link fence around the City of San Juan Bautista's pump house approximately six feet above the ground. Hourly average noise levels ranged from about 60 dBA to 69 dBA $L_{eq}$. The calculated day-night average noise level on April 15, 2015 was 72 dBA $L_{dn}$ (See Figure 3).

A series of four (4) short-term noise measurements were made on April 16, 2015. Figure 1 shows the locations of the long term and the short term measurements. Short-term noise measurement ST-1 was made 300 feet from the centerline of SR 156 at the approximate center of the property. The measured noise level at Site ST-1 was 54 dBA $L_{eq.}$ Short-term noise measurement ST-2 was made approximately 145 feet from the centerline of SR 156 at the approximate setback of the proposed homes. The measured noise level at Site ST-2 was 66 dBA $L_{eq}$. Short-term noise measurement ST-3 was made approximately 145 feet from the centerline of SR 152 at the approximate setback of the homes. The measured noise level at Site ST-3 was 65 dBA $L_{eq}$. Short-term noise measurement ST-4 was made approximately 60 feet from the centerline of Old San Juan Hollister Road at the approximate setback of the proposed homes. The measured noise level at Site ST-4 was 53 dBA $L_{eq}$. The short-term measurement results are shown in Table 4.

**TABLE 4 Summary of Short-term Noise Data**

| Location, Date, and Time | Noise Level, dBA | | | | | Noise Source |
|---|---|---|---|---|---|---|
| | $L_{eq}$ | $L_{10}$ | $L_{50}$ | $L_{90}$ | $L_{dn}$ | |
| **ST-1:** Central portion of site. (4/16/15, 11:40-11:50 am) | 54 | 57 | 53 | 46 | 57 | SR 156 |
| **ST-2:** Northern portion of the site (4/16/15, 10:00-10:10) | 66 | 69 | 65 | 55 | 69 | SR 156 |
| **ST-3:** Northeast portion of site. (4/16/15, 11:40-11:50 am) | 65 | 69 | 64 | 50 | 68 | SR 156 |
| **ST-4:** Southeast portion of site. (4/16/15, 10:40-10:50 am) | 53 | 56 | 51 | 45 | 55 | SR 156 |

**FIGURE 1 Noise Measurement Locations**



**Noise Levels at LT-1**
**~30 feet from centerline of Old San Juan Hollister Road**
**April 16, 2015**

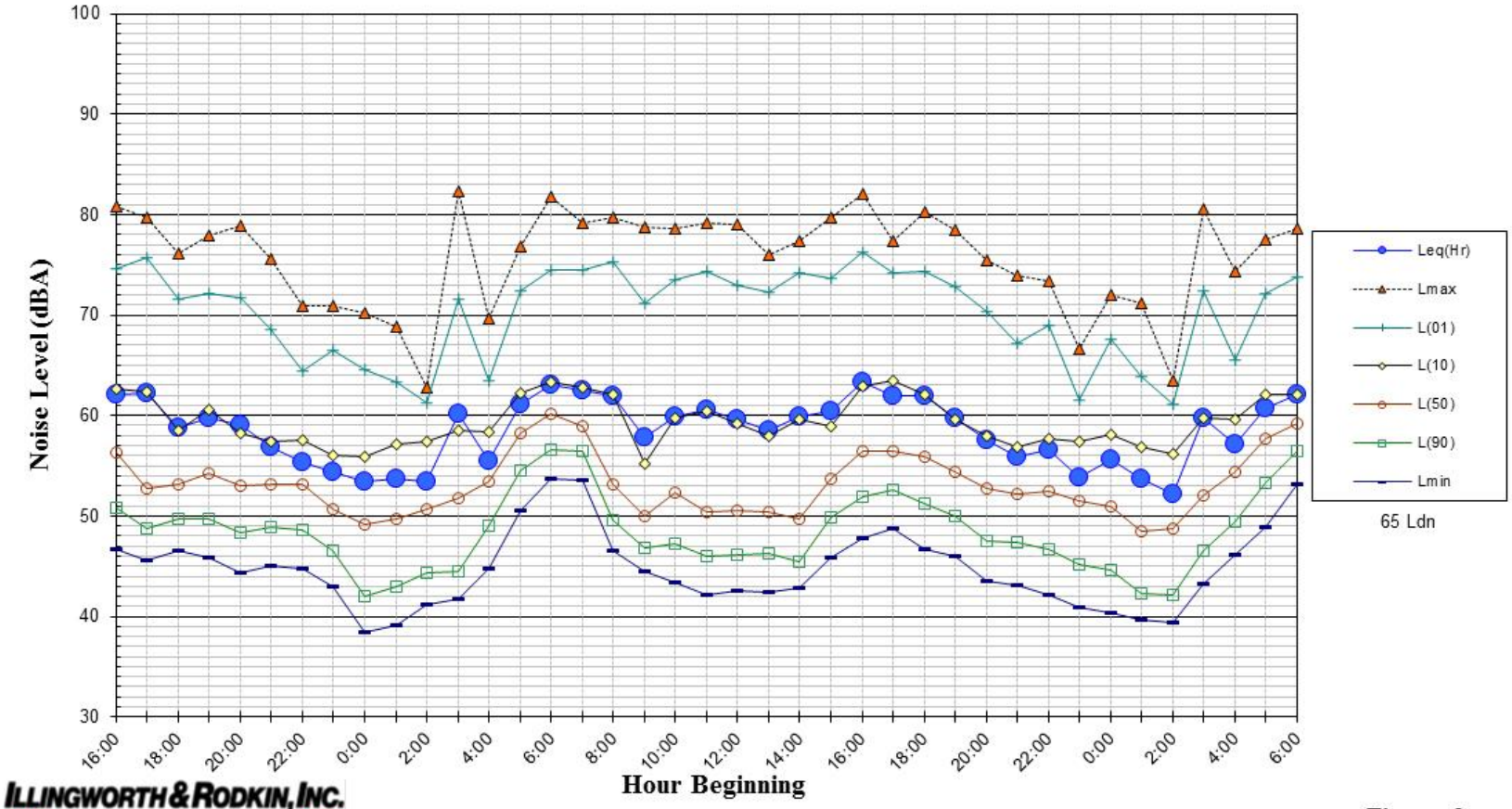



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**Figure 2**

**Noise Levels at LT-2**
**~230 feet from centerline of SR 156**
**April 16, 2015**

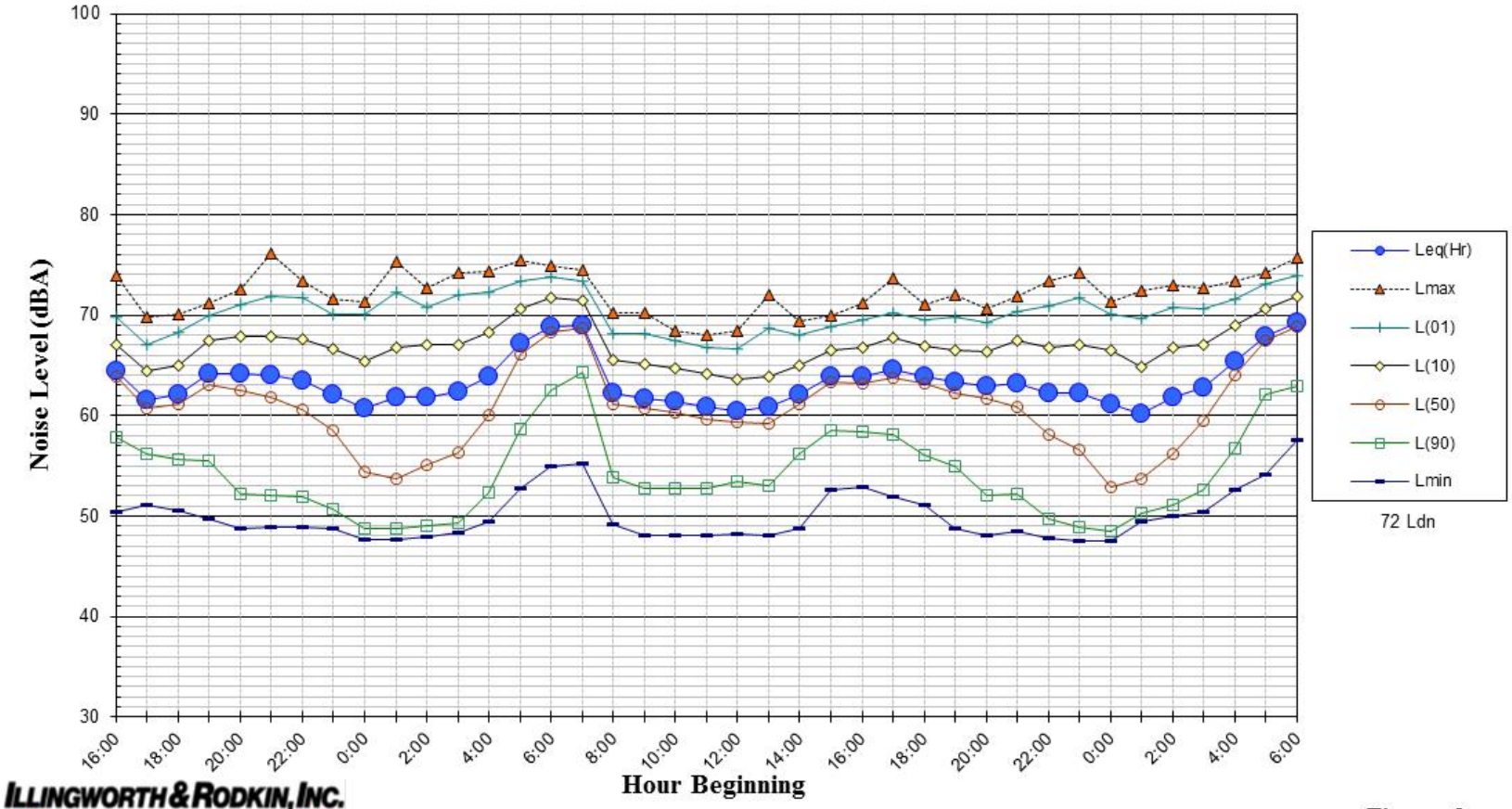


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**Figure 3**

## NOISE IMPACTS AND MITIGATION MEASURES

### Significance Criteria

The following criteria were used to evaluate the significance of impacts 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. Residential uses are considered "normally acceptable" where exterior noise exposures are 60 dBA $L_{dn}$ or less and interior noise levels are 45 dBA $L_{dn}$ or less.
- 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 would have the potential to result in cosmetic damage to normal buildings and would be considered excessive.
- A significant impact would be identified if traffic generated by the project or project improvements/operations 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 $L_{dn}$ or greater, with a future noise level of less than 60 dBA $L_{dn}$, or b) the noise level increase is 3 dBA $L_{dn}$ or greater, with a future noise level of 60 dBA $L_{dn}$ 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 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.** Future noise levels at the project site are calculated to exceed the City San Juan Bautista's exterior and interior noise and land use compatibility standards. **This is a significant impact.**

### Future Exterior Noise Environment

The future noise environment at the project site would primarily result from vehicular traffic along SR 156 and Old San Juan-Hollister Road. The Federal Highway Administration's Traffic Noise Model (TNM) was used to calculate the noise levels from the surrounding roadways. For the purposes of this assessment, traffic numbers supplied by *Hatch Mott MacDonald Traffic Consultants,*[2] were used and assumed a 2% increase in traffic volumes along SR 156 and 0.5% for all other roadways over the next 22 years. As a result, future noise levels are predicted to increase by approximately 1 decibel. Exterior noise levels would be as high as 74 dBA $L_{dn}$ at the northernmost homes nearest SR 156.

Traffic noise levels at the project site were predicted using TNM. TNM calculates traffic noise levels based on the geometry of the site, which includes the positioning of travel lanes, receptors, barriers, terrain, ground type, buildings, etc. Geometrical features were digitized and input into

[2] Copperfield Subdivision Traffic Assessment, Hatch Mott MacDonald, May 2015..

the traffic noise model based on the project's geometric plans dated March 10, 2015. The noise source is the traffic flow, as defined by the user, in terms of hourly volumes of automobiles (autos), medium-duty trucks (medium), heavy-duty trucks (heavy), buses, and motorcycles. Travel speeds were input into the model based on observations made during the noise monitoring survey.

The compatibility of proposed exterior use areas are assessed against the Land Use Compatibility Standards established in the General Plan. Residential exterior use areas in single home residential developments are considered "conditionally acceptable" in noise environments of 70 dBA $L_{dn}$ or less. Future noise levels are predicted to reach 74 dBA $L_{dn}$ at the proposed backyards of the homes closest to SR 156. As such, exterior noise levels at the common outdoor use area would be considered "normally unacceptable" by the City of San Juan Bautista and additional mitigation would be required.

Table 5 summarizes these results and identifies the minimum heights of noise barriers necessary to meet the 70 dBA $L_{dn}$ "conditionally acceptable" noise threshold in affected outdoor use areas. As indicated in Table 5, a six-foot noise barrier would reduce noise levels to 70 dBA $L_{dn}$ or less, a nine-foot noise barrier would be required to reduce noise levels to 65 dBA $L_{dn}$ or less. It is not possible to reduce exterior noise levels to 60 dBA $L_{dn}$ or less at all receptors even with a barrier twelve-feet high. The optimal height for the barrier along SR 156 is 9 feet tall with the ends wrapped around lot 10 and Lot 23. Because lot 24 is set back behind the open land and not protected by the first wall, a second separate wall will be needed to reduce the noise from SR 156 to lots 24 o 25. Figure 4 shows the approximate location of the walls.

**TABLE 5 Traffic Noise Modeling Results, dBA $L_{dn}$**

| Lot # | 2035 Noise Level | Future Noise Level with Property Line Noise Barrier[1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 6 ft. | | 9 ft. | | 10 ft. | | 12 ft. | |
| | | Level | Reduction | Level | Reduction | Level | Reduction | Level | Reduction |
| 23 | **74** | **69** | 5 | **65** | 9 | **65** | 9 | **64** | 10 |
| 21 | **74** | **69** | 5 | **65** | 9 | **65** | 9 | **64** | 10 |
| 18 | **74** | **70** | 4 | **65** | 9 | **65** | 9 | **64** | 10 |
| 14 | **74** | **70** | 4 | **65** | 9 | **65** | 9 | **64** | 10 |
| 10 | **74** | **71** | 3 | **65** | 9 | **66** | 8 | **64** | 10 |
| 41 | **67** | **65** | 2 | **61** | 6 | **61** | 6 | **60** | 7 |
| 9 | **66** | **65** | 1 | **62** | 4 | **62** | 4 | **61** | 5 |
| 31 | **68** | **67** | 1 | **66** | 2 | **66** | 2 | **65** | 3 |
| 1 | **62** | **60** | 2 | **59** | 3 | **59** | 4 | 56 | 6 |
| 45 | **63** | **61** | 3 | **59** | 4 | **59** | 4 | 56 | 7 |
| 28 | **62** | **60** | 2 | **59** | 3 | 58 | 4 | 58 | 4 |
| 27 | **62** | 59 | 3 | 58 | 4 | 58 | 4 | 58 | 5 |

**Table 5 (continued)**

| Lot # | 2035 Noise Level | Future Noise Level with Property Line Noise Barrier[1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 6 ft. | | 7 ft. | | 8 ft. | | 9 ft. | |
| | | Level | Reduction | Level | Reduction | Level | Reduction | Level | Reduction |
| 24 | **68** | **60** | 6 | **60** | 7 | **61** | 8 | **62** | 8 |

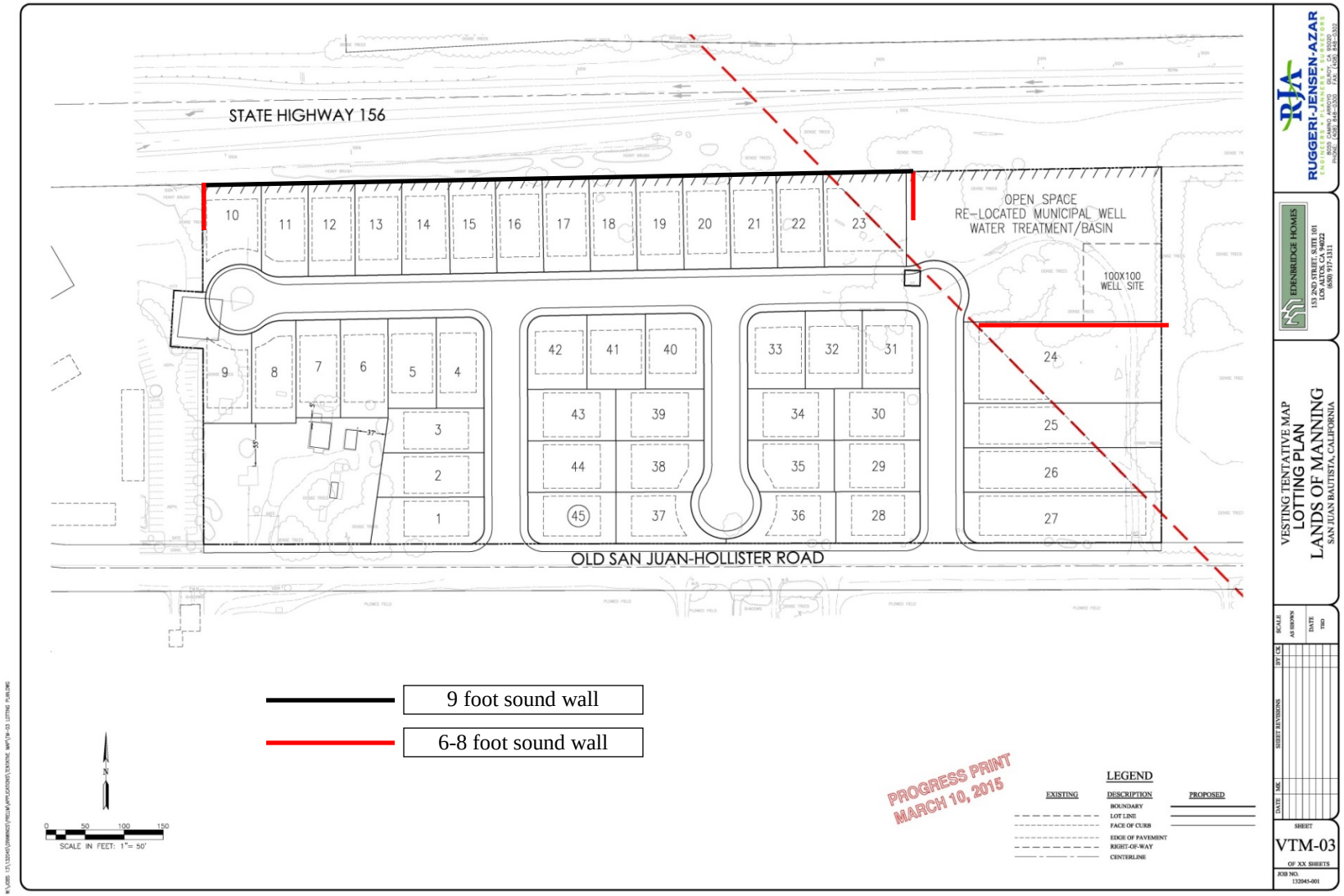
Notes:

[1] Height of the property line noise barrier is relative to the residential pad elevation.

[2] **Yellow font** indicates lots exposed to noise levels ranging from 60 dBA $L_{dn}$ to 65 dBA $L_{dn}$.

[3] **Red font** indicates lots exposed to noise levels exceeding 65 dBA $L_{dn}$.

Figure 4 Proposed Sound Wall Locations



**Future Interior Noise Environment**

The City of San Juan Bautista requires that interior noise levels within new residential units be maintained at or below 45 dBA $L_{dn}$. 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 60 dBA $L_{dn}$ would be 45 dBA $L_{dn}$ inside with the windows partially open and would range from 35 to 40 dBA $L_{dn}$ with the windows shut. 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.

The final design of the homes has not been completed at this time so the following analysis is based on typical California home construction. We assumed that the exterior walls of the proposed units would be 2x4 wood studs with fiberglass insulation, a single layer of gypsum board attached to the inside of the studs, and a 7/8" exterior cement plaster (Stucco) finish. This exterior wall construction has an approximate rating of STC 46. Windows and doors were then tested to determine the necessary sound transmission class ratings of these building elements in order to reduce interior noise levels due to traffic to acceptable levels.

The nearest proposed unshielded residential façades facing SR 156 would be located approximately 120 feet from the roadway centerline. North-facing façades of these residential units would be exposed to future traffic noise levels of about 74 dBA $L_{dn}$. These façades would require sound rated building elements to control traffic noise intrusion, and should achieve a minimum outdoor to indoor composite noise reduction of 29 dBA to reduce traffic noise to below 45 dBA $L_{dn.}$ Preliminary calculations indicate that windows and doors of stucco sided building façades would need minimum of 30 STC to adequately reduce noise levels indoors. In these homes, interior noise levels would be approximately 45 dBA $L_{dn}$ with windows kept closed assuming typical California construction methods. Attaining the necessary noise reduction (approximately 29 dBA) from exterior to interior spaces is readily achievable with proper wall construction techniques, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

**Mitigation Measure 1:**

Mitigation options are limited for residential land uses proposed nearest SR 156 because of the high noise levels generated by traffic. Reasonable height noise barriers, constructed on the project site, would not provide enough attenuation to achieve the 60 dBA $L_{dn}$ standard for all residential outdoor use areas. The following mitigation measures shall be incorporated into the proposed project to mitigate the impact to a less-than-significant level:

- Ensure that all residents have access to outdoor use areas that achieve the City of San Juan Bautista's exterior noise criteria (Normally Acceptable 60 dBA $L_{dn}$ for residential uses or Conditionally Acceptable 70 dBA $L_{dn}$ After noise reduction features are included in the design). Based on site plan provided, achieving 65 dBA $L_{dn}$ would be possible at all residential land uses with the construction of a 9-foot high wall along the northern edge of the proposed development. The final barrier limits and heights should be confirmed during final design, based on the latest site plan and grading plan.

A qualified acoustical consultant shall review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce interior noise levels to 45 dBA $L_{dn}$ or lower. Treatments would include, but are not limited to, sound rated windows and doors, sound rated wall and window constructions, acoustical caulking, protected ventilation openings, etc. Results of the analysis, including the description of the necessary noise control treatments, shall be incorporated in the building plans and approved design.

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residences on the project site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise.

**Impact 2**: **Construction Vibration.** Vibration levels generated during construction activities may at times be perceptible at neighboring residential land uses, but vibration levels would not be excessive causing cosmetic 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 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 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. A vibratory roller typically generates vibration levels of 0.210 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 used to assess potential cosmetic damage to buildings that are structurally sound. The nearest residential structures to the site are located 120 feet or further from the proposed new roads in the subdivision. Vibration levels at a distance of 50 feet would be 0.1 in/sec PPV or less. Vibration generated by construction activities near the San Juan Inn and the residential unit located at 102 San Juan Highway would at times be perceptible, however, would be infrequent and only during the allowable daytime construction period. This is a less-than-significant impact.

**TABLE 6 Vibration Source Levels for Construction Equipment**

| **Equipment** | | **PPV at 25 ft. (in/sec)** | **Approximate $L_v$ at 25 ft. (VdB)** |
|---|---|---|---|
| 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.**

**Impact 3:** **Project-Generated Traffic Noise:** Project generated traffic would not substantially increase ambient noise levels in the area. **This is a less-than-significant impact.**

Traffic volume information contained in the project's transportation assessment[3] was reviewed to calculate the change in traffic noise levels attributable to the operation of the project. Traffic volumes under the "Existing" and "Existing plus Project" traffic scenarios were compared to calculate the relative increase in traffic noise attributable to the proposed project. A noise impact would be identified at noise-sensitive land uses where the project would result in a noise level increase of 3 dBA $L_{dn}$ or more where exterior noise levels would exceed the normally acceptable noise level standard (60 dBA $L_{dn}$) or if existing plus project noise levels would be 5 dBA $L_{dn}$ or greater where noise levels would remain at or below the normally acceptable noise level. For reference, a 3 dBA $L_{dn}$ noise increase would be expected if the project would double existing traffic volumes along a roadway.

A comparison of the "Existing" and "Existing Plus Project" traffic scenarios shows that traffic volumes on all roadways serving the project site would only be slightly increased with the project as compared to existing conditions. Traffic noise levels on area roadways are calculated to increase by 1 dBA $L_{dn}$ or less as a result of the project. Existing traffic noise levels would not increase by 3 dBA $L_{dn}$; therefore, the impact related to project generated traffic would be less-than-significant.

**Mitigation Measure 3:** **None Required**

**Impact 4:** **Construction Noise.** Noise generated by project construction activities would temporarily elevate ambient noise levels at sensitive land uses in the vicinity. Due to the proximity of existing residential land uses, there is a potential that construction noise levels would exceed 60 dBA $L_{eq}$, and the ambient by at least 5 dBA $L_{eq}$, for a period greater than one year. **This is a significant impact.**

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. Once construction moves indoors, minimal noise would be generated at off-site locations.

Construction activities can generate high noise levels, especially during the construction of project infrastructure when heavy equipment is used. Maximum instantaneous noise levels from the majority of construction equipment ranges from about 73 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 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.

For the proposed project, the larger equipment would be used for approximately 45 work days (Site Preparation – 5 days, Grading/Excavation – 15 days, and Trenching and paving – 25 days). The construction of the residential units would utilize less heavy equipment and would last approximately 390 work days.

[3] Copperfield Subdivision Traffic Assessment, Hatch Mott MacDonald, May 2015.

Construction activities for the entire project are anticipated to last approximately 20 months.

Hourly average noise levels are calculated to range from about 72 to 79 dBA $L_{eq}$ at the nearest receptors located between 50 and 140 feet from the construction site (single family home 50 feet and the San Juan Inn – 140 feet). Therefore, ambient noise levels at single-family residential land uses adjacent to the project site along the southwest boundary could be elevated by up to 10 to 15 dBA during project construction, depending on the proximity of the portion of the site under construction to the sensitive receptor. Noise from temporary construction activities would exceed 60 dBA $L_{eq}$ and the ambient noise environment by at least 5 dBA $L_{eq}$ at noise-sensitive uses in the project vicinity for a period greater than one year, and the impact would be considered significant.

**Mitigation Measure 4:**

The construction contractor will implement the following controls in order to reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. With the implementation of these measures, the substantial temporary increase in ambient noise levels would be less-than-significant:

- Limit construction activity to weekdays between 7:00 am and 7:00 pm and Saturdays and holidays between 9:00 am and 7:00 pm, with no construction on Sundays;
- Locate stationary noise-generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction project area;
- Construct sound walls or other noise reduction measures prior to developing the project site, where feasible;
- Equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment;
- Prohibit all unnecessary idling of internal combustion engines; and
- Utilize “quiet” models of air compressors and other stationary noise sources where technology exists.