Toll Brothers Laguna Hills Townhome Project Noise Impact Study

City of Laguna Hills, California
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RK ENGINEERING GROUP INC.

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City of Laguna Hills, California

Prepared for:
CITY OF LAGUNA HILLS, CA
24035 El Toro Road
Laguna Hills, CA 92653

Prepared by:
RK Engineering Group, Inc.
1401 Dove Street, Ste. 540
Newport Beach, CA 92660

Bryan Estrada, T.E.
Becca Morrison
Claire Stokes

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1.0 Introduction

1.1 Purpose of Report & Study Objectives

The purpose of this report is to evaluate the potential noise impacts from the proposed Toll Brothers Laguna Hills Townhome Project (hereinafter referred to as "project") and provide recommendations, if necessary, to minimize any project noise impacts.

The assessment was conducted pursuant to the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000, et seq.) and the standards and methodology follow the City of Laguna Hills Municipal Code and General Plan requirements.

The following is provided in this report:

- A description of the study area and the proposed project;
- Information regarding the fundamentals of noise;
- Identification of the regulatory setting and applicable noise standards;
- Establishment of the existing ambient noise environment at the project site;
- Analysis of the project's construction and operational noise impact to adjacent receptors;
- Analysis of the project's noise/land use compatibility and preliminary interior noise levels; and

1.2 Site Location & Project Description

The proposed project site will be constructed on the 2.43-acre parcel at 23161 Mill Creek Drive (APN 588-142-07) in the City of Laguna Hills, Orange County, California (Project Site). The project site is located on the west side of Mill Creek Drive, approximately 0.27 miles south of Lake Forest Drive, Mill Creek Drive, and Scientific Intersection. The project site is currently developed with a two-story office building, surface parking lot, and associated landscaping and pavement. **Exhibit A** shows the location map of the proposed project.

The proposed project consists of the demolition of the existing office building and associated surface parking lot and landscaping to construct 36 single-family-attached condominium residential units, parking, roadways, and associated infrastructure at a density of 14.8 dwelling units per acre (du/ac). Two units will be deed-restricted for very low-income households, while the remaining 34 units are designated as above-moderate income.

Construction activities are expected to consist of demolition, site preparation, grading, building construction, paving, and architectural coating. The project will require the import/export of up to approximately 35,000 cubic yards of earthwork material for grading purposes during construction.

Exhibit B shows the proposed site plan used for this analysis.

1.3 Sensitive Receptors

Sensitive receptors are considered land uses or other types of population groups that are more sensitive to noise exposure. There are several sensitive land uses adjacent to the project site as described below.

A project site location map, including sensitive receptor locations, is provided in **Exhibit A**.

Receptor-1 Existing residential land uses located to the west of the proposed project site. The nearest residential home located at Receptor-1 (marked as circle "1" on **Exhibit A**) is located approximately 80 feet west of the project site's western boundary.

Receptor-2 Existing commercial land uses located to the north, east, and south of the proposed project site. the nearest commercial receptor located at Receptor-2 (marked as circle "2" on **Exhibit A**) is located directly adjacent to the project site's southern boundary.

1.4 Summary of Analysis Results

Table 1-1 provides a summary of the noise analysis results, per the CEQA impact criteria checklist.

Table 1-1 | CEQA Noise Impact Criteria

Noise Impact Criteria	Potentially Significant	Potentially Significant Unless Mitigated	Less Than Significant	No Impact
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			X	
b) Generation of excessive groundborne vibration or groundborne noise levels?			X	
c) For a project located within the vicinity of a private airstrip or 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, would the project expose people residing or working in the project area to excessive noise levels?				X

Legend

① = Sensitive Receptor Location

= Project Site Boundary

Exhibit A

Location Map

N

Exhibit B

Site Plan

2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

2.1 Sound, Noise, and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. Noise is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its frequency (pitch) and its amplitude (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The amplitude of a sound determines its loudness. The loudness of sound increases or decreases, as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels and abbreviated dB.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds of equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5

dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway), would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels. The following are the most commonly used noise descriptors along with brief definitions.

- **A-Weighted Sound Level.** The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

- **Ambient Noise Level.** The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

- **Community Noise Equivalent Level (CNEL).** The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

- **Decibel (dB).** A unit for measuring the amplitude of a 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, which is 20 micro-pascals.

- **dBA.** A-weighted sound level (see definition above).

- **Equivalent Sound Level (Leq).** The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

- **Habitable Room.** Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

- **L(n).** The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 is the sound level exceeded 10 percent of the sample time. Similarly, L50, L90 and L99, etc.

- **Noise.** Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

- **Outdoor Living Area.** Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

- **Percent Noise Levels.** See L(n).

- **Sound Level (Noise Level).** The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

- **Sound Level Meter.** An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

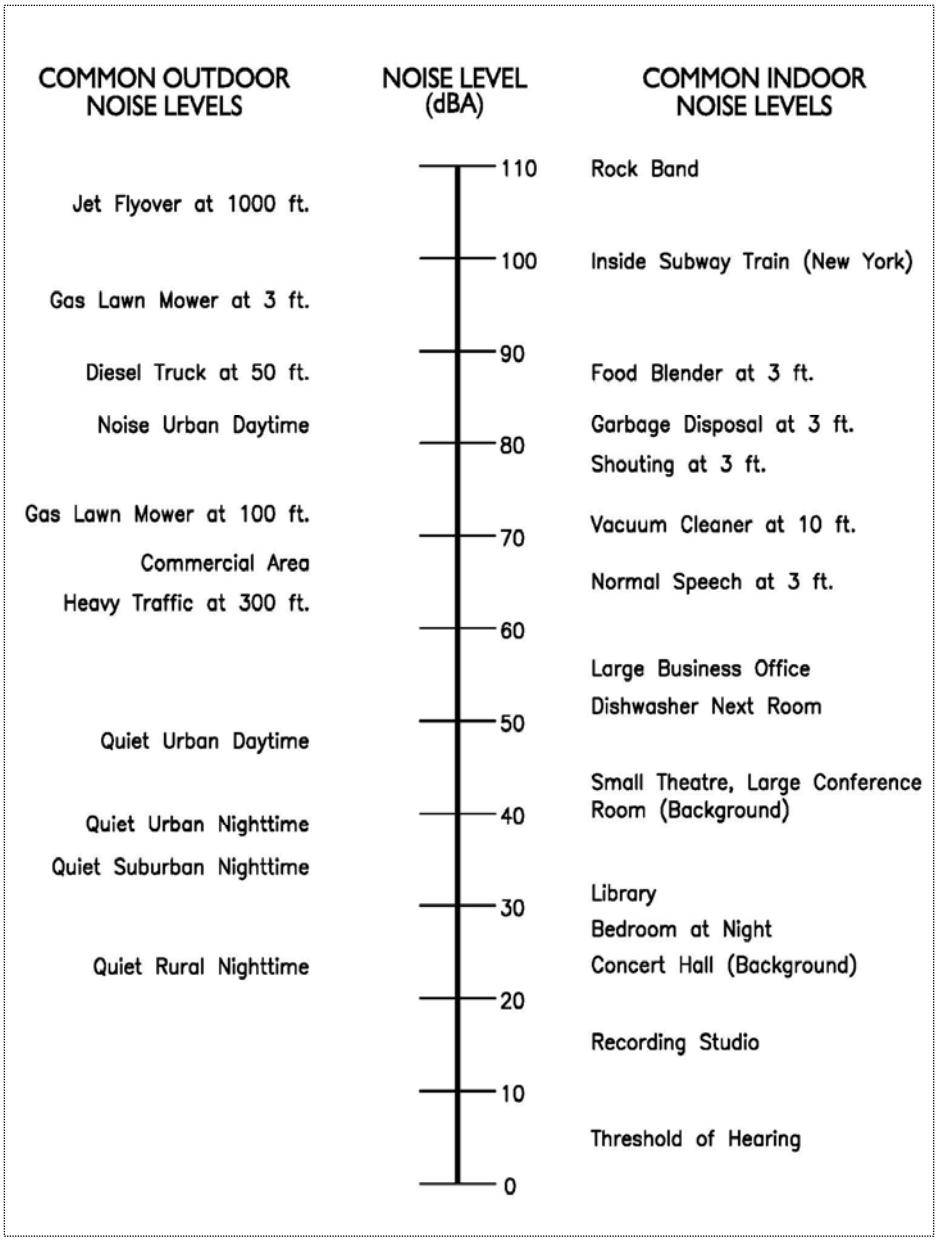
- **Single Event Noise Exposure Level (SENEL).** The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at an additional rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 3 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Figure 1-1 | Typical Sound Levels from Indoor and Outdoor Noise Sources[1]



[1] Source: AASHSTO. 1993. Guide on Evaluation and Abatement of Traffic Noise

2.8 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration that only exists indoors since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude:

- **PPV.** Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.
- **RMS.** Known as the root mean squared (RMS) can be used to denote vibration amplitude.
- **VdB.** A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

2.9 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. The Federal Transit Administration (FTA) has published guidance relative to vibration impacts.

2.10 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown

to be effective enough for screening purposes in order to identify potential vibration impacts that may need to be studied through actual field tests.

2.11 Construction-Related Vibration Level Prediction[2]

Vibration activities are separated into two different categories. The vibration can be transient or continuous in nature. Each category can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the project area respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. The thresholds from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual, September 2018, in the table below provide general guidelines as to the maximum vibration limits for when vibration becomes potentially damaging to structures.

The FTA Transit Noise and Vibration Impact Assessment Manual, September 2018, provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts. **Table 2-1** provides general vibration damage potential thresholds.

Table 2-1 | Construction Vibration Damage Criteria

Building/Structural Category	PPV (in./sec.)	Approximate L_V[1]
Reinforced-concrete, steel, or timber (no plaster)	0.50	102
Engineered concrete and masonry (no plaster)	0.30	98
Non-engineered timber and masonry buildings	0.20	94
Buildings extremely susceptible to vibration damage	0.12	90

[1] RMD velocity in decibels, VdB re 1 micro-in/sec

Soil conditions have an impact on how vibration propagates through the ground. The Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, provides suggested "n" values based on soil class. **Table 2-2** outlines the manual's suggested values and description.

[2] Source: Caltrans Transportation and Construction Vibration Guidance Manual, April 2020.

Table 2-2 | Suggested "n" Values Based on Soil Classes

Soil Class	Description of Soil Material	Suggested Value of "n"
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand.	1.4
II	Most sands, sandy clays, silty clays, gravel, silts, and weathered rock.	1.3
III	Hard soils: densely compacted sand, dry consolidated clay, consolidated glacial till, and some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

3.0 Regulatory Setting

The proposed project is located in the City of Laguna Hills. The applicable noise regulations are described below.

3.1 State Regulations

The State of California has established noise insulation standards as outlined in Title 24 of the Building Standards Code which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold.

Noise insulation design standards for residential dwellings are established in the 2022 California Building Code, Title 24, Part 2, Volume 1, Section 1206 Sound Transmission. The City is required by the State Housing Law to adopt these State codes as minimum performance standards. The City may enact stricter noise standards throughout the city or on a case-by-case basis if deemed necessary. In brief, the Title 24 noise standards require the following for allowable interior noise levels:

1. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

2. Party wall and floor-ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.

3. Floor-ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.

4. Penetrations or openings in sound rated assemblies must be treated to maintain required ratings.

3.2 City of Laguna Hills Noise Regulations

The proposed project is located in the City of Laguna Hills and is subject to the standards and regulations established by the City of Laguna Hills General Plan Noise Element and Municipal Code Chapter 5-24 – Noise Control, as discussed below.

A copy of the City of Laguna Hills General Plan and Municipal Code standards are provided in **Appendix A**.

3.2.1 General Plan Noise Standards

3.2.1.1 Noise/Land Use Compatibility

The City of Laguna Hills General Plan establishes planning criteria for determining a development's noise/land use compatibility based on the community noise equivalent level (CNEL). CNEL noise levels are typically used to evaluate mobile noise source impacts such as those from roadways.

Table 3-1 shows the City of Laguna Hills noise/land use compatibility standards for the land uses on and adjacent to the proposed project site, as prescribed in the General Plan.

Table 3-1 | City of Laguna Hill Land Use Compatibility Guidelines[1]

Land Use Category	Community Noise Exposure (dBA CNEL)[2]			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Single family, duplex, mobile home	60 and below	55 – 70	70 – 75	75 and above
Residential – Multiple family	65 and below	60 – 70	70 – 75	75 and above
Office Buildings, Business Commercial, Professional	70 and below	67 – 77	75 and above	--

[1] Source: City of Laguna Hills General Plan Noise Element, Figure N-1: Land Use Compatibility Guidelines.

[2] Notes:

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development clearly should not be undertaken.

3.2.1.2 Noise Standards

In addition to the above noise/land use compatibility guidelines, the General Plan has established the following noise standards which represent the maximum acceptable noise level as measured form any residential property in the City. Accordingly, it is unlawful to cause the noise level on any residential property to exceed the exterior noise standards listed in **Table 3-2**:

1. For a cumulative period of more than 30 minutes in any hour;

2. Plus 5 dBA for a cumulative period of more than 15 minutes in any hour;

3. Plus 10 dBA for a cumulative period of more than 1 minute in any hour; or
4. Pus 20 dBA for any period of time.

In addition, it is unlawful to cause the noise level on any residential property to exceed the interior noise standards listed in **Table 3-2**:

1. For a cumulative period of more than 5 minutes in any hour;
2. Plus 5 dBA for a cumulative period of more than 1 minute in any hour; or
3. Plus 10 dBA for any period of time.

Table 3-2 | City of Laguna Hills General Plan Noise Standards[1]

Land Use Category	Allowable Noise Level (dBA Leq)	
	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Residential - Exterior	55.0	50.0
Residential - Interior	55.0	45.0
Nonresidential	65.0	65.0

[1] Source: City of Laguna hills General Plan Noise Element, Table N-2: Residential Noise Standards.

For the purposes of this analysis, the noise levels listed in **Table 3-1** are used to evaluate the project's noise/land use compatibility, and the noise levels listed in **Table 3-2** are used to evaluate the project's consistency with established plans, policies, and programs for noise control within the City.

3.2.2 Municipal Code Noise Standards

3.2.2.1 Noise Standards

Table 3-3 shows the exterior noise standards established in Chapter 5-24 of the City of Laguna Hills Municipal Code.

Table 3-3 | City of Laguna Hills Municipal Code Noise Standards[1]

Land Use Category	Exterior Noise Level Thresholds (dBA Leq)	
	Daytime (7:00 a.m. – 10:00 p.m.)	Nighttime (10:00 p.m. – 7:00 a.m.)
Residential - Exterior	55.0	50.0
Residential - Interior	55.0	45.0
Nonresidential	65.0	65.0

[1] Source: City of Laguna Hills Municipal Code Chapter 5-24 – Noise Control.

Per the Municipal Code, it is unlawful for any person at any location within the City to operate, or cause to be operated, any source of sound at any location within the incorporated City or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured on any other property, either incorporated or unincorporated, to exceed:

1. The noise standard for a cumulative period of more than thirty (30) minutes in any hour;
2. The noise standard plus five dBA for a cumulative period of more than fifteen (15) minutes in any hour;
3. The noise standard plus ten dBA for a cumulative period of more than five minutes in any hour;
4. The noise standard plus fifteen (15) dBA for a cumulative period of more than one minute in any hour; or
5. The noise standard plus twenty (20) dBA for any period of time.

In addition, it is unlawful to cause the noise level on any residential property to exceed the interior noise standards, as follows:

1. For a cumulative period of more than five (5) minutes in any hour;
2. Plus five (5) dBA for a cumulative period of more than one (1) minute in any hour; or
3. Plus ten (10) dBA for any period of time.

In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category is increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category is increased to reflect the maximum ambient noise level.

3.2.2.2 Construction Noise Standards

Per the Municipal Code, noise sources associated with construction, repair, remodeling, or grading of any real property shall be exempted from the provisions of Chapter 5-24, provided said activities do not take place between the hours of eight p.m. and seven a.m. on weekdays, eight p.m. and eight a.m. on Saturday, or at any time on Sunday or a federal holiday.

4.0 Study Method and Procedures

The following section describes the noise measurement procedures and locations, noise modeling procedures, and assumptions used in this analysis.

4.1 Noise Measurement Procedures and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the nearest houses to the project site;
- Locations that are acoustically representative and equivalent to the area of concern;
- Human land usage; and
- Sites clear of major obstructions and contamination.

RK conducted the sound level measurements in accordance with Caltrans technical noise specifications. All measurement equipment met American National Standards Institute (ANSI) specifications for sound level meters (ANSI S1.4: Specification for Sound Level Meter, 1983)

Piccolo-II Type 2 integrating-averaging level meters were used to conduct noise measurements at the project site and property boundaries.

The Leq, Lmin, Lmax, L2, L8, L25, and L50 statistical data were recorded over the measurement time intervals and the information was utilized to define the noise characteristics for the project. The following gives a brief description of the procedures for sound level measurements:

- Microphones for sound level meters were placed five (5) feet above the ground;
- Sound level meters were calibrated before each measurement;
- Following the calibration of equipment, a windscreen was placed over the microphone;
- Frequency weighting was set on “A” and slow response; and
- Temperature and sky conditions were observed and documented.

Appendix B includes photos, field sheets, and measured noise data.

4.2 Stationary Noise Source Modeling

Stationary noise generated by the project was modeled using a computer program that replicates the FHWA Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at a predicted noise level through a series of adjustments to the reference energy noise level. For stationary sources, the following noise levels were applied to the model. The model outputs the projected noise level based on the following key parameters:

- Referenced noise level (i.e., how loud a source is at a specific distance);
- Vertical and horizontal distances of sensitive receptor from the noise source;
- Vertical and horizontal distances of noise barriers from the noise source and receptor;
- Typical noise source spectra; and
- Topography.

The project proposes to install one (1) Carrier 37MUHAQ60AA3 outdoor heat pump for each dwelling unit. To model the noise generated by these units, manufacturer specifications were obtained and utilized. **Table 4-1** indicates the referenced noise levels used in this analysis.

Table 4-1 | Referenced Stationary Noise Levels

Noise Source	Distance from Source (Feet)	Noise Levels	
		dBA Leq	dBA Lmax
HVAC[1]	3.25	65	65

[1] Noise level is representative of a single unit. Manufacturer specifications for the proposed HVAC units are provided in **Appendix C**.

4.3 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's façade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows closed". The interior noise level is estimated by subtracting the building shell design from the estimated exterior noise level.

The interior noise analysis is based on industry standards for building noise reduction established by the Federal Highway Administration (FHWA), the 2013 Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (TeNS), the California Office of Noise Control Catalog of Sound Transmission Class (STC) and Impact Insulation Class (IIC) Ratings for Wall and Floor/Ceiling Assemblies, and the California Building Standards Code, Title 24.

The TeNS manual shows that the noise reduction due to building exteriors with ordinary sash windows (windows closed) is at least 20 decibels. By providing upgraded STC rated windows, the project design is considered adequate to meet interior noise standards. The building's exterior walls will be constructed per the latest building code insulation requirements and provide occupants with the most protection from exterior noise. Insulated exterior walls, designed per the latest California Building Standards, would provide a minimum of STC 35-40. Windows, on the other hand, are one of the acoustically weakest parts of the structure. Therefore, for a conservative estimate of preliminary interior noise, the building's noise reduction potential is limited to the STC of the windows.

4.4 Construction Noise Modeling

The construction noise vibration assessment is based on the General Assessment methodology set forth by the FTA's Transit Noise and Vibration Impact Assessment Manual, Section 7 – Noise and Vibration during Construction. This analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model, together with several key construction parameters, to estimate future construction noise levels during each phase of construction. Consistent with the FTA General Assessment methodology, the following assumptions have been utilized in the construction noise model:

- Noise emission level ($L_{emission}$) – Determine the emission level at 50 feet according to noise from typical construction equipment.
- Usage factor (Adj_{Usage}) – Assume a usage factor of one (1). This assumes a time period of one-hour with full power operation.
- Distance (D) – Assume that all equipment operates at the center of the project, or centerline for guideway or highway construction projects.
- Ground effect (G) – G equals zero (0) assuming free-field conditions and ignoring ground effects.
- The $L_{eq.equip}$ is determined only for the two noisiest pieces of equipment expected to be used in each phase of construction. The equipment noise levels are summed for each phase of construction using decibel addition.

Noise levels were projected from the center of the project site to the adjacent sensitive receptor property lines. Although some construction activity may occur closer to the adjacent receptors than the center of the project site, noise levels are based on an average distance from the center of the site per FTA General Assessment recommendations.

4.5 Construction Vibration Modeling

The construction vibration assessment is based on the methodology set forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. The vibration impacts from

bulldozers, heavy truck loading, vibratory rollers and compactors, and caisson drilling activity are analyzed. All vibratory activity is analyzed as a continuous and/or frequent event. This represents a conservative assessment, as construction equipment would in practice operate intermittently rather than continuously. It is expected that vibration levels will be highest during the paving phase. No impact pile driving is expected as part of this project.

Vibratory impacts were calculated from the nearest expected location of on-site construction to the nearest sensitive receptors and structures using the reference vibration levels, soil conditions, and the reference equation PPV= PPV ref (25/D)^n (in/sec) (from Caltrans Manual) where:

- PPV = reference measurement at 25 feet from the vibration source;
- D = distance from equipment to property line; and
- n = vibration attenuation rate through ground (n = 1.1 was utilized for this study).

For the purposes of this analysis, hard soil conditions (i.e., densely compacted sand, dry consolidated clay, consolidated glacial till, and some exposed rock) were assumed.

5.0 Existing Noise Environment

The existing noise environment for the project site and surrounding areas has been established based on noise measurement data collected by RK. The project setting is residential and commercial and the primary environmental noise impacting the project site is roadway noise from Mill Creek Drive.

5.1 Noise Measurement Results

To determine the existing noise level environment, RK conducted two (2) 24-hour noise measurements at the project site and receptors.

Noise levels were measured on May 21, 2024, using Piccolo-II Type 2 integrating-averaging sound level meters. The information was utilized to establish the noise characteristics of the existing ambient environment.

The noise monitoring locations were selected based on the proximity and location of adjacent sensitive receptors. **Exhibit C** graphically illustrates the location of the noise measurements.

- Noise Monitoring Location 1 (L-1) was taken near the residential receptors to the west/southwest of the project site, approximately 35 feet northwest of the centerline of Mill Creek Drive.
- Noise Monitoring Location 2 (L-2) was taken near the commercial uses to the southeast of the project site, approximately 240 feet northeast of the centerline of Mill Creek Drive.

Noise measurements were conducted at the above-selected locations to determine the existing ambient noise environment at the project site and nearby sensitive receptors. The primary source of ambient noise during the measurement period was roadway noise along adjacent streets.

Results of the ambient noise measurements are shown in **Tables 5-1** and **5-2**. **Appendix B** includes photographs, field sheets, and measured noise data.

Table 5-1 | 24-Hour Noise Measurement Results – L-1[1]

Time	dBA Leq	Time	dBA Leq
12:00 AM	53.0	12:00 PM	57.6
1:00 AM	43.9	1:00 PM	63.2
2:00 AM	43.3	2:00 PM	57.5
3:00 AM	41.6	3:00 PM	65.8
4:00 AM	46.3	4:00 PM	59.4
5:00 AM	58.0	5:00 PM	58.0
6:00 AM	68.3	6:00 PM	54.0
7:00 AM	67.8	7:00 PM	52.5
8:00 AM	60.9	8:00 PM	48.9
9:00 AM	62.8	9:00 PM	47.4
10:00 AM	64.0	10:00 PM	46.6
11:00 AM	57.6	11:00 PM	65.3
24-Hour CNEL			**67.4**

[1] L-1 was measured on May 21, 2024.

Table 5-2 | 24-Hour Noise Measurement Results – L-2[1]

Time	dBA Leq	Time	dBA Leq
12:00 AM	46.8	12:00 PM	56.3
1:00 AM	49.3	1:00 PM	53.9
2:00 AM	47.1	2:00 PM	53.8
3:00 AM	47.2	3:00 PM	53.7
4:00 AM	48.3	4:00 PM	57.3
5:00 AM	51.8	5:00 PM	55.0
6:00 AM	66.0	6:00 PM	56.2
7:00 AM	63.3	7:00 PM	53.7
8:00 AM	52.7	8:00 PM	56.3
9:00 AM	53.2	9:00 PM	50.0
10:00 AM	53.5	10:00 PM	48.6
11:00 AM	51.8	11:00 PM	49.0
24-Hour CNEL			**63.5**

[1] L-2 was measured on May 21, 2024.

As shown in **Table 5-1** and **Table 5-2**, the existing ambient noise levels at the proposed project site range from approximately 67.4 dBA CNEL to 63.5 dBA CNEL.

Legend

① = Noise Monitoring Location

= Project Site Boundary

Exhibit C

Noise Monitoring Location

6.0 Operational Noise Impacts

The following noise impact analysis has been performed to determine whether the proposed project would result in a substantial increase in ambient noise levels in the vicinity of the site. Additionally, the noise analysis examines whether the project can meet the City of Laguna Hills and State of California requirements for residential exterior and interior noise exposure.

6.1 Stationary Noise Source Impacts

The proposed project consists of constructing and operating thirty-six (36) townhome dwelling units. The main source of potential on-site noise would be HVAC equipment.

These types of on-site stationary noises would not typically be categorized as loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness. In particular, social activities and vehicle-related noise are generally substantially less during the noise sensitive nighttime hours.

To help ensure on-site noise levels do not exceed the City of Laguna Hills General Plan and Municipal Code noise standards, the following stationary noise impact analysis has been prepared. The analysis considers all project noise sources operating continuously during daytime hours (7:00 a.m. to 10:00 p.m.) and nighttime hours (10:00 p.m. to 7:00 a.m.). The result is a worst-case assessment of impacts, as HVAC units would likely only operate intermittently throughout the day.

Stationary noise calculation worksheets are provided in **Appendix D**.

6.1.1 HVAC Noise Impacts

HVAC noise levels were modeled using manufacturer specifications for the proposed outdoor units, which are planned to be located at ground level and shielded behind noise barrier walls/enclosures. To ensure a comprehensive assessment, the analysis assumes simultaneous operation of all units with direct line of sight to adjacent receptors. Noise from units blocked from line of sight is assumed to be adequately attenuated by intervening onsite structures.

To estimate noise level impacts at the adjacent residential receptors, the referenced noise level is input into the FHWA model and projected from the nearest proposed HVAC locations to the nearest residential habitable areas at a distance of approximately 100 feet. Per the City of Laguna Hills Municipal Code Section 5-24.100, “the location selected for measuring exterior noise levels shall be at any point on the affected property.” In this case, the property line adjacent to the project site consists of landscaped slope that does not contain and would not accommodate habitable structures. Accordingly, receptors were placed at the nearest residential structures, which represent the actual locations of potential noise exposure. This approach is consistent with the intent of the Code requirement while providing a conservative and realistic assessment of potential impacts.

To estimate noise level impacts at the adjacent commercial receptors, the referenced noise level is input into the FHWA model and projected from the nearest proposed HVAC locations to the nearest commercial property line, at a distance of approximately 10 feet.

The project site and surrounding area consist primarily of paved surfaces and vegetated areas. Consistent with the inverse square law for stationary noise sources, stationary noise generated by the project was projected to the nearby receptors using a distance attenuation factor of 20, which results in a reduction of approximately 6 dBA per doubling of distance from the noise source.

Tables 6-1 and **6-2** show the projected operational noise levels at the nearest residential and commercial receptors, respectively. The noise modeling used in this analysis accounts for existing topographical changes in elevation in the vicinity of the project site and receptors, as well as attenuation provided by the proposed property line walls.

The project includes property line retaining walls along the western and southern project boundaries. Along the western boundary, which separates the project site from adjacent residential receptors, the property line wall is anticipated to range in height from approximately 5 feet to approximately 15 feet. To be conservative, potential noise impacts at residential receptors are modeled assuming a worst-case wall height of 5 feet. Along the southern boundary, which separates the project site from adjacent commercial receptors, the wall is anticipated to range in height from approximately 15 feet to approximately 19 feet. Accordingly, noise modeling for the southern boundary assumes a conservative wall height of 15 feet.

Stationary noise calculation worksheets are provided in **Appendix D**.

Table 6-1 | Stationary Noise Impacts at Residential Receptors

Noise Source	Receptor Distance from Noise Source (feet)	Noise Level at Receptor	
		dBA Leq	dBA Lmax
HVAC[1]	100	39.1	39.1
Noise Level Threshold (Day / Night)		55.0 / 50.0	75.0 / 70.0
Noise Level Exceeds Threshold?		**No / No**	**No / No**

[1] Noise level is indicative of eight units and includes the attenuation effects of the proposed noise barriers/enclosures. For the purposes of this analysis, noise associated with the simultaneous operation of all units with direct line of sight to adjacent receptors is considered. Noise from units blocked from line of sight is assumed to be adequately attenuated by intervening onsite structures.

Table 6-2 | Stationary Noise Impacts at Commercial Receptors

Noise Source	Receptor Distance from Noise Source (feet)	Noise Level at Receptor	
		dBA Leq	dBA Lmax
HVAC[1]	10	49.6	49.6
Noise Level Threshold (Day and Night)		65.0	65.0
Noise Level Exceeds Threshold?		**No**	**No**

[1] Noise level is indicative of eight units and includes the attenuation effects of the proposed noise barriers/enclosures. For the purposes of this analysis, noise associated with the simultaneous operation of all units with direct line of sight to adjacent receptors is considered. Noise from units blocked from line of sight is assumed to be adequately attenuated by intervening onsite structures.

As shown in the tables above, noise levels generated by the project are not expected to exceed the City's daytime or nighttime noise standards at any of the adjacent residential or commercial receptor locations.

6.1.2 Other Stationary Noise Source Impacts

In addition to onsite HVAC noise, the proposed project will generate noise associated with maintenance activities, including landscaping and trash removal. These types of on-site stationary noises would not typically be categorized as loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness. Furthermore, these activities would typically occur during daytime hours only.

Per the City of Laguna Hills Municipal Code Section 5-24.070(I), property maintenance activities such as landscaping are exempt from noise standards when conducted between 7:00 a.m. and 8:00 p.m. on weekdays and Saturdays, or between 9:00 a.m. and 8:00 p.m. on Sundays and federal holidays. In compliance with the Municipal Code, no project-related maintenance activity, including landscaping, shall occur outside of the approved hours.

Furthermore, it should be noted that the project site is currently occupied by an existing commercial building, which includes trash removal and landscaping operations. As a result, these activities would not be new sources of noise generated by the project, and the project would not result in a substantial change in noise levels in the vicinity of the project site from these activities.

6.1.3 Summary of Stationary Noise Source Impacts

As discussed in **Sections 6.1.1** and **6.1.2**, the proposed project is not expected to generate stationary noise levels in excess of the noise standards established by the City, and **the impact is considered less than significant**.

6.2 Mobile Source Noise Impacts

6.2.1 Roadway Noise

The main source of roadway noise in the vicinity of the project site is activity along Mill Creek Drive. As described in the City's General Plan Mobility Element, Mill Creek Drive is classified as a Collector (Commuter) Arterial, which can accommodate up to 10,000 vehicle trips per day.

Per California Department of Transportation (Caltrans) guidance, a doubling of traffic volume along a roadway would be required to increase ambient noise levels by 3 dBA or more[3]. An increase in noise levels by 3 dBA or more is an industry standard threshold of significance and is generally considered the point at which the human ear will perceive a change in noise level[4].

The project is expected to generate approximately 259 daily trips[5]. Per Streetlight segment volume data, the segment of Mill Creek Drive adjacent to the proposed project site has an average daily traffic (ADT) of approximately 1,877. As a result, the 259 daily trips generated by the proposed project will not double the amount of traffic along adjacent streets, and the potential increase in noise from project-related roadway activity would be less than 3 dBA. **Therefore, the increase in roadway noise levels as a result of the project would be less than significant**.

6.2.2 Airport Noise

The John Wayne Airport, located in Santa Ana, California, is the nearest airport to the proposed project site at a distance of approximately 8 miles. The project site is not located within the John Wayne Airport, or any other airport's airport land use plan area.

Furthermore, as described above, the proposed project is not expected to expose people residing or working in the project area to excessive airplane noise levels. **Therefore, the project would have no impact on exposing people residing or working in the area to excessive airplane noise.**

6.3 Noise/Land Use Compatibility

The project proposes to site new townhome dwelling units along Mill Creek Drive. Traffic noise from Mill Creek Drive will be the primary source of noise impacting the project site and may expose future residents to noise levels above the City of Laguna Hills exterior noise thresholds for residential uses.

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[3] Source: Technical Noise Supplement to the Traffic Noise Analysis Protocol, California Department of Transportation (Caltrans), September 2013.
[4] Source: Technical Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects, California Department of Transportation (Caltrans), April 2020.
[5] Source: *Toll Brothers Townhome Project Trip Generation and Vehicle Miles Traveled (VMT) Screening Analysis and Gate Queueing Study, City of Laguna Hills* (January 2025), prepared by RK.

6.3.1 Exterior Noise/Land Use Compatibility

A noise/land use compatibility assessment has been prepared to help determine whether existing exterior noise levels affecting the project site exceed the City's noise/land use compatibility threshold for residential land uses. This assessment is for informational and local planning purposes only and isn't intended to serve as a CEQA impact determination, since it looks at existing noise conditions relative to future on-site sensitive receptors.

Exterior ambient noise levels are assessed at the first-row residential building façades of each dwelling unit facing Mill Creek Drive.

The first-row residential lots will be set back a minimum of approximately 55 feet from the centerline of Mill Creek Drive.

Future exterior noise levels are estimated based on the existing ambient noise level measurements collected by RK. To account for future increases in roadway volumes, a three-decibel increase has been applied to the measured noise levels. This is a conservative estimate, as a doubling of traffic volume along a roadway would by required to increase ambient noise levels by 3 dBA or more[6].

Table 6-3 shows the anticipated exterior noise levels at the first-row residential building façades.

Table 6-3 | Exterior Noise/Land Use Compatibility (dBA CNEL)

Receptor Location	Noise Monitoring Location	Estimated Future Exterior Noise Levels
First-row building façades along Mill Creek Drive	L-1	70.4

As shown in **Table 6-3**, future exterior ambient noise levels are expected to be approximately 70.4 dBA CNEL and fall within the Normally Unacceptable noise/land use compatibility category.

Per the City of Laguna Hills General Plan, if new construction of Normally Unacceptable land uses proceeds, a detailed analysis of the noise reduction requirements must be made and the required noise insulation features must be included in the design.

In order to ensure that interior noise levels comply with County and State standards, the following preliminary interior noise analysis is provided.

[6] Source: Technical Noise Supplement to the Traffic Noise Analysis Protocol, California Department of Transportation (Caltrans), September 2013.

6.3.2 Interior Noise/Land Use Compatibility

The project must show that interior noise levels at the project site will not exceed the City of Laguna Hills and State of California noise/land use compatibility threshold for residential land uses. A preliminary interior noise analysis has been performed for the first row of habitable dwellings facing the adjacent roadways using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level.

Table 6-4 indicates the future interior noise levels along the adjacent roadways.

Table 6-4 | Future Interior Noise Levels (dBA CNEL)

Exterior Façade Study Location	Projected Exterior Noise Level[1]	Interior Noise Standard	Required Building Shell Noise Reduction	Interior Noise Level with Standard Windows (STC ~ 25)		Required STC Rating
				"Windows Open"[2]	"Windows Closed"[3]	
First-row dwelling units along Mill Creek Drive	70.4	45.0	25.4	58.4	50.4	28

[1] Worst-case future exterior noise levels are based on existing ambient noise level measurements collected by RK.
[2] A minimum of 12 dBA noise reduction is assumed with the "windows open" condition.
[3] A minimum of 20 dBA noise reduction is assumed with the "windows closed" condition.

The project is expected to require a "windows closed" condition and upgraded STC-rated windows for all residential units facing Mill Creek Drive. To accommodate windows closed conditions, all residential units facing the adjacent roadways shall be equipped with adequate fresh air ventilation.

Exterior walls, designed per the latest California Building Standards are typically rated between STC 35-40. In order to ensure adequate noise attenuation is provided from the building shell, exterior walls should be designed to meet the required sound attenuation targets. Attic vents and other openings should be baffled and oriented away from facing the adjacent roadways.

Prior to issuance of building permits, the project proponent should demonstrate to the City Building Department that the proposed building shell and window assemblies will achieve exterior to interior noise reduction necessary to meet the State of California and City of Laguna Hills requirements.

7.0 Construction Noise and Vibration Impacts

Temporary construction noise and vibration impacts have been assessed from the project site to the surrounding adjacent land uses. The degree of construction noise and vibration will vary depending on the type of construction activity taking place and the location of the activity relative to the surrounding properties.

During the construction period, the contractors will be required to comply with the City of Laguna Hills Municipal Code Chapter 5-24. Per the Municipal Code, noise sources associated with construction, repair, remodeling, or grading of any real property shall be exempted from the provisions of Chapter 5-24, provided said activities do not take place between the hours of eight p.m. and seven a.m. on weekdays, eight p.m. and eight a.m. on Saturday, or at any time on Sunday or a federal holiday. The Municipal Code does not include specific noise level limits for construction activities.

Because the City of Laguna Hills does not establish quantitative thresholds for construction-related noise, the proposed project's potential construction noise impacts have been evaluated using the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2006) criteria. The FTA provides criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential and commercial uses, the General Assessment daytime noise thresholds are 90 dBA Leq and 100 dBA Leq, respectively, for a 1-hour period. However, for the purposes of a conservative analysis, the project's construction-related noise impacts will be assessed utilizing the Detailed Analysis daytime noise thresholds of 80 dBA Leq and 85 dBA Leq, respectively, for residential and commercial land uses. It is assumed that no project-related construction would occur during the noise-sensitive nighttime hours.

Construction phasing and equipment usage assumptions are referenced from the *Toll Brothers Laguna Hills Townhome Project Air Quality, Greenhouse Gas, And Energy Study, City of Laguna Hills*, prepared by RK.

7.1 Typical Construction Noise Levels

Table 7-1 shows typical construction noise levels compiled by the Environmental Protection Agency (EPA) for common-type construction equipment. Typical construction noise levels are used to estimate potential project construction noise levels at the adjacent sensitive receptors.

Table 7-1 | Typical Construction Noise Levels (dBA Leq)[1]

Equipment Type	Noise Level at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86
Impact Equipment	
Pneumatic Wrenches	82 - 87
Jack Hammers, Rock Drills	80 - 99
Pile Drivers (Peak)	95-105
Other	
Vibrators	68 - 82
Saws	71 - 82

[1] Referenced noise levels from the Environmental Protection Agency (EPA).

7.2 Construction Noise Impact Analysis

This assessment analyzes potential noise impacts of the two noisiest pieces of equipment during all expected phases of construction, including demolition, site preparation, grading, building construction, paving, and architectural coating. Noise levels are calculated based on an average distance of equipment over a 1-hour period to the nearest adjacent residential and commercial receptors. The project's estimated construction noise levels have been calculated using the Federal Highway Administration Roadway Construction Noise Model Version 1.1.

Tables 7-2 and **7-3** show the noise level impacts from the center of the project site to the nearest residential and commercial property lines. Construction noise calculation worksheets are provided in **Appendix E**.

Table 7-2 | Project Construction Noise Levels – Residential Receptors

Phase	Equipment	Quantity	Equipment Noise Level at 215 ft. (dBA Leq)	Combined Noise Level (dBA Leq)
Demolition	Concrete/Industrial Saws	1	76.9	78.0
	Tractors/Loaders/Backhoes	1	71.3	
Site Preparation	Graders	1	72.3	74.9
	Tractors/Loaders/Backhoes	1	71.3	
Grading	Graders	1	72.3	74.9
	Tractors/Loaders/Backhoes	1	71.3	
Building Construction	Cranes	1	67.9	73.0
	Tractors/Loaders/Backhoes	1	71.3	
Paving	Rollers	1	67.3	72.8
	Tractors/Loaders/Backhoes	1	71.3	
Architectural Coating	Air Compressors	1	65.0	65.0
Worst-Case Construction Phase Noise Level (dBA Leq)				**78.0**
FTA Daytime Detailed Assessment Construction Noise Criteria (dBA Leq)[1]				80.0
Noise level exceeds criteria?				**No**

[1] Source: Federal Transit Administration (FTA). *Transit Noise and Vibration Impact Assessment Manual, Section 7: Noise and Vibration During Construction.*

Table 7-3 | Project Construction Noise Levels – Commercial Receptors

Phase	Equipment	Quantity	Equipment Noise Level at 135 ft. (dBA Leq)	Combined Noise Level (dBA Leq)
Demolition	Concrete/Industrial Saws	1	81.0	82.0
	Tractors/Loaders/Backhoes	1	75.4	
Site Preparation	Graders	1	76.4	78.9
	Tractors/Loaders/Backhoes	1	75.4	
Grading	Graders	1	76.4	78.9
	Tractors/Loaders/Backhoes	1	75.4	
Building Construction	Cranes	1	72.0	77.0
	Tractors/Loaders/Backhoes	1	75.4	
Paving	Rollers	1	71.4	76.8
	Tractors/Loaders/Backhoes	1	75.4	
Architectural Coating	Air Compressors	1	69.1	69.1
Worst-Case Construction Phase Noise Level (dBA Leq)				**82.0**
FTA Daytime Detailed Assessment Construction Noise Criteria (dBA Leq)[1]				85.0
Noise level exceeds criteria?				**No**

[1] Source: Federal Transit Administration (FTA). *Transit Noise and Vibration Impact Assessment Manual, Section 7: Noise and Vibration During Construction.*

As shown in **Tables 7-2** and **7-3**, the project is not expected to generate noise levels which exceed the FTA Detailed Assessment construction noise thresholds for residential and commercial land uses. **As a result, the project impact would be less than significant.**

7.3 Construction Vibration

To determine the vibratory impacts during construction, reference construction equipment vibration levels were utilized and then extrapolated to the façade of the nearest adjacent structures.

The nearest structures to the project site are the existing residential homes located to the west of the proposed project site and the existing commercial structure located to the south of the project site. These structures are considered to be older residential homes and new commercial structures and are located approximately 100 feet and 10 feet, respectively, from the nearest expected areas of onsite construction activity.

The construction of the proposed project is not expected to require the use of substantial vibration-inducing equipment or activities, such as pile drivers or blasting. The main source of vibration impacts during the construction of the project would be the operation of equipment such as bulldozer activity during site preparation, loading trucks during grading and excavation, and vibratory rollers during paving.

The construction vibration assessment utilizes the referenced vibration levels and methodology set forth within the Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, September 2018. **Table 7-4** shows the FTA-referenced vibration levels.

Table 7-4 | Typical Construction Vibration Levels[1]

Equipment	Peak Particle Velocity (PPV) at 25 Feet (in./sec.)	Approximate Vibration Level (LV) at 25 feet
Piledriver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Piledriver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Federal Transit Administration (FTA). *Transit Noise and Vibration Impact Assessment Manual, Section 7: Noise and Vibration During Construction.*

Tables 7-5 and **7-6** show the project's construction-related vibration analysis at the nearest residential and commercial structures to the project construction area. Construction vibration calculation worksheets are provided in **Appendix E**.

The FTA provides criteria for potential damage resulting from construction vibration based on building type. The adjacent residential structures are estimated to be constructed in the 1970's and are therefore considered to be older residential structures. Older residential buildings commonly include construction materials and interior finishes that may be more susceptible to cosmetic cracking from vibration when compared to newer construction, such as plaster or other brittle finishes. Consistent with FTA criteria, these residential structures are conservatively evaluated using the vibration damage potential threshold of 0.20 inches per second PPV.

The nearest adjacent commercial building is assumed to be of modern, engineered construction with steel or reinforced concrete framing and interior finishes. Therefore, it is evaluated using the FTA category 'reinforced concrete, steel, or timber (no plaster),' with a vibration damage potential threshold of 0.50 inches per second PPV. This category is intended for engineered structures that are generally less susceptible to vibration-related cosmetic or structural damage than non-engineered buildings or unusually vibration-sensitive structures.

Table 7-5 | Construction Vibration Impact Analysis – Residential Structures

Construction Activity	Distance to Nearest Structure (Feet)	Duration	Calculated Vibration Level (PPV) (in./sec.)
Large Bulldozer	100	Continuous/Frequent	0.019
Loaded Trucks		Continuous/Frequent	0.017
Vibratory Rollers		Continuous/Frequent	0.046
Worst-Case Construction Vibration Level			**0.046**
Vibration Damage Potential Threshold[1]			0.200
Vibration level exceeds threshold?			**No**

[1] Source: FTA Transit Noise and Vibration Impact Assessment Manual (September 2018) vibration damage potential threshold for "Non-engineered timber and masonry buildings".

Table 7-6 | Construction Vibration Impact Analysis – Commercial Structures

Construction Activity	Distance to Nearest Structure (Feet)	Duration	Calculated Vibration Level (PPV) (in./sec.)
Large Bulldozer	15	Continuous/Frequent	0.156
Loaded Trucks		Continuous/Frequent	0.133
Vibratory Rollers		Continuous/Frequent	0.368
Worst-Case Construction Vibration Level			**0.368**
Vibration Damage Potential Threshold[1]			0.500
Vibration level exceeds threshold?			**No**

[1] Source: FTA Transit Noise and Vibration Impact Assessment Manual (September 2018) vibration damage potential threshold for "reinforced-concrete, steel, or timber (no plaster)."

Based on the tables above, project-related construction activity is not expected to cause any potential damage to the nearest structures. **Hence, the impact from construction-related vibration would be less than significant.**

Appendices

Appendix A

City of Laguna Hills General Plan Noise Element and Municipal Code Chapter 5-24 – Noise Control

Laguna Hills GENERAL PLAN Noise Element

July 14, 2009

Laguna Hills
GENERAL PLAN

City Council

Mayor:	Joel Lautenschleger
Mayor Pro Tem:	Randal Bressette
Council Member:	Melody Carruth
Council Member:	R. Craig Scott
Council Member:	L. Allan Songstad, Jr.

City Staff

Bruce Channing, City Manager
Donald White, Assistant City Manager
David Reynolds, Deputy City Manager/
Community Services Director
Vern Jones, Community Development Director
Julie Molloy, Project Manager
Peggy Johns, City Clerk
Ken Rosenfield, Public Services Director/
City Engineer
Steve Doan, Chief of Police Services
Greg Simonian, City Attorney
Jennifer Luna, Administrative Assistant

General Plan Advisory Committee

Larry Bertino
Barbara Breazeale
Bud Freedman
Donald Froelich
Steve Geidt
Steve Kazarian
Mary King
Joe Martinez
Susan Masson
Tom McCabe
Carol Meyers
John Oldroyd
Melissa Palencia
Charles Reames
Christina Salcido
Marty Samuel
Don Sedgwick
Everett Stone

Consultants to the City

EDAW | AECOM

In Association with:

Austin Foust Associates
Stanley R. Hoffman Associates
Wilson Geosciences

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Noise

Introduction

Noise is unwanted sound that interferes with living, working, and enjoying daily life. Exposure to excessive noise can affect general well-being and contributes to annoyance and undue stress. The Noise Element is intended to reduce unwanted sounds for the health, safety, and welfare of the community. Removing or reducing significant sources of noise where feasible will improve the quality of life for Laguna Hills residents, workers, and visitors.

Purpose and Scope of the Noise Element

The purpose of the Noise Element is to identify and assess existing noise sources in the community, and to discuss the City's role in ensuring comfortable and safe noise levels in the future. As a part of the General Plan process, citizens and City officials identified goals for the future relating to balancing land uses in the City, in part to minimize incompatibilities and exposure to excessive noise while providing the range of uses needed to maintain a high quality of life. The goals, policies, and programs will assist in achieving noise compatibility between land uses.

The State of California recognizes the relationship between noise and noise sensitive uses and has adopted guidelines for noise elements that have been followed in the preparation of this Element.

Background

Laguna Hill is located in an urbanized and developed area and is subject to numerous noise sources, primarily vehicular traffic on major roadways. The City is also subject to typical urban noise sources such as construction, police and fire department sirens, landscaping equipment, barking dogs, and car alarms.

Major noise sources in the City include traffic on Interstate 5 (I-5), State Route 73 (SR-73), and major arterials throughout the City. Truck traffic is prevalent on these roadways and generates higher noise levels relative to other vehicle types that travel

on local roadways. Train traffic on the Atchison, Topeka, and Santa Fe Railway (AT&SF) rail line, which runs parallel to I-5, is another source of noise in the City. The AT&SF rail line traffic includes daily passenger (Amtrak), transit (Metrolink), and freight service. The nearest airport is John Wayne International Airport, approximately 10 miles northwest of Laguna Hills. The distance from the airport results in no noise impact from aircraft overflight.

The City has land uses that are sensitive to noise and may be significantly affected by interference from noise. Noise sensitive land uses include residences, schools, churches, hospitals, convalescent (nursing) homes, hotels, and certain parks. Excessive noise exposure to human receptors can cause adverse physical and psychological responses, in addition to interfering with speech and concentration, and diminishing the quality of life.

In addition to humans, protected animal species and their habitats may be considered sensitive receptors if located near construction and operational noise sources, especially during the species' breeding seasons. The City of Laguna Hills is located within a region where there is the potential habitat for noise sensitive bird species, such as the coastal California gnatcatcher and least Bell's vireo, that nest or forage in upland scrub vegetation.

Noise is generally defined as unwanted sound. Its effects can range from annoyance to health problems.

EFFECTS OF NOISE ON PEOPLE

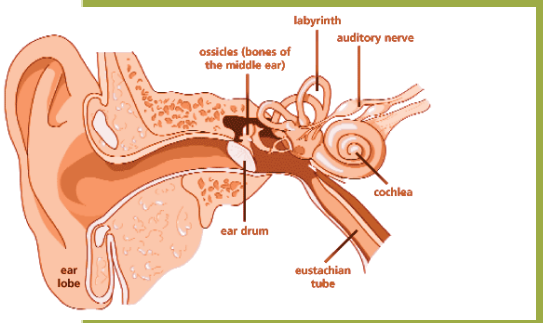
The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in the extreme, hearing impairment or loss. While physical damage to the ear from an intense noise is rare, degradation of auditory acuity can occur within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but it may be due to a single event such as an explosion. Table N-1 provides typical instantaneous noise levels of common activities.

Table N-1 Common Noise Levels	
Noises	**Sound Level (dBA)**
Threshold of Pain	140
Rock Band, Leaf Blower, Car Horn	110
Gas Lawn Mower, Train Approaching (Engines)	90
Diesel Truck, Food Blender	80
Gas Lawn Mower, Vacuum Cleaner	70
Normal Conversation, Heavy Traffic at 300 feet	60
Large Business Office, Dishwasher in Next Room	50
Quiet residential area	40
Library	30
Normal Breathing	10
Lowest Threshold of Human Hearing	0

These are typical noise levels. Distance from the source will reduce the noise level. A 10 dB increase doubles perceived loudness. Continued exposure to noise above 85 dB can cause hearing loss. A single exposure to 140 dB noise can cause some hearing loss.

Noise Plan

As Laguna Hills and surrounding communities continue to grow, noise levels associated with transportation- and nontransportation-related noise continue to increase. The City seeks ways to safeguard the community from excessive noise as the ambient noise level in the community rises. The goals, policies, and the Plan in this section describe the means to reduce the negative effects of noise in the City. Programs addressing noise, contained in the Implementation Program section of the General Plan, are an extension of the Noise Plan and contain specific actions that the City uses to protect the community from excessive noise.



NOISE MEASUREMENT

Evaluating noise is complex. Noise levels are measured as decibels (dB) on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, doubling the energy of a noise source (e.g., traffic volume) would not double the noise level.

The human ear is not equally sensitive to all frequencies within the sound spectrum. The most common method to characterize sound is the "A-weighted" sound level, or dB(A), which filters out noise frequencies not audible to the human ear, thereby weighting the audible frequencies. Therefore, the dBA is used for noise measurements and standards involving the human perception of noise.

In addition to instantaneous noise levels, noise levels measured over a period of time are used to assess noise limits and impacts. Noise levels measured over 1 hour are usually expressed as dBA L_{eq}, the equivalent 1-hour noise level. Time of day is also an important factor for noise assessment; noise levels that may be acceptable during the day may interfere with the ability to sleep during evening or nighttime hours. Therefore, 24-hour noise levels are used. The community noise equivalent level (CNEL) is the cumulative noise exposure in a community during a 24-hour period, which adds 5 dB(A) to evening sound levels (between 7:00 p.m. and 10:00 p.m.), and 10 dB(A) to the nighttime sound levels (between 10:00 p.m. and 7:00 a.m.). The day/night average sound level (L_{dn}) is the same as the CNEL, except the 3-hour evening period is considered part of the daytime period.

In addition to noise measurement, traffic noise levels for freeways and arterials can be modeled using a traffic noise model with traffic volumes, mix, and speed characteristics.

NOISE AND LAND USE PLANNING

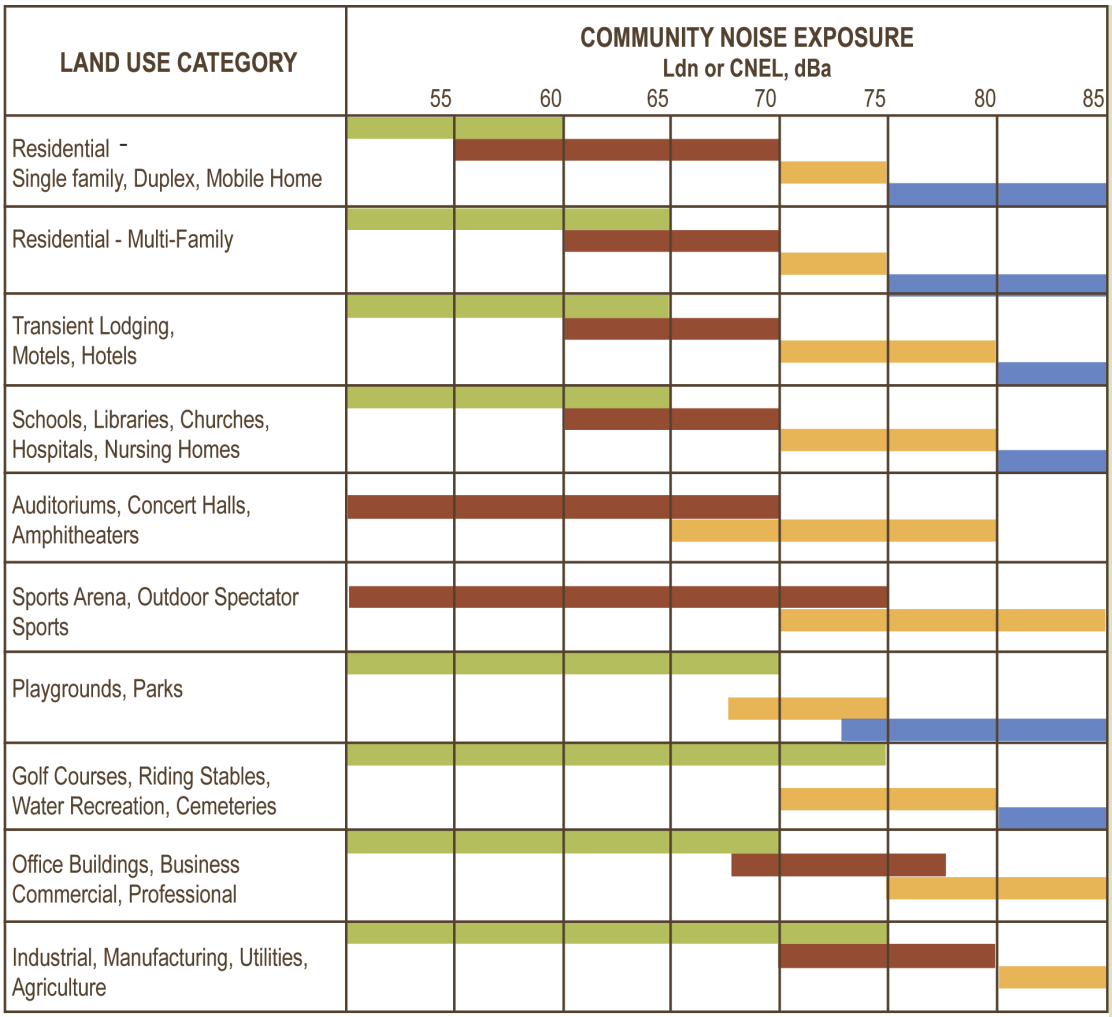
Accumulation of noise from transportation and nontransportation sources determine the overall noise environment within a community. Transportation noise refers to noise from automobile use, trucking, airport operations and rail operations. Nontransportation noise typically refers to noise from stationary sources such as commercial establishments, machinery, air conditioning systems, compressors, and landscape maintenance equipment.

Regardless of the type of noise, noise levels are highest near the source and substantially decrease with distance. Most noise impacts can be avoided when noise sources, sensitive land uses, and information about the future noise environment are considered in land use planning and development decisions. Land uses that generate significant noise should be separated from uses that are particularly sensitive to noise.

To establish the compatibility of various land uses with exterior noise levels, the City uses CNEL in its planning guidelines. CNEL takes into account heightened sensitivity of persons to noise during evening and nighttime periods.

Figure N-1 illustrates Laguna Hills' land use compatibility guidelines.

Noise levels can be estimated and represented as noise contour lines, which indicate the area subject to a particular noise level. Figures N-2 and N-3 show the estimated existing and projected future noise contours in Laguna Hills, based on traffic volume counts and projected 2030 traffic volumes on the City's arterials.



NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, California Office of Planning and Research, 1998.

Figure N-1
Land Use Compatibility Guidelines

The noise contours are used as a guide for land use and development decisions. Land uses within contours of 60 dB(A) or greater may be noise impacted depending on the use. When noise sensitive land uses are proposed within these contours, an acoustical analysis may be required. For a project to be approved in a noise impacted area, the analysis must demonstrate that the project is designed to attenuate noise to meet the City's noise standards as defined in Table N-1. If the project is not designed to meet the noise standards, mitigation measures can be recommended in the analysis. If the analysis demonstrates that the noise standards can be met with implementation of the mitigation measures, the project can be approved with the mitigation measures required as conditions of project approval.

NOISE STANDARDS

Table N-2 summarizes the City of Laguna Hills exterior and interior noise standards. The standards represent the maximum acceptable noise levels as measured from any residential property in the City. Accordingly, it is unlawful to cause the noise level on any residential property to exceed the exterior noise standards:

1. for a cumulative period of more than 30 minutes in any hour;
2. plus 5 dB(A) for a cumulative period of more than 15 minutes in any hour;
3. plus 10 dB(A) for a cumulative period of more than 5 minutes in any hour;
4. plus 15 dB(A) for a cumulative period of more than 1 minute in any hour; or
5. plus 20 dB(A) for any period of time.

In addition, it is unlawful to cause the noise level on any residential property to exceed the interior noise standards (see Table N-2):

1. for a cumulative period of more than 5 minutes in any hour;
2. plus 5 dB(A) for a cumulative period of more than 1 minute in any hour; or
3. plus 10 dB(A) for any period of time.

Table N-2
Residential Noise Standards

	Daytime Noise Standards (7:00 am to 10:00 pm)	Nighttime Noise Standards (10:00 pm to 7:00 am)
Exterior Noise Standards	**55 dB(A)**	**50 dB(A)**
Interior Noise Standards	**55 dB(A)**	**45 dB(A)**

Source: Laguna Hills Municipal Code Chapter 5-24.
Note: Standards are based on measurements taken from any residential property in the City.

CITY OF LAGUNA HILLS GENERAL PLAN | NOISE

Noise Contours

CNEL 70 — CNEL 60

CNEL 65 — Measurement Locations

City Boundary

Freeway/ Toll Road

Major Streets

Local Streets

Source: Urban Crossroads, 2008.

Figure N - 2

Noise Contours 2008

Noise Contours

CNEL 70 — CNEL 60

CNEL 65 — Measurement Locations

City Boundary — Freeway/ Toll Road

Major Streets — Local Streets

Source: Urban Crossroads, 2008

Figure N - 3

Noise Contours 2030

The nonresidential exterior noise standard is always 65 dBA. Exempt from these standards are activities at any public or private educational facilities, or public park or playground; emergency equipment or work; construction activities during the day on Monday through Saturday; certain agricultural operations; and landscaping and maintenance. Schools, hospitals, and churches are protected from noise sources that exceed the specified noise limits.

TRANSPORTATION-RELATED NOISE

Laguna Hills contains a number of transportation-related noise sources including freeways, major roadways, and railroad operations. I-5, SR-73, the railroad, and major roadways create high levels of noise that affect the overall quality of life in the community and are the major contributors of noise in the City. Some locations, such as areas adjacent to I-5 at Los Alisos, are regularly impacted by transportation noise. Reducing transportation-related noise is necessary to improve the quality of life for noise sensitive land uses. Cost-effective strategies to reduce the influence of transportation-related noise sources are an essential part of the Noise Element.

NOISE CONTROL AT RECEPTION SITES

The most efficient and effective means of controlling noise from transportation is to reduce noise at the source. However, the City has little direct control over noise produced by transportation sources because State noise regulations preempt location regulations. Because the City cannot control the noise at the source, City noise programs focus on reducing the impact of transportation noise reception sites.

The most effective way to mitigate transportation noise impacts on the City is by using the site development permit process and implementing CEQA. During the planning stages of the development process, potential impacts from transportation noise will be identified and mitigation measures will be required as needed to meet the City's noise standards. Site planning, landscaping, natural topography and design, and construction noise barriers are the most common method of alleviating vehicular traffic and train noise impacts. Setbacks and buffer areas can also be used to achieve small noise reductions. The City can also use weight limitations on certain roadways and designate truck routes to reduce traffic noise in specific locations.

The City also encourages the construction and use of alternative modes of transportation such as alternative fuel vehicles, transit systems, and transit-oriented development (higher density, mixed use development near major rail and transit stops) to reduce transportation-related noise. Alternative transportation modes can emit less noise per passenger than their automotive counterparts and can reduce traffic congestion.

Noise Control at the Source

The California Vehicle Code contains noise regulations pertaining to the operation of all vehicles on public roads. These noise standards for cars, trucks, and motorcycles are enforced through coordination with the California Highway Patrol and the Orange County Sheriff's Department. The City also regulates traffic flow and coordinates with the California Highway Patrol and Orange County Sheriff's Department to enforce speed limits to reduce traffic noise.

NONTRANSPORTATION-RELATED NOISE

The City contains a variety of land uses, many of which generate noise. Noise from non-transportation-related sources includes industrial areas that involve heavy equipment and machinery, and commercial areas such as restaurants, bars, and entertainment establishments. Mechanical equipment such as heating, ventilating, and air conditioning units also generates noise throughout the City. Residential areas are also subject to noise from the use of pool equipment, landscape maintenance equipment, barking dogs, and other noise sources. Finally, construction activities throughout the City can temporarily elevate noise.

Application of the City's noise regulations is the best means to control non-transportation-related noise. The Community Development Department and Orange County Sheriff's Department cooperate to identify development or actives that violate noise regulations. The City's municipal code gives the City the authority to enforce the noise standards through penalties and other abatement tactics.

Noise generated by new development is effectively controlled though the site development permit process, compliance with CEQA, and compliance with the City noise standards contained in this Noise Element and the City's noise regulations. During preliminary stages in the development process, potential noise impacts will be identified and mitigation measures imposed.

When reviewing proposed mixed use and nonresidential projects, noise generation and potential impacts to surrounding development are considered. An acoustical analysis is required for projects that will generate noise potentially affecting sensitive receptors. Where significant impacts are identified, mitigation measures will be required. Mitigation measures that could be applied when reviewing projects include acoustically treated and/or quiet designs for furnaces, fans, motors, compressors, pumps, and other mechanical equipment. The City may also require limited delivery hours and/or hours of operation to minimize impacts to adjacent residential or other noise sensitive uses. In addition, all City departments must comply with State and federal

Occupational Safety and Health Administration (OSHA) standards. Any new equipment or vehicles purchased by the City will comply with local, State, and federal noise regulations, and the City will encourage landscaping contractors to utilize up to date noise-reducing equipment.

NOISE ORDINANCE

The City Noise Ordinance is designed to protect people from non-transportation noise sources such as construction activity, commercial and industrial operations, machinery, and pumps and air conditioners. Enforcing the ordinance includes requiring proposed development projects to show compliance with the ordinance, including operating in accordance with noise levels and hours of operation limits placed on the project site. The City also requires construction activity to comply with established work schedule limits. The ordinance is reviewed periodically for adequacy and amended as needed to address community needs and development patterns.

The City also has the opportunity to control noise and vibration transfers between adjacent land uses. Problems can arise when noise-producing uses are located immediately adjacent to sensitive uses, such as business park or light industrial uses near residences or schools. Additionally, increasing mixed use development throughout the City will place more sensitive residential uses alongside or above commercial uses, which could present challenges. The City's Zoning Ordinance or any Specific Plan developed following adoption of the General Plan will include specific standards that address noise and vibration transfer in mixed use development.

Goals and Policies

The goals and policies section sets both broad and specific direction for the future of the City based on identified issues, as captured in the Guiding Themes and expressed by the community, City staff, and decision makers.

Three major issue areas are addressed in the goals and policies of the Noise Element. These major issues are:

- Using land use planning and development techniques to reduce noise and ensure compatibility between different land uses;
- Utilizing a variety of techniques and strategies to reduce transportation-related noise; and
- Requiring site design and other measures to reduce or maintain noise at acceptable levels for non-transportation-related noise.

NOISE AND LAND USE PLANNING

Land use directly affects noise compatibility because higher noise levels associated with certain land uses can encroach upon more sensitive land uses. Noise-producing and noise sensitive uses will be planned and/or sufficiently buffered to ensure that sensitive uses are not exposed to unacceptable noise levels. Non-compatible land uses will incorporate noise attenuation and/or control measures in the development and design process to reduce noise.

Goal N-1: Reduce the effects of noise through proper land use planning and development techniques.

Policy N-1.1: Use the City's noise/land use compatibility matrix (Figure N-1) as a guide for future planning and development decisions.

Policy N-1.2: Use transitional and buffer areas to separate excessive noise-generating uses from residential and other noise sensitive land uses.

Policy N-1.3: Limit future residential and other noise sensitive land uses in areas exposed to high levels of noise and/or utilize strategies to reduce noise experienced by sensitive uses at the point of reception.

TRANSPORTATION-RELATED NOISE

Transportation-related noise sources are the major contributors of noise in Laguna Hills and affect the overall quality of life. Reduction of transportation-related noise through a variety of measures is necessary to deal with the detrimental effects attributable to excessive noise.

Goal N-2: Reduce the impact of transportation-related noise on residential areas and other sensitive land uses.

Policy N-2.1: Reduce new transportation-related noise impacts to noise sensitive land uses through the use of noise control measures.

Policy N-2.2: Require noise-reducing construction techniques and site design measures for new development in areas impacted by transportation-related noise.

Policy N-2.3: Encourage new development to provide facilities that support the use of alternative transportation modes, such as walking, bicycling, carpooling and, where applicable, transit to reduce automobile traffic and its associated noise.

Policy N-2.4: Consider using low-noise pavement surfaces on Mobility Element roadways that reduce motor vehicle traffic noise.

Policy N-2.5: Control truck traffic routing to reduce truck traffic impacts on noise sensitive land uses.

Policy N-2.6: Use traffic calming design and traffic control measures as needed to reduce vehicular speeds and associated noise levels in residential neighborhoods.

NONTRANSPORTATION-RELATED NOISE

Noise unrelated to vehicles, streets, and freeways also impacts the quality of life in Laguna Hills. Excessive noise from construction, business operations, and everyday activities negatively affects the community. Site design, regulation, and enforcement measures will reduce non-transportation-related noise.

Goal N-3: Reduce the impact of non-transportation-related noise on residential areas and other sensitive land uses.

Policy N-3.1: Ensure noise sources from construction activities, entertainment venues, private development/residences, landscaping activities, and special events impacting noise sensitive lands use are maintained at acceptable levels.

Policy N-3.2: Require that commercial and mixed use structures be designed to prevent transfer of noise and vibration to residential and other noise sensitive land uses.

Policy N-3.3: Require commercial and mixed use developments to locate loading areas, parking lots, driveways, trash enclosures, mechanical equipment, and other noise sources away from residential development and, if necessary, to shield such noise sources with acoustic barriers.

Summary of Approach

The goals, policies, and programs in the Noise Element will help the City reduce noise from transportation and non-transportation-related sources. The Noise Element encourages the use of land use compatibility measures and noise reduction techniques to ensure that redevelopment and new development are compatible with established uses. Table N-3 identifies the three major issue areas guiding the Noise Element. These major issues represent the direction the City will take in its noise goals, policies, and programs to implement the vision of Laguna Hills as captured in the Guiding Themes and expressed in the Noise Plan.

Table N-3
Description of Actions to Address Noise Issues

Issues	Element	Section	Policy	Programs	Figure	Table
Noise and Land Use Planning	Noise	Noise and Land Use Planning	N-1.1 through N-1.3	N-1 through N-4	Figure N-1 (Land Use Compatibility) Figure N-3 (Future Noise Contours)	Table N-2 (Noise Standards)
	Land Use	Respect for Existing Neighborhoods	LU-2.7	LU-6		
Transportation-Related Noise	Noise	Transportation-related Noise	N-2.1 through N-2.6	N-1, N-3, N-5		
Nontransportation-Related Noise	Noise	Nontransportation-related noise	N-3.1 through N-3.3	N-5		

Chapter 5-24

NOISE CONTROL

Sections:

5-24.010 Declaration of policy.

In order to control unnecessary, excessive and annoying sounds emanating from the city, it is declared to be the policy of the city to prohibit such sounds generated from all sources as specified in this chapter.

It is determined that certain sound levels are detrimental to the public health, welfare and safety, and contrary to public interest. (OCC § 4-6-1)

5-24.020 Definitions.

The following words, phrases and terms as used in this chapter shall have the meaning as indicated below:

"Ambient noise level" means the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

"Cumulative period" means an additive period of time composed of individual time segments which may be continuous or interrupted.

"Decibel (dB)" means a unit which denotes the ratio between two quantities which are proportional to power: the number of decibels corresponding to the ratio of two amounts of power is ten times the logarithm to the base ten of this ratio.

"Dwelling unit" means a single unit providing complete, independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking and sanitation.

"Emergency machinery, vehicle or work" means any machinery, vehicle or work used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

"Fixed noise source" means a stationary device which creates sounds while fixed or motionless, including but not limited to industrial and commercial machinery and equipment, pumps, fans, compressors, generators, air conditioners and refrigeration equipment.

"Grading" means any excavating or filling of earth material, or any combination thereof, conducted at a site to prepare said site for construction or other improvements thereon.

"Impact noise" means the noise produced by the collision of one mass in motion with a second mass which may be either in motion or at rest.

"Mobile noise source" means any noise source other than a fixed noise source.

"Noise level" means the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) micronewtons per square meter. The unit of measurement shall be designated as dB(A).

"Person" means a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.

"Residential property" means a parcel of real property which is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and motels.

"Simple tone noise" means a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

"Sound level meter" means an instrument meeting American National Standard Institute's Standard S1.4-1971 for Type 1 or Type 2 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

"Sound pressure level" of a sound, in decibels, means twenty (20) times the logarithm to the base ten of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated. (OCC § 4-6-2)

5-24.030 Noise level measurement criteria.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 5-24.020 of this chapter. (OCC § 4-6-3)

5-24.040 Designated noise zone.

The entire territory of the city is designated as "Noise Zone 1." (OCC § 4-6-4)

5-24.050 Exterior noise standards.

A. The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

RESIDENTIAL EXTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dB(A)	7:00 a.m.—10:00 p.m.
	50 dB(A)	10:00 p.m.—7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels is reduced by five dB(A).

B. The following noise standards, unless otherwise specifically indicated, apply to all land use entities that affect nonresidential property. If a land use affects both residential and nonresidential property then the residential standards are applied.

NONRESIDENTIAL EXTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	65 dB(A)	At any time

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels is reduced by five dB(A).

C. It is unlawful for any person at any location within the city to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other property, either incorporated or unincorporated, to exceed:
   1. The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or
   2. The noise standard plus five dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or
   3. The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour; or
   4. The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one minute in any hour; or
   5. The noise standard plus twenty (20) dB(A) for any period of time.

D. In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category is increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category is increased to reflect the maximum ambient noise level.

(Ord. 2003-11 § 2: OCC § 4-6-5)

5-24.060 Interior noise standards.

A. The following interior noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

INTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dB(A)	7:00 a.m.—10:00 p.m.
	45 dB(A)	10:00 p.m.—7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five dB(A).

B. It is unlawful for any person at any location within the city to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured within any other dwelling unit on any residential property, either incorporated or unincorporated, to exceed:
   1. The interior noise standard for a cumulative period of more than five minutes in any hour; or
   2. The interior noise standard plus five db(A) for a cumulative period of more than one minute in any hour; or
   3. The interior noise standard plus ten db(A) for any period of time.

C. In the event the ambient noise level exceeds either of the first two noise limit categories above, the cumulative period applicable to said category shall be in-

creased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit category the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

(OCC § 4-6-6)

5-24.070 Special provisions.

The following activities shall be exempted from the provisions of this chapter:

A. Activities conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

B. Outdoor gatherings, public dances and shows, provided said events are conducted pursuant to a license issued by the city pursuant to Title 4 of this code.

C. Activities conducted on any park or playground, provided such park or playground is owned and operated by a public entity.

D. Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

E. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of eight p.m. and seven a.m. on weekdays, eight p.m. and eight a.m. on Saturday, or at any time on Sunday or a federal holiday.

F. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

G. Mobile noise sources associated with agricultural operations, provided such operations do not take place between the hours of eight p.m. and seven a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

H. Mobile noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural Commissioner.

I. Noise sources associated with the maintenance of real property, provided said activities take place between seven a.m. and eight p.m. on any day except Sunday or a federal holiday, or between the hours of nine a.m. and eight p.m. on Sunday or a federal holiday.

J. Any activity to the extent regulation thereof has been preempted by state or federal law.

K. A temporary public construction activity deemed necessary for the safety and convenience of the traveling public by the City Manager or his or her authorized representative, which exemption shall be placed in writing, and subject to such conditions deemed necessary to protect the public welfare, health, and safety and to minimize noise disturbances.

(Ord. 2004-8 § 2; Ord. 2003-3 Exh. A § 1; OCC § 4-6-7)

5-24.080 Schools, hospitals and churches—Special provisions.

It is unlawful for any person to create any noise which causes the noise level at any school, hospital or church while the same is in use to exceed the noise limits as specified in Section 5-24.050 of this chapter prescribed for the assigned noise zone in which the school, hospital or church is located, or which noise level unreasonably interferes with the use of such institutions or which unreasonably disturbs or annoys patients in the hospital, provided conspicuous signs are displayed in three separate locations within one-tenth of a mile of the institution indicating the presence of a school, church or hospital. (OCC § 4-6-8)

5-24.090 Motor vehicle racing.

It is unlawful to conduct motor vehicle racing, testing, timing or similar noise-producing activities at raceways, speedways, off-road vehicle courses, drag strips or other similar places, including, but not limited to, the operation of midget race cars, drag cars, motorcycles, off-road vehicles, and specialty automobiles, between the hours of eleven-thirty p.m. and eight a.m. (OCC § 4-6-8.1)

5-24.100 Air conditioning and refrigeration—Special provisions.

During the five-year period following the effective date of this chapter, the noise standards enumerated in Sections 5-24.050 and 5-24.060 shall be increased eight db(A) where the alleged offensive noise source is an air conditioning or refrigeration system or associated equipment which was installed prior to the effective date of this chapter. (OCC § 4-6-9)

5-24.110 Noise level measurement.

The location selected for measuring exterior noise levels shall be at any point on the affected property. Interior noise measurements shall be made within the affected dwelling unit. The measurement shall be made at a point at least four feet from the wall, ceiling, or floor nearest the alleged offensive noise source and may be made with the windows of the affected unit open. (OCC § 4-6-10)

5-24.120 Manner of enforcement.

The City Manager, the Chief of Police Services, and their duly authorized representatives are directed to enforce the provisions of this chapter. The Chief of Police Services and his or her duly authorized representatives are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

No person shall interfere with, oppose, or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his or her duly. (Ord. 2003-11 § 3: OCC § 4-6-11)

5-24.130 Violations—Misdemeanors.

Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such. The provisions of this chapter shall not be construed as permitting conduct not prescribed herein and shall not affect the enforceability of any other applicable provisions of law. (OCC § 4-6-15)

Appendix B
Field Data and Photos

RK ENGINEERING GROUP INC.

Field Sheet

Project:	Toll Brothers Laguna Hills Townhome Project		**Engineer:**	B. Morrison	**Date:** 5/20/2024
					JN: 3075-2024-29
Measurement Address:	23161 Mill Creek Drive		**City:**	Laguna Hills, CA	

Sound Level Meter:
Piccolo II
Serial #: P0222082204
P0222082205

Calibrator:
BSWA
Serial #: 500732

Calibration Record:

Meter	Input (dB)	Time
1	94	2:26 p.m.
2	94	2:28 p.m.
3	--	--
4	--	--

Conditions:

Temperature (°F):	H: 68, L: 56
Windspeed (m.p.h.):	1
Wind Direction:	Northwest
Skies:	Partly Cloudy

Meter Settings:

- [x] A-Weighted
- [ ] C-Weighted
- [ ] Linear
- [ ] Impulse
- [x] Slow
- [ ] Fast
- [ ] 1/1 Octave
- [ ] 1/3 Octave
- [x] _60_ Minute Intervals
- [x] L(n) Percentile Values

Notes:
Noise measurements were taken at 1-hour intervals over a 24-hour period. Ambient noise sources during the measurement period consisted primarily of roadway activity along Mill Creek Drive.

Measurement Type:

- [x] Long-term (24-hour)
- [ ] Short-term

1 = Noise Monitoring Location

RK ENGINEERING GROUP INC.

Field Photos - Noise Monitoring Location 1 (L-1)

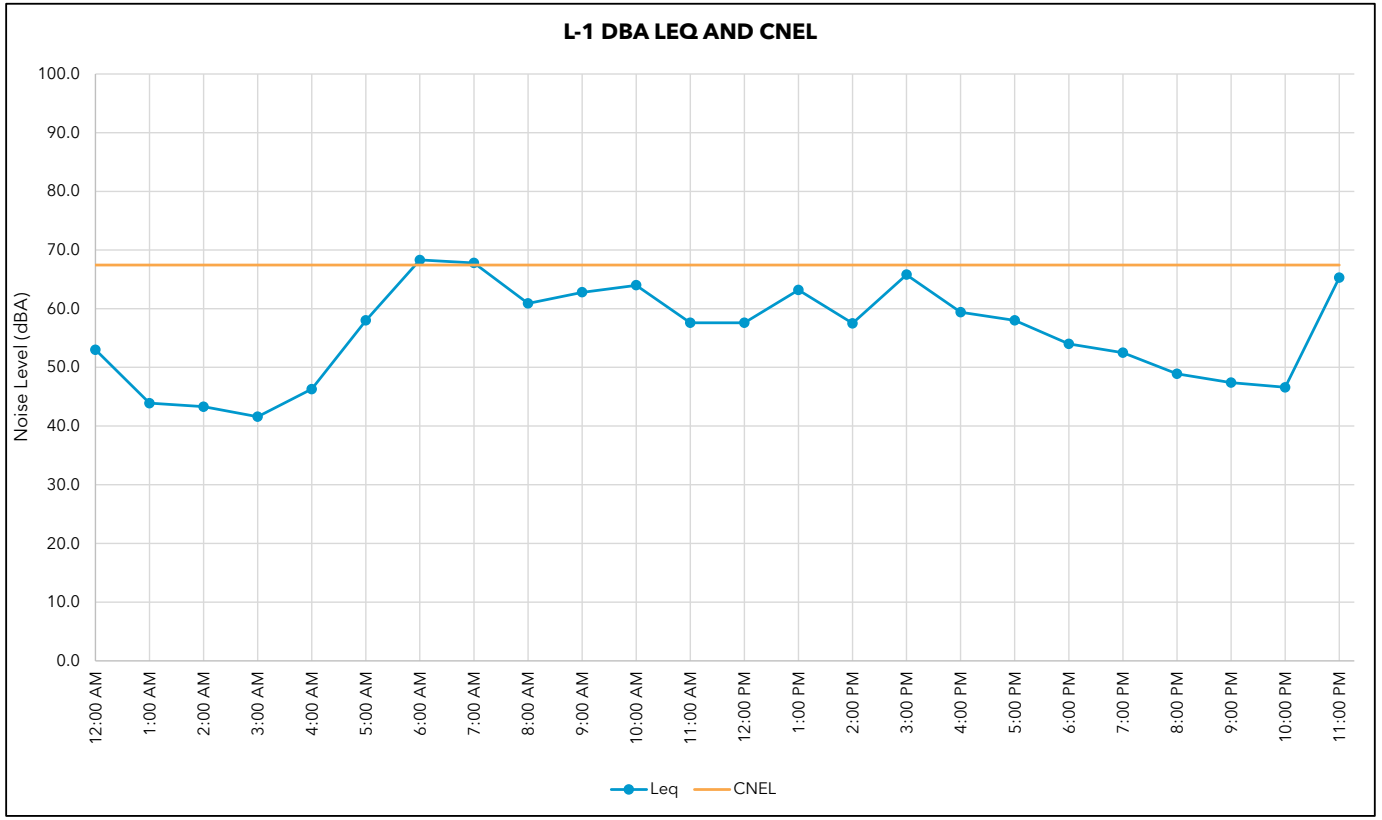
Project:	Toll Brothers Laguna Hills Townhome Project		**Engineer:**	B. Morrison	**Date:** 5/20/2024
Measurement Address:	23161 Mill Creek Drive		**City:**	Laguna Hills, CA	**JN:** 3075-2024-29
Notes:	Noise Monitoring Location 1 (L-1) was taken near the residential receptors to the west/southwest of the project site, approximately 35 feet northwest of the cetnerline of Mill Creek Drive.				

RK ENGINEERING GROUP INC.

Noise Monitoring Location 1 Noise Monitoring Results (dBA Leq and CNEL)

Time	Leq	CNEL
12:00 AM	53.0	67.4
1:00 AM	43.9	67.4
2:00 AM	43.3	67.4
3:00 AM	41.6	67.4
4:00 AM	46.3	67.4
5:00 AM	58.0	67.4
6:00 AM	68.3	67.4
7:00 AM	67.8	67.4
8:00 AM	60.9	67.4
9:00 AM	62.8	67.4
10:00 AM	64.0	67.4
11:00 AM	57.6	67.4
12:00 PM	57.6	67.4
1:00 PM	63.2	67.4
2:00 PM	57.5	67.4
3:00 PM	65.8	67.4
4:00 PM	59.4	67.4
5:00 PM	58.0	67.4
6:00 PM	54.0	67.4
7:00 PM	52.5	67.4
8:00 PM	48.9	67.4
9:00 PM	47.4	67.4
10:00 PM	46.6	67.4
11:00 PM	65.3	67.4

Day Min:	47.4
Night Min	41.6



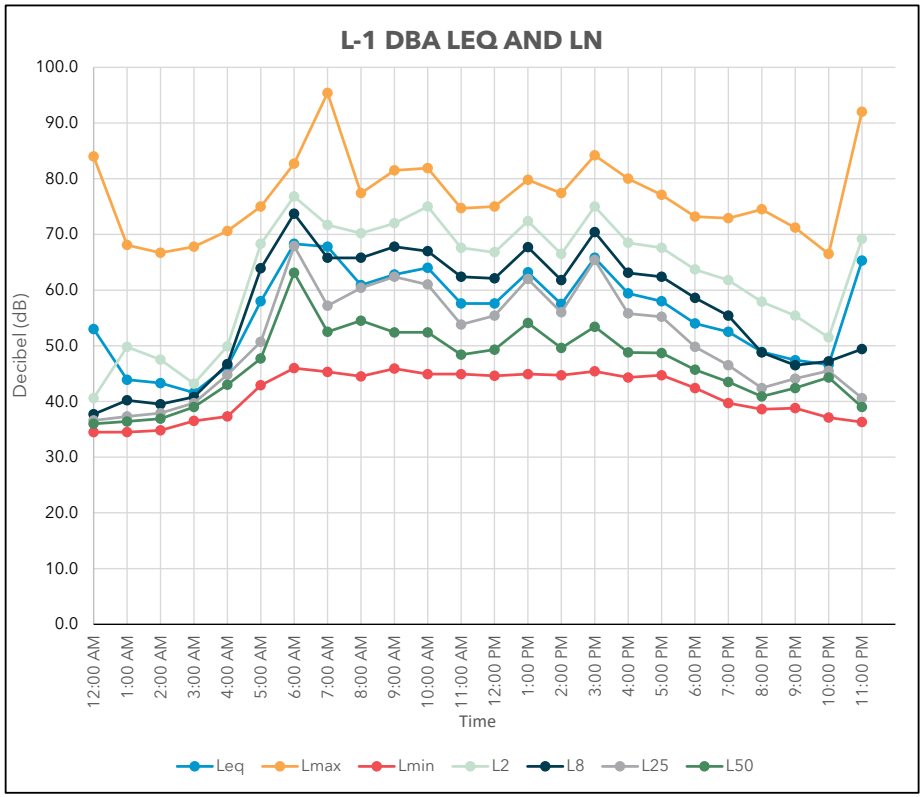
RK ENGINEERING GROUP INC.

Noise Monitoring Location 1 Noise Monitoring Results (dBA Leq and Ln)

PROJECT:	Toll Brothers Laguna Hills Townhome Project	**JOB #:**	3075-2024-29
NOISE METER:	Piccolo II SLM, 24-Hour Measurement	**DATE:**	5/20/2024
LOCATION:	1	**BY:**	B. Morrison

Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	53.0	84.0	34.5	40.6	37.7	36.6	36.0
1:00 AM	43.9	68.1	34.5	49.8	40.2	37.3	36.4
2:00 AM	43.3	66.7	34.8	47.5	39.5	37.9	36.9
3:00 AM	41.6	67.8	36.5	43.2	40.8	39.7	39.0
4:00 AM	46.3	70.6	37.3	49.9	46.7	44.8	43.0
5:00 AM	58.0	75.0	42.9	68.3	63.9	50.7	47.7
6:00 AM	68.3	82.7	46.0	76.8	73.7	67.9	63.1
7:00 AM	67.8	95.4	45.3	71.7	65.8	57.2	52.5
8:00 AM	60.9	77.4	44.5	70.2	65.8	60.4	54.5
9:00 AM	62.8	81.5	45.9	72.0	67.8	62.4	52.4
10:00 AM	64.0	81.9	44.9	75.0	67.0	61.0	52.4
11:00 AM	57.6	74.7	44.9	67.6	62.4	53.8	48.4
12:00 PM	57.6	75.0	44.6	66.8	62.1	55.4	49.3
1:00 PM	63.2	79.8	44.9	72.4	67.7	62.0	54.1
2:00 PM	57.5	77.4	44.7	66.5	61.8	56.0	49.6
3:00 PM	65.8	84.2	45.4	75.0	70.4	65.4	53.4
4:00 PM	59.4	80.0	44.3	68.5	63.1	55.8	48.8
5:00 PM	58.0	77.1	44.7	67.6	62.4	55.2	48.7
6:00 PM	54.0	73.2	42.4	63.7	58.6	49.8	45.7
7:00 PM	52.5	72.9	39.7	61.8	55.4	46.5	43.5
8:00 PM	48.9	74.5	38.6	57.9	48.8	42.4	40.9
9:00 PM	47.4	71.2	38.8	55.4	46.5	44.1	42.4
10:00 PM	46.6	66.5	37.1	51.5	47.2	45.5	44.3
11:00 PM	65.3	92.0	36.3	69.2	49.4	40.6	39.0

Daytime	61.3	95.4	37.1	69.8	64.5	58.6	50.5
Nighttime	61.4	92.0	34.5	69.0	65.1	59.0	54.3



RK ENGINEERING GROUP INC.

Field Photos - Noise Monitoring Location 2 (L-2)

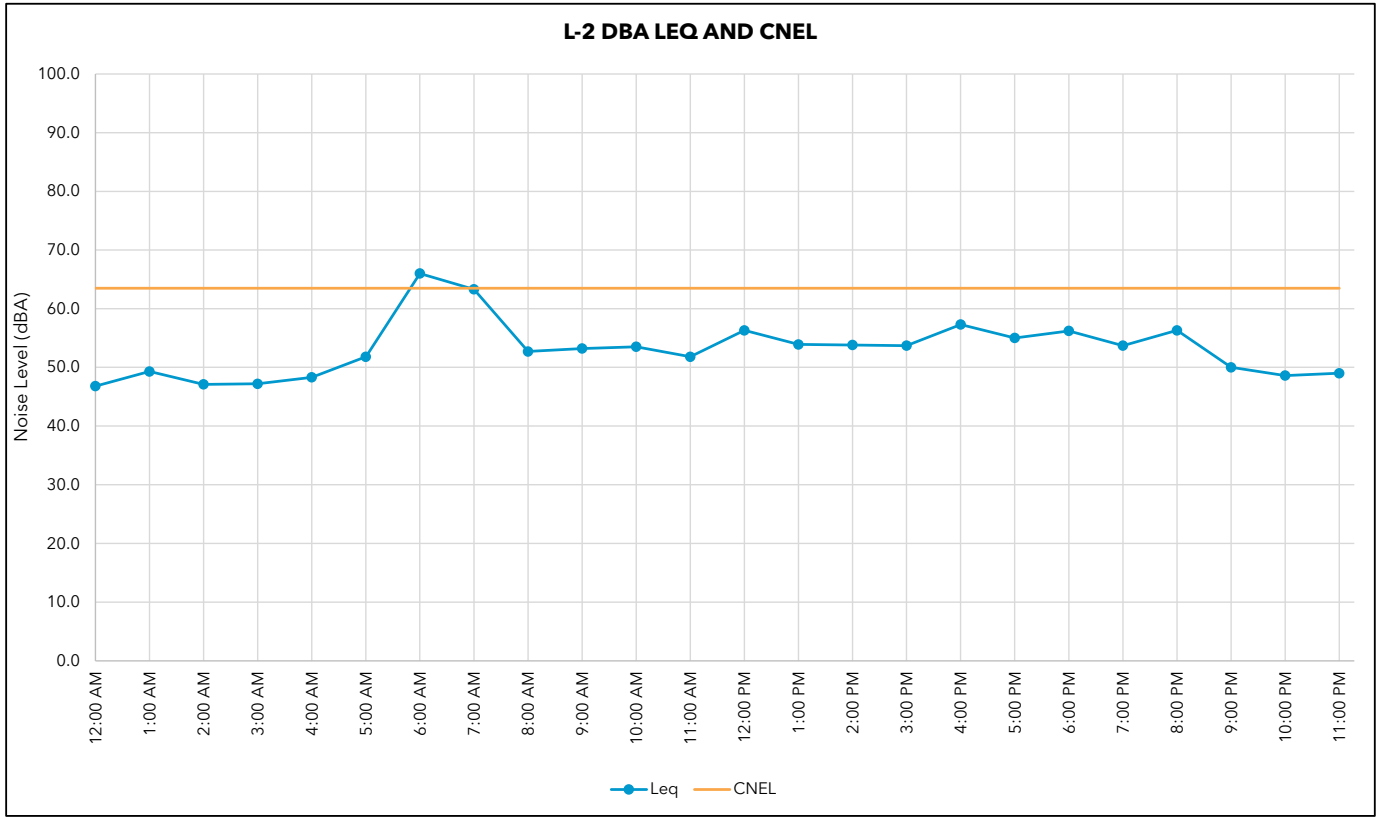
Project:	Toll Brothers Laguna Hills Townhome Project		**Engineer:**	B. Morrison	**Date:** 5/20/2024
Measurement Address:	23161 Mill Creek Drive		**City:**	Laguna Hills, CA	**JN:** 3075-2024-29
Notes:	Noise Monitoring Location 2 (L-2) was taken near the commercial uses to the east of the project site, approximatley 240 feet northeast of the centerline of Mill Creek Drive.				

RK ENGINEERING GROUP INC.

Noise Monitoring Location 2 Noise Monitoring Results (dBA Leq and CNEL)

Time	Leq	CNEL
12:00 AM	46.8	63.5
1:00 AM	49.3	63.5
2:00 AM	47.1	63.5
3:00 AM	47.2	63.5
4:00 AM	48.3	63.5
5:00 AM	51.8	63.5
6:00 AM	66.0	63.5
7:00 AM	63.3	63.5
8:00 AM	52.7	63.5
9:00 AM	53.2	63.5
10:00 AM	53.5	63.5
11:00 AM	51.8	63.5
12:00 PM	56.3	63.5
1:00 PM	53.9	63.5
2:00 PM	53.8	63.5
3:00 PM	53.7	63.5
4:00 PM	57.3	63.5
5:00 PM	55.0	63.5
6:00 PM	56.2	63.5
7:00 PM	53.7	63.5
8:00 PM	56.3	63.5
9:00 PM	50.0	63.5
10:00 PM	48.6	63.5
11:00 PM	49.0	63.5

Day Min:	50.0
Night Min	46.8



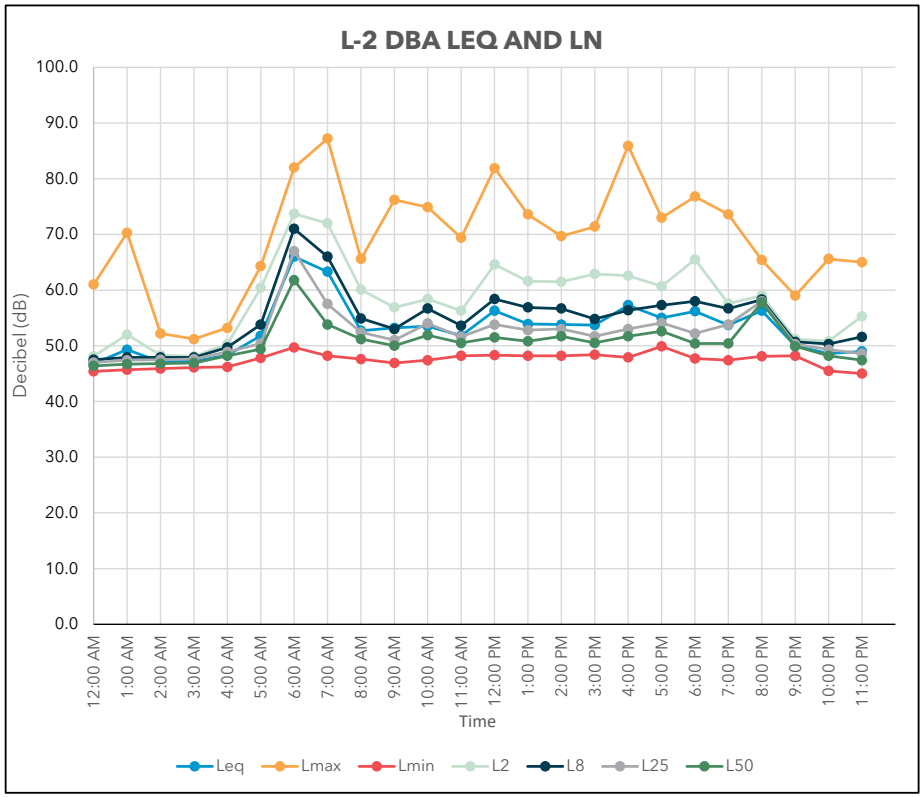
RK ENGINEERING GROUP INC.

Noise Monitoring Location 2 Noise Monitoring Results (dBA Leq and Ln)

PROJECT:	Toll Brothers Laguna Hills Townhome Project	**JOB #:**	3075-2024-29
NOISE METER:	Piccolo II SLM, 24-Hour Measurement	**DATE:**	5/20/2024
LOCATION:	2	**BY:**	B. Morrison

Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	46.8	61.0	45.4	48.1	47.5	47.0	46.4
1:00 AM	49.3	70.3	45.7	52.0	47.9	47.4	46.7
2:00 AM	47.1	52.2	45.9	48.3	47.9	47.5	46.8
3:00 AM	47.2	51.2	46.1	48.1	47.9	47.6	46.9
4:00 AM	48.3	53.2	46.2	50.3	49.7	48.9	48.2
5:00 AM	51.8	64.3	47.8	60.4	53.8	50.4	49.4
6:00 AM	66.0	82.0	49.7	73.7	71.0	67.0	61.8
7:00 AM	63.3	87.2	48.2	72.0	66.0	57.5	53.8
8:00 AM	52.7	65.6	47.6	60.1	54.9	52.4	51.2
9:00 AM	53.2	76.2	46.9	56.9	53.0	51.0	50.0
10:00 AM	53.5	74.9	47.4	58.4	56.7	54.0	51.9
11:00 AM	51.8	69.4	48.2	56.3	53.6	51.6	50.5
12:00 PM	56.3	81.9	48.3	64.6	58.4	53.8	51.5
1:00 PM	53.9	73.6	48.2	61.6	56.9	52.8	50.8
2:00 PM	53.8	69.7	48.2	61.5	56.7	53.0	51.7
3:00 PM	53.7	71.4	48.4	62.9	54.8	51.7	50.5
4:00 PM	57.3	85.9	47.9	62.6	56.4	53.0	51.7
5:00 PM	55.0	73.0	49.9	60.7	57.3	54.1	52.6
6:00 PM	56.2	76.8	47.7	65.5	58.0	52.2	50.4
7:00 PM	53.7	73.6	47.4	57.6	56.7	53.8	50.4
8:00 PM	56.3	65.4	48.1	59.0	58.3	58.0	57.8
9:00 PM	50.0	59.0	48.2	51.2	50.7	50.3	49.9
10:00 PM	48.6	65.6	45.5	50.8	50.3	49.3	48.2
11:00 PM	49.0	65.0	45.0	55.3	51.6	48.6	47.4

Daytime	55.9	87.2	45.5	63.3	58.0	53.7	52.1
Nighttime	57.5	82.0	45.0	65.0	62.2	58.4	53.8



Appendix C
Stationary Noise Calculation Worksheets

RK ENGINEERING GROUP INC.

Stationary Noise Calculations - Based on FHWA-RD-77-108

Project:	Toll Brothers Laguna Hills Townhome Project Noise Impact Study	**Date:**	1/21/2026
		JN:	3075-2024-29
Noise Source:	HVAC - Single Unit	**Engineer:**	B. Morrison
Location:	Nearest adjacent residential receptor		

Noise Input Data				
OBS DIST=	100.0			
DT WALL=	7.0			
DT W/OB=	93.0			
HTH WALL=	5.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	12.0			
NOISE HTH=	4.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-5.09
NOISE EL =	0.0		NOISE HTH EL=	4.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		

Noise Output Data (dBA)							
	Distance (ft.)	**Leq**	**Lmax**	**L2**	**L8**	**L25**	**L50**
REF LEVEL	3.25	65.0	65.0	65.0	65.0	65.0	65.0
PROJ LEVEL	100	35.2	35.2	35.2	35.2	35.2	35.2
SHIELDING	100	-5.1	-5.1	-5.1	-5.1	-5.1	-5.1
ADJ LEVEL	**100**	***30.1***	***30.1***	***30.1***	***30.1***	***30.1***	***30.1***
NOISE LEVEL REDUCTION DUE TO DISTANCE =							-29.76233278

RK ENGINEERING GROUP INC.

dB Adder

Project:	Toll Brothers Laguna Hills Townhome Project Noise Impact Study	**Date:**	1/21/2026
		JN:	3075-2024-29
Noise Source:	Combined HVAC Units	**Engineer:**	B. Morrison
Location:	Nearest adjacent residential receptor		

Noise Levels (dBA)						
Noise Source	**Leq**	**Lmax**	**L2**	**L8**	**L25**	**L50**
HVAC - 1	30.1	30.1	30.1	30.1	30.1	30.1
HVAC - 2	30.1	30.1	30.1	30.1	30.1	30.1
HVAC - 3	30.1	30.1	30.1	30.1	30.1	30.1
HVAC - 4	30.1	30.1	30.1	30.1	30.1	30.1
HVAC - 5	30.1	30.1	30.1	30.1	30.1	30.1
HVAC - 6	30.1	30.1	30.1	30.1	30.1	30.1
HVAC - 7	30.1	30.1	30.1	30.1	30.1	30.1
HVAC - 8	30.1	30.1	30.1	30.1	30.1	30.1
Total	***39.1***	***39.1***	***39.1***	***39.1***	***39.1***	***39.1***

RK ENGINEERING GROUP INC.

Stationary Noise Calculations - Based on FHWA-RD-77-108

Project:	Toll Brothers Laguna Hills Townhome Project Noise Impact Study	**Date:**	1/21/2026
		JN:	3075-2024-29
Noise Source:	HVAC - Single Unit	**Engineer:**	B. Morrison
Location:	Nearest adjacent commercial receptor		

Noise Input Data				
OBS DIST=	10.0			
DT WALL=	7.0			
DT W/OB=	3.0			
HTH WALL=	15.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	12.0			
NOISE HTH=	4.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-14.60
NOISE EL =	0.0		NOISE HTH EL=	4.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		

Noise Output Data (dBA)							
	Distance (ft.)	**Leq**	**Lmax**	**L2**	**L8**	**L25**	**L50**
REF LEVEL	3.25	65.0	65.0	65.0	65.0	65.0	65.0
PROJ LEVEL	10	55.2	55.2	55.2	55.2	55.2	55.2
SHIELDING	10	-14.6	-14.6	-14.6	-14.6	-14.6	-14.6
ADJ LEVEL	**10**	***40.6***	***40.6***	***40.6***	***40.6***	***40.6***	***40.6***
NOISE LEVEL REDUCTION DUE TO DISTANCE =							-9.76233278

RK ENGINEERING GROUP INC.

dB Adder

Project:	Toll Brothers Laguna Hills Townhome Project Noise Impact Study	**Date:**	1/21/2026
		JN:	3075-2024-29
Noise Source:	Combined HVAC Units	**Engineer:**	B. Morrison
Location:	Nearest adjacent commercial receptor		

Noise Levels (dBA)						
Noise Source	**Leq**	**Lmax**	**L2**	**L8**	**L25**	**L50**
HVAC - 1	40.6	40.6	40.6	40.6	40.6	40.6
HVAC - 2	40.6	40.6	40.6	40.6	40.6	40.6
HVAC - 3	40.6	40.6	40.6	40.6	40.6	40.6
HVAC - 4	40.6	40.6	40.6	40.6	40.6	40.6
HVAC - 5	40.6	40.6	40.6	40.6	40.6	40.6
HVAC - 6	40.6	40.6	40.6	40.6	40.6	40.6
HVAC - 7	40.6	40.6	40.6	40.6	40.6	40.6
HVAC - 8	40.6	40.6	40.6	40.6	40.6	40.6
Total	***49.6***	***49.6***	***49.6***	***49.6***	***49.6***	***49.6***

Appendix D
Construction Noise and Vibration Calculation Worksheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Demolition	Residential	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	100		89.6	215	0
Tractor	No	100	84		215	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Concrete Saw		76.9	76.9
Tractor		71.3	71.3
	Total	76.9	78

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Site Preparation	Residential	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	100	85		215	0
Tractor	No	100	84		215	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		72.3	72.3
Tractor		71.3	71.3
	Total	72.3	74.9

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Grading	Residential	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	100	85		215	0
Tractor	No	100	84		215	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		72.3	72.3
Tractor		71.3	71.3
	Total	72.3	74.9

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	100		80.6	215	0
Tractor	No	100	84		215	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Crane		67.9	67.9
Tractor		71.3	71.3
	Total	71.3	73

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Paving	Residential	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Roller	No	100		80	215	0
Tractor	No	100	84		215	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Roller		67.3	67.3
Tractor		71.3	71.3
	Total	71.3	72.8

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	47.4	47.7	47.4

	Equipment				
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)
Compressor (air)	No	100		77.7	215

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Compressor (air)		65	65
	Total	65	65

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Demolition	Commercial	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	100		89.6	135	0
Tractor	No	100	84		135	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Concrete Saw		81	81
Tractor		75.4	75.4
	Total	81	82

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Site Preparation	Commercial	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	100	85		135	0
Tractor	No	100	84		135	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		76.4	76.4
Tractor		75.4	75.4
	Total	76.4	78.9

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Grading	Commercial	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	100	85		135	0
Tractor	No	100	84		135	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		76.4	76.4
Tractor		75.4	75.4
	Total	76.4	78.9

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Building Construction	Commercial	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	100		80.6	135	0
Tractor	No	100	84		135	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Crane		72	72
Tractor		75.4	75.4
	Total	75.4	77

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Paving	Commercial	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Roller	No	100		80	135	0
Tractor	No	100	84		135	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Roller		71.4	71.4
Tractor		75.4	75.4
	Total	75.4	76.8

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/25/2025
Case Description: Toll Brothers Laguna Hills Townhome Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Architectural Coating	Commercial	47.4	47.7	47.4

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)
Compressor (air)	No	100		77.7	135

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Compressor (air)		69.1	69.1
	Total	69.1	69.1

*Calculated Lmax is the Loudest value.

RK ENGINEERING GROUP INC.

Vibration Impact Analysis

Project:	Toll Brothers Laguna Hills Townhomes Project	**Date:**	2/25/2025
Activity:	Construction Vibration	**JN:**	3075-2024-29
Location:	Nearest Residential Structures	**Engineer:**	B. Morrison

Vibration Input/Output Data

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.019 in/sec**

Equipment Type =	2	Large Bulldozer
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	100.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

Equipment PPV Reference Levels

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

RK ENGINEERING GROUP INC.

Vibration Impact Analysis

Project:	Toll Brothers Laguna Hills Townhomes Project	**Date:**	2/25/2025
Activity:	Construction Vibration	**JN:**	3075-2024-29
Location:	Nearest Residential Structures	**Engineer:**	B. Morrison

Vibration Input/Output Data

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.017 in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	100.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

Equipment PPV Reference Levels

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

RK ENGINEERING GROUP INC.

Vibration Impact Analysis

Project:	Toll Brothers Laguna Hills Townhomes Project	**Date:**	2/25/2025
Activity:	Construction Vibration	**JN:**	3075-2024-29
Location:	Nearest Residential Structures	**Engineer:**	B. Morrison

Vibration Input/Output Data

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.046 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	100.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

Equipment PPV Reference Levels

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

RK ENGINEERING GROUP INC.

Vibration Impact Analysis

Project:	Toll Brothers Laguna Hills Townhomes Project	**Date:**	2/25/2025
Activity:	Construction Vibration	**JN:**	3075-2024-29
Location:	Nearest Commercial Structures	**Engineer:**	B. Morrison

Vibration Input/Output Data

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.156 in/sec**

Equipment Type =	2	Large Bulldozer
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	15.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

Equipment PPV Reference Levels

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

RK ENGINEERING GROUP INC.

Vibration Impact Analysis

Project:	Toll Brothers Laguna Hills Townhomes Project	**Date:**	2/25/2025
Activity:	Construction Vibration	**JN:**	3075-2024-29
Location:	Nearest Commercial Structures	**Engineer:**	B. Morrison

Vibration Input/Output Data

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV = **0.133 in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	15.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

Equipment PPV Reference Levels

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

RK ENGINEERING GROUP INC.

Vibration Impact Analysis

Project:	Toll Brothers Laguna Hills Townhomes Project	**Date:**	2/25/2025
Activity:	Construction Vibration	**JN:**	3075-2024-29
Location:	Nearest Commercial Structures	**Engineer:**	B. Morrison

Vibration Input/Output Data

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.368 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	15.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

Equipment PPV Reference Levels

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400