NOISE ANALYSIS REPORT

SUMMIT TOWNHOMES

Santee, CA

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EXECUTIVE SUMMARY

This analysis evaluates noise associated with the implementation of the proposed Summit Townhomes project. The project proposes development of 50 townhomes in ten three-story buildings. The project site is located at the southeast corner of Summit Avenue and the future extension of Magnolia Avenue, in the City of Santee, California (Figure 1).

Future exterior noise levels would be 57 dBA Ldn or lower at all open space areas and building façades in the project, and considered Normally Acceptable at multifamily residential land uses. Because the project is not exposed to noise levels over 65 dBA Ldn, an interior noise analysis is not necessary or required.

Project construction would occur during allowable times, and generate noise levels up to 71 dBA Leq at residential property lines. Because project construction noise levels would not exceed 75 dBA at sensitive receptors, a Construction Noise Best Management Plan is not necessary or required.

Figure 1. Vicinity Map

1.0 ENVIRONMENTAL NOISE BACKGROUND

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound typically associated with human activity and that interferes with or disrupts normal activities. The human environment is characterized by a certain consistent noise level which varies with each area. This is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, and sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 dBA. A change of at least 5 dBA would be noticeable and would likely evoke a community reaction. A 10-dBA increase is subjectively heard as a doubling in loudness and would cause a community response [Caltrans 2013a]. Sound levels of typical noise sources and environments are provided in Table 1.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels. If a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB. The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz.

However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the human ear's sensitivity within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the "A-weighting" frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Table 1. Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	128 times as loud
Civil Defense Siren (100 ft)		130	64 times as loud
Commercial Jet Take-off (200 ft)		120	32 times as loud **Threshold of Pain**
Pile Driver (50 ft)	Rock Music Concert Inside Subway Station (New York)	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Gas Lawn Mower (3 ft)		100	8 times as loud **Very Loud**
Food Blender (3 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck (150 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Noisy Urban Daytime	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (10 ft)	Commercial Areas	70	Reference Loudness **Moderately Loud**
Normal Speech (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Large Business Office Quiet Urban Daytime	50	1/4 as loud
Bird Calls (distant)	Quiet Urban Nighttime	40	1/8 as loud **Quiet**
Soft Whisper (5 ft)	Library and Bedroom at Night Quiet Rural Nighttime	30	1/16 as loud
	Broadcast and Recording Studio	20	1/32 as loud Just Audible
		0	1/64 as loud Threshold of Hearing

Source: Compiled by dBF Associates, Inc.

Because community noise fluctuates over time, a single measure called the Equivalent Sound Level (Leq) is often used to describe the time-varying character of community noise. The Leq is the energy-averaged A-weighted sound level during a measured time interval, and is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the Lmax and Lmin indicators, which represent the root-mean-square maximum and minimum noise levels obtained during the measurement interval. The Lmin value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L10 typically describe transient or short-term events, whereas levels associated with L90 describe the steady-state (or most prevalent) noise conditions.

The Day-Night Level (Ldn) is a descriptor representing the 24-hour, time-weighted, annual average A-weighted noise level. Noise occurring in the nighttime period (10:00 p.m. to 7:00 a.m.) is penalized by adding 10 dB; this weighting is intended to reflect a typical person's increased sensitivity to noise during late-night and early morning hours. This descriptor is used by the City of Santee to evaluate land-use compatibility with regard to noise.

2.0 REGULATORY FRAMEWORK

2.1 City of Santee

2.1.1 General Plan

The City of Santee requires new projects to meet noise level standards as established in the Noise Element of its General Plan [City of Santee]. In the Residential – Multi Family land use category, noise levels up to 65 dBA Ldn are considered Normally Acceptable; noise levels up to 70 dBA Ldn are considered Conditionally Acceptable. Development Standard #2 indicates that, if the project is exposed to noise levels over 65 dBA Ldn, the building structure must attenuate exterior noise in occupied areas to 45 dBA Ldn or below.

The Housing Element of the General Plan Mitigation Monitoring and Reporting Plan requires demonstration that construction activities would not exceed 75 dBA at the nearest sensitive receptor, or a Construction Noise Best Management Practice Plan to minimize noise.

2.1.2 Municipal Code

The City of Santee does not regulate construction noise levels, only times of day; per Santee Municipal Code section 5.04.090, construction may occur on non-holidays, Monday through Saturday, between 7:00 a.m. and 7:00 p.m. Many jurisdictions in San Diego County, including the City of San Diego, limit construction noise at occupied residential property lines to a 12-hour average (Leq-12h) of 75 A-weighted decibels (dBA).

3.0 ENVIRONMENTAL SETTING AND EXISTING CONDITIONS

Noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise-sensitive and may warrant unique measures for protection from intruding noise.

3.1 Existing Conditions

The project site is currently developed with a single-family residence. Noise-sensitive land uses in the project area include single-family residences to the north, south, and east; and a church to the southwest. The primary existing noise source in the vicinity of the project is vehicular traffic on Summit Avenue.

Summit Avenue is a two-way unclassified roadway adjacent to the project site on the west. Its speed limit is unposted. There are no traffic counts available for Summit Avenue in the project area.

3.2 Sound Level Measurement

A sound level measurement was conducted to estimate the existing acoustical environment in the project area. A RION Model NL-31 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meter (SLM) was used as the data-collection device. The meter was mounted on a tripod roughly 5 feet above ground to simulate the average height of the human ear. The microphone was fitted with a windscreen. The sound level meter was calibrated before the measurement period. Simultaneous traffic counts were conducted during the measurement period. The measurement results are summarized in Table 2 and correspond to the locations depicted on Figure 2.

Table 2. Sound Level Measurement (dBA)

Measurement Location		Date / Time	Leq	Lmin	Lmax	L10	L50	L90	Traffic
ML1	West project property line	2023-10-11 09:55 – 10:10	47.8	35.3	68.9	48.1	41.0	37.3	7 cars

Figure 2. Sound Level Measurement Location

4.0 POTENTIAL NOISE IMPACTS

4.1 Vehicular Traffic Noise

The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) version 2.5 was used to estimate traffic noise levels. The modeling effort considered the peak-hour traffic volume, average estimated vehicle speed, and estimated vehicle mix, i.e., percentage of cars, medium trucks, heavy trucks, buses, and motorcycles. The peak hour traffic noise level was considered equivalent to the Ldn [24 CFR §51.106]. Future vehicular traffic calculations are summarized in Appendix A.

Sound levels caused by line sources (i.e., variable or moving sound sources such as traffic) generally decrease at a rate of 3 to 4.5 dBA when the distance from the road is doubled, depending on the ground surface hardness between the source and the receiving property [Caltrans 2013a]. The model assumed "hard soil" propagation conditions, which corresponds to a drop-off rate of approximately 3 dBA per doubling of distance. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures (walls and buildings), barriers, and topography. The noise attenuating effects of changes in elevation, topography, and intervening structures were not included in the model. Therefore, the modeling effort is considered a worst-case representation of the roadway noise.

4.1.1 Traffic Noise Affecting the Project Site

The future noise environment would be a result of vehicular traffic on Summit Avenue and the future extension of Magnolia Avenue.

Summit Avenue is planned to be a Collector Residential roadway. Summit Avenue is projected to carry a future (year 2050) ADT volume of 100 vehicles between Magnolia Avenue and Princess Joann Road [SANDAG 2023]. The existing vehicle speed of 25 mph and traffic mix of 100% cars were assumed to remain constant in the future.

Magnolia Avenue is planned to be a Parkway roadway, adjacent to the project site on the north. Magnolia Avenue is projected to carry a future (year 2050) ADT volume of 2,300 vehicles east and west of Summit Avenue [SANDAG 2023]. Magnolia Avenue has a planned speed limit of 40 mph. It was assumed that the vehicle mix on Magnolia Avenue would be 100% cars.

The open space areas in the project are the Neighborhood Amenity at the northwest corner and two paseos between northern buildings. Noise levels at the outdoor use areas would be approximately 57 dBA Ldn at the Neighborhood Amenity, and less at all building façades and other outdoor use areas. These noise levels are considered Normally Acceptable at multifamily residential land uses by the City of Santee. Refer to Figure 3 for details.

Because the project is not exposed to noise levels over 65 dBA Ldn, an interior noise analysis is not necessary or required.

Figure 3. Future Exterior Noise Levels (Ldn)

4.2 Construction Noise

The primary noise source from project construction would be from site preparation. Grading could require the use of heavy equipment such as bulldozers, loaders, and scrapers. No blasting would be necessary. Haul trucks could be used to import or export fill to or from the project sites. The project would not utilize pile driving. No vibratory equipment would be used.

Construction of the project would generate a short-term temporary increase in noise in the project area. The increase in noise level would be primarily experienced close to the noise source. The magnitude of the impact would depend on the type of construction activity, noise level generated by various pieces of construction equipment, duration of the construction phase, acoustical shielding and distance between the noise source and receiver.

Construction activity and delivery of construction materials and equipment would be limited to between 7:00 a.m. and 7:00 p.m., except on Sundays or holidays.

This project would implement conventional construction techniques and equipment. Standard equipment such as scrapers, graders, backhoes, loaders, tractors, cranes, and miscellaneous trucks would be used for construction of most project facilities. Sound levels of typical construction equipment range from approximately 65–95 dBA at 50 feet from the source [U.S. Environmental Protection Agency (U.S. EPA) 1971]. Worst-case noise levels are typically associated with grading. Noise sources associated with grading of the proposed project, and associated noise levels, are shown in Table 3.

Table 3. Grading Noise Source Levels

Noise Source	Noise Level	Number
Bulldozer	80 dBA at 10 meters	1
Backhoe	69 dBA at 10 meters	1
Water Truck	81 dBA at 10 meters	1
Roller	73 dBA at 10 meters	1

Source: DEFRA 2005

The Datakustik Cadna/A industrial noise prediction model was used to estimate construction noise levels. It was assumed that up to two pieces of equipment at any given time would operate continuously within the grading area boundary. No correction was applied for downtime associated with equipment maintenance, breaks, or similar situations. No noise reduction related to ground effects, atmospheric absorption, or intervening topography was included in the model.

The closest occupied residential properties are located adjacent to the project site on the north, south, and east. Without noise abatement, under the assumptions detailed above, project construction activity would produce noise levels ranging from approximately 68-71 dBA Leq at the property lines of the residences.

Construction would occur during the days and hours proscribed by the City of Santee Municipal Code. Construction noise levels at the nearest sensitive receptor would not exceed 75 dBA. As such, a Construction Noise Best Management Plan is not necessary or required.

5.0 REFERENCES

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6.0 LIST OF PREPARERS

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APPENDICES

APPENDIX A

ROADWAY TRAFFIC CALCULATIONS