

## ATTACHMENT "J"

# **HANNA CENTER 60 ACRE HOUSING DEVELOPMENT 810 AGUA CALIENTE ROAD WEST, SONOMA, CA ENVIRONMENTAL NOISE STUDY**



**PREPARED FOR: Hanna Center**

Sent via email

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## **1.0 Executive Summary**

This report summarizes our analysis of the existing environmental noise levels and anticipated project-generated noise for the 60-acre mixed-use housing development at 810 Agua Caliente Road West in Sonoma, CA. The proposed project will include senior housing consisting of 24 memory care units, 48 assisted living units, 80 independent living units and 120 casitas, a hotel consisting of 119 rooms and 20 branded residences, 136 for-sale townhomes, 120 apartment rental units, 6,500 square feet (sf) of retail space, 3,500 sf of office space, a 4,000 sf child day care center, a 5,600 sf adult day care center, and a 10,000 sf vocational training center. The project site is exposed to noise generated from traffic along Arnold Drive and Agua Caliente Road West and primarily neighbors single-family residential land uses.

The proposed development will be constructed upon a largely undeveloped plot of land currently consisting of one single-family home. The 60-acre plot of land features an elevation change of approximately 45 feet across the property and contains several sections of wetland scheduled for removal.

Long-term noise measurements were conducted along the property line bordering Arnold Drive and Agua Caliente Road West. The existing 24-hour ambient noise levels are up to 80 dB  $L_{dn}$  along Arnold Drive and up to 72 dB  $L_{dn}$  along Agua Caliente Road West. Noise modeling software was used to calculate future noise levels due to project-generated traffic. The model predicts no significant change in future 24-hour noise levels at sensitive receptors ( $\leq 1$  dB increase). These results indicate that mitigation measures are not required for project-generated traffic noise.

Building facade noise reduction recommendations to achieve Building Code interior noise requirements will be provided when the project design is more refined.

## **2.0 Introduction/Study Parameters**

### **2.1 Introduction**

This noise study aims to quantify the existing noise environment around the future Hanna Center 60 Acre Mixed-Use Housing Development in Sonoma, CA and provides preliminary recommendations for noise controls. Vehicular traffic along roadways surrounding the project site exceeds minimum thresholds to require an environmental noise analysis for compliance with the noise elements of the Sonoma County General Plan, California Building Code (CBC), and CALGreen.

### **2.2 Fundamentals of Noise**

Noise is typically defined as unwanted sound and has the potential of negatively affecting human health. Noise in the community has often been cited as a health problem since it affects general well-being and contributes to undue stress and annoyance. At especially high noise levels, hearing loss can occur. Details about the fundamentals of sound and common noise descriptors, as well as further discussion regarding human response to noise, are provided below.

Sound is the energy (disturbance or vibration), that is transmitted in the form of waves through a medium, such as air. Sound waves are typically described in terms of intensity and frequency. Sound intensity refers to the amount of energy in a sound wave and is quantified on a logarithmic "decibel" scale. Levels of sound intensity correspond to different degrees of loudness, where 0 dBA generally corresponds with the threshold of human hearing and sound levels of 120 dBA to 140 dBA, or higher correspond to thresholds of pain. The frequency of sound is defined as the number of cycles per second and is measured in hertz (Hz). Humans are typically sensitive to sound levels between 20 Hz to 20,000 Hz, where the frequency of a sound wave corresponds to the perceived pitch.

Since human ears are not equally sensitive to all frequencies, noise measurements are therefore weighted to account for the ear's frequency-dependent response to sound. The most common

example of frequency-weighting is known as A-weighted decibel level (“dBA”; “dB(A)”), which is applied to most environmental noise measurements. Since sound levels are measured on a logarithmic scale, decibel addition is also based on a logarithmic scale. For example, a 65 dBA sound source when added to another 65 dBA source (a doubling of the sound pressure) does not result in 130 dBA, but rather in a total incremental increase of 3 dB. In general, a change in sound level between 1 dB to 3 dB is barely noticeable to humans, where a change of 10 dB is perceived as a doubling or halving of sound level.

Sound levels reduce with respect to distance at different rates, depending on the source type. In general, noise from sources such as stationary mechanical equipment and construction machinery (known as “point sources”) reduce between 6 dB to 7.5 dB per doubling of distance from the source. Noise from sources such as a busy highway (known as “line sources”) reduce between 3 dB to 4.5 dB per doubling of distance from the source. The presented ranges of attenuation depend on the type of ground surface between the noise source and the receiver. Highways and hard surfaces such as concrete or asphalt typically have an attenuation rate of 6 dB for point sources and 3 dB for line sources, whereas softer surfaces, such as vegetated terrain, have an attenuation rate of 7.5 dB for point sources and 4.5 dB for line sources. The proposed development will primarily generate noise from vehicular traffic within the 60-acre development. Atmospheric conditions as well as shielding (such as the existence of buildings or noise walls between source and receiver) could also affect noise levels from different positions.

Environmental noise has the potential to annoy residents, disturb sleep, and reduce the quality of life. A discussion of sleep disturbance and land-use compatibility with respect to noise is contained in Section 3.2.3.

### **2.3 Description of the Proposed Development**

The project will feature a mixed-use housing development covering 60 acres of land, with a main entrance at 810 Aqua Caliente Road West, Sonoma, CA. Currently, the land at the project site is largely undeveloped and consists of one single-family residential home. Figure 1 shows the proposed project layout with existing land uses located within 1,200 feet of the property line. Figure 2 outlines noise-generating areas on the proposed project site, which consists of roadways and parking lots.

The project goals include creating additional single-family, affordable multi-family, and senior living housing, creating lodging options, and providing child and adult day care, new retail spaces, and a vocational training center to the community.

A phasing plan has not been established and proposed dates of project completion have not yet been set.

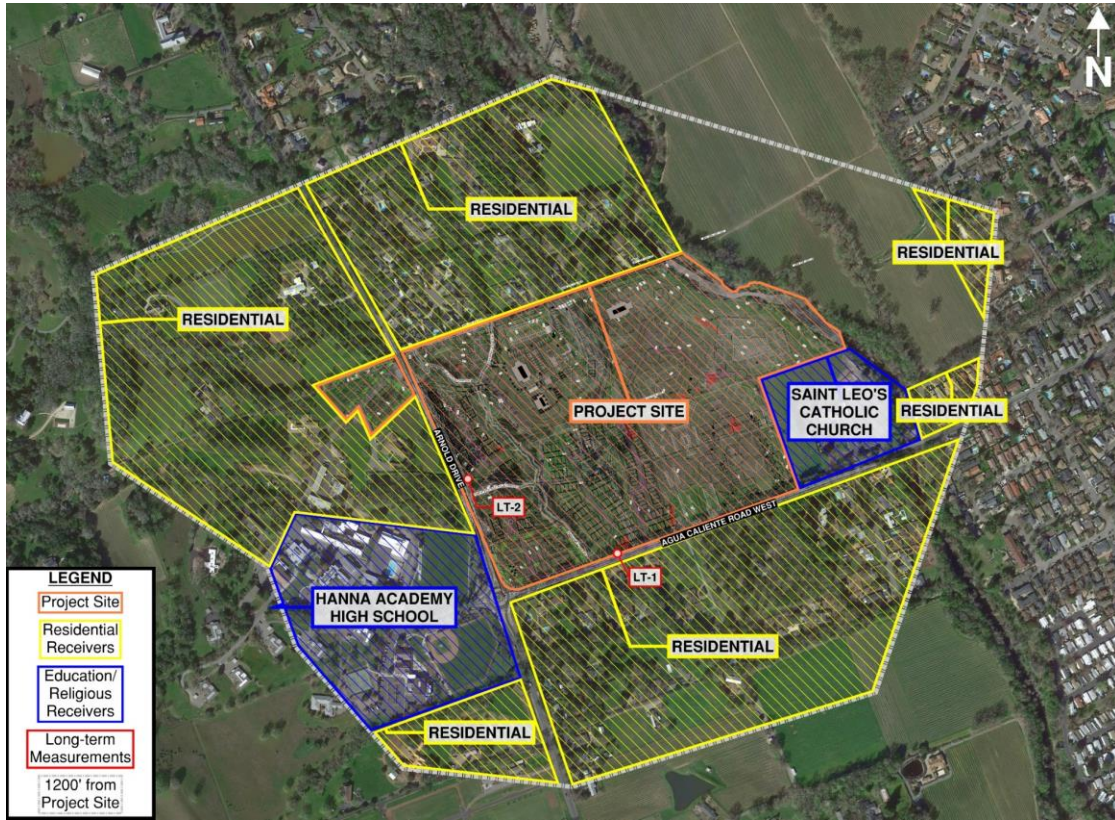


Figure 1: Sensitive Receivers and Measurement Locations



Figure 2: Proposed Project Layout with Noise-Generating Project Areas

## 2.4 Noise Analysis Study Area

The study area included in the noise assessment is depicted in Figure 1. Several representative sensitive receivers, shown in Figure 3, were selected to analyze their current and future environmental noise levels.



Figure 3: Sensitive Receiver Sites used in Noise Analysis

## 2.5 Operating Scenarios and Hours to Be Studied

The project consists of senior housing, for-rent apartment units, for-sale townhouses, and a hotel; it also features a vocational training center, a child and an adult day care center, office spaces, and retail operations. Operating hours for the commercial and educational uses have not yet been formally established and will be specific to the facility. Therefore, daily (weekday and weekend) operating hours from 8 AM to 10 PM will be conservative assumptions for the analysis.

## 2.6 Description of Methodologies and Assumptions

Noise sensitive receivers were determined based on the use of the adjacent properties, including residential, religious, and educational uses. Measurement locations were selected relative to the most significant noise sources surrounding the project site: along Arnold Drive and along Agua Caliente Road West. The ambient noise measurement duration of 72 hours was used to capture a representative range of noise-generating events during both the weekdays and weekend. Measurement locations are shown in Figure 1.

No significant sources of vibration were observed in the project site vicinity, so vibration monitoring was deemed not necessary.

## 2.7 Measuring Times, Durations, and Repetition

Noise measurements were taken from 1 PM on Thursday, September 21, 2023 to 1 PM on Sunday, September 24, 2023. Vehicular traffic along Arnold Drive and Agua Caliente Road West are the primary sources of noise surrounding the project site. While traffic volume can vary from day-to-day, times which see the greatest volumes of traffic/noise levels are generally consistent. No unusual peak noise levels were observed in the analysis. Variations in the ambient noise levels can be attributed to changes in traffic volume.

## 2.8 Field Measurement Procedures

To measure ambient noise levels, two Type 1 Larson Davis Model 831 sound level meters were set up in different locations (see Figure 1) and used to capture spectral measurements in one-third octave bands from 20 Hz to 20 kHz. Each sound level meter was attached to a utility pole 19 feet from the centerline of the respective roadway and positioned approximately 12 feet above grade (see Figure 6). The meters were configured to log the sound level one time per second.

An average vehicle speed of 30 mph was recorded during the measurements at long-term location 1 (LT-1) on Agua Caliente Road West. An average vehicle speed of 35 mph was recorded during the measurements at long-term location 2 (LT-2) on Arnold Drive. An 8-minute traffic count was performed during which 95 cars and 11 trucks passed. Note that traffic volumes were higher on Arnold Drive at this time due to a bridge closure in the area.

Based on a review of online weather data (accessed through [weatherunderground.com](http://weatherunderground.com)) between September 21 and 24, 2023, the temperature ranged from 47 to 76°F and averaged 58°F. The humidity level ranged from a low of 42% to a high of 100%, with no precipitation. The wind speed ranged from 0 to 12 miles per hour (mph) with an average wind speed of 4 mph. Based on a review of the noise levels during this timeframe, wind noise did not affect the measurements.

## 2.9 Noise Prediction Methodology Used

Noise generated by project-related traffic has been analyzed based on the traffic impact data prepared by the project traffic engineer (Fehr & Peers). Noise generated by project traffic on the future roads of the site was calculated utilizing the Federal Highway Administration's Traffic Noise Model v2.5, assuming an average vehicle speed of 15 mph. The peak hour noise level was calculated from the traffic engineer's trip projections worksheet. Note that the peak hour noise level can be considered roughly equivalent to the  $L_{dn}$  noise level (see Caltrans [Technical Noise Supplement](#), page 2-56).

The results from these calculations were imported into the CadnaA environmental noise modeling software to estimate the new project environmental noise levels at nearby sensitive receivers. Note that this model did not account for future buildings, which will provide additional acoustical shielding to residents/patrons of the proposed development.

In addition to transportation, the Sonoma County General Plan outlines noise impact criteria for non-transportation noise sources, applicable to project mechanical equipment noise. Given the early phase of the project, mechanical equipment schedules and plans have not yet been developed. All project equipment will be selected and designed to meet the County limits, as described in Table 1.

## 2.10 Criteria/Thresholds

### 2.10.1 Sonoma County General Plan

The Sonoma County General Plan 2020 stipulates the following policies/goals applicable to this project.

- **Policy NE-1a:** Designate areas within Sonoma County as noise impacted if they are exposed to existing or projected exterior noise levels exceeding 60 dB  $L_{dn}$ , 60 dB CNEL, or the performance standards of Table NE-2 (Table 1).



- **Policy NE-1b:** Avoid noise sensitive land use development in noise impacted areas unless effective measures are included to reduce noise levels. For noise due to traffic on public roadways, railroads and airports, reduce exterior noise to 60 dB  $L_{dn}$  or less in outdoor activity areas and interior noise levels to 45 dB  $L_{dn}$  or less with windows and doors closed. Where it is not possible to meet this 60 dB  $L_{dn}$  standard using a practical application of the best available noise reduction technology, a maximum level of up to 65 dB  $L_{dn}$  may be allowed but interior noise level shall be maintained so as not to exceed 45 dB  $L_{dn}$ . For uses such as Single Room Occupancy, Work-Live, Mixed Use Projects, and Caretaker Units, exterior noise levels above 65 dB  $L_{dn}$  or the Table NE-2 (Table 1) standards may be considered if the interior standards of 45 dB  $L_{dn}$  can be met. For schools, libraries, offices, and other similar uses, the interior noise standard shall be 45 dB  $L_{eq}$  in the worst-case hour when the building is in use.
- **Policy NE-1c:** Control non-transportation related noise from new projects. The total noise level resulting from new sources shall not exceed the standards in Table NE-2 (Table 1) as measured at the exterior property line of any adjacent noise sensitive land use. Limit exceptions to the following:
  - (1) If the ambient noise level exceeds the standard in Table NE-2 (Table 1), adjust the standard to equal the ambient level, up to a maximum of 5 dB above the standard, provided that no measurable increase (i.e. +/- 1.5 dB) shall be allowed.
  - (2) Reduce the applicable standards in Table NE-2 (Table 1) by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises, such as pile drivers and dog barking at kennels.
  - (3) Reduce the applicable standards in Table NE-2 (Table 1) by 5 decibels if the proposed use exceeds the ambient level by 10 or more decibels.
  - (4) For short term noise sources which are permitted to operate no more than six days per year, such as concerts or race events, the allowable noise exposures shown in Table NE-2 (Table 1) may be increased by 5 dB. These events shall be subject to a noise management plan including provisions for maximum noise level limits, noise monitoring, complaint response and allowable hours of operation. The plan shall address potential cumulative noise impacts from all events in the area.
  - (5) Noise levels may be measured at the location of the outdoor activity area of the noise sensitive land use, instead of the exterior property line of the adjacent noise sensitive land use where:
    - (a) the property on which the noise sensitive use is located has already been substantially developed pursuant to its existing zoning, and
    - (b) there is available open land on those noise sensitive lands for noise attenuation. This exception may not be used on vacant properties which are zoned to allow noise sensitive uses.
- **Policy NE-1d:** Consider requiring an acoustical analysis prior to approval of any discretionary project involving a potentially significant new noise source or a noise-sensitive land use in a noise impacted area. The analysis shall:
  - (1) Be the responsibility of the applicant,
  - (2) Be prepared by a qualified acoustical consultant,
  - (3) Include noise measurements adequate to describe local conditions,
  - (4) Include estimated noise levels in terms of  $L_{dn}$  and/or the standards of Table NE-2 (Table 1) for existing and projected future (20 years hence) conditions, based on accepted engineering data and practices, with a comparison made to the adopted policies of the Noise Element. Where low frequency noise (ex: blasting) would be generated, include assessment of noise levels and vibration using the most appropriate measuring technique to adequately characterize the impact,
  - (5) Recommend measures to achieve compliance with this Element. Where the noise source consists of intermittent single events, address the effects of maximum noise levels on sleep disturbance,
  - (6) Include estimates of noise exposure after these measures have been implemented, and

- (7) Be reviewed by the Permit and Resource Management Department and found to be in compliance with PRMD guidelines for the preparation of acoustical analyses.
- **Policy NE-1e:** Continue to follow building permit procedures to ensure that requirements based upon the acoustical analysis are implemented.
  - **Policy NE-1g:** Enforce the State Noise Insulation Standards (Title 24, Part 2, California Administrative Code and Appendix Chapter 12 of the California Building Code) concerning new multiple occupancy dwellings.
  - **Policy NE-1m:** Consider requiring the monitoring of noise levels for discretionary projects to determine if noise levels are in compliance with required standards. The cost of monitoring shall be the responsibility of the applicant.

Table 1: Maximum Allowable Exterior Noise Exposures for Non-Transportation Noise Sources (Table NE-2)

Hourly Noise Metric <sup>1</sup> , dBA	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
L50 (30 minutes in any hour)	50	45
L25 (15 minutes in any hour)	55	50
L08 (4 minutes 48 seconds in any hour)	60	55
L02 (72 seconds in any hour)	65	60
<sup>1</sup> The sound level exceeded n% of the time in any hour. For example, the L50 is the value exceeded 50% of the time or 30 minutes in any hour; this is the median noise level.		

### 2.10.2 California Building Code – Residential Interior

The 2022 California Building Code (CBC), California Code of Regulations, Title 24, Part 2, Section 1207.4, stipulates that an interior noise level attributed to exterior sources shall not exceed  $L_{dn}$  45 dB for any habitable room in a multi-family building (including hotels).

### 2.10.3 California Building Code – Commercial

Section 5.507 of the 2022 California Green Building Standards Code (CALGreen) stipulates noise criteria for commercial spaces. If exterior hourly noise levels at the project site are above 65 dB  $L_{eq}$ , then interior noise levels in the Lobby, Amenity, and Commercial spaces must not exceed 50 dB  $L_{eq}$  during the noisiest hour of operation (Performance Method).

This CALGreen standard applies to the Retail and Daycare spaces.

### 2.10.4 CEQA Initial Study Checklist Questions

CEQA provides an assessment to determine the impact that project development and operation will have on the surrounding environment. The Initial Study Checklist Questions include assessing if the project will result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

### 2.10.5 Project-Generated Traffic Noise

Although the County does not have quantitative criteria for project-generated traffic noise, the following criterion is often applied. In general, traffic noise increases of less than 3 dB  $L_{dn}$  are barely perceptible to people, while a 5 dB  $L_{dn}$  increase is readily noticeable (see Caltrans Technical Noise Supplement). Therefore, permanent increases in ambient noise levels of more than 5 dB  $L_{dn}$  are considered to be unacceptable and a significant noise impact in any existing or resulting noise environment. However, in places where the existing or resulting noise environment is 60 dB  $L_{dn}$  or less at sensitive receptors, any noise increase greater than 3 dB  $L_{dn}$  is considered a significant noise impact.

### 2.10.6 Sleep Disturbance Guidelines

While there are no widely accepted industry thresholds for sleep disturbance the County provides the following quantitative  $L_{max}$  criteria in their Guidelines for the Preparation of Noise Analysis document:

- Generally, when two or more events exceed the 45 dBA interior noise threshold (during the hours of 10 PM to 7 AM), the concern of sleep disturbance needs to be evaluated.

## 3.0 Noise Impact Analysis

### 3.1 Existing Noise Environment

The existing surrounding land consists primarily of residential (and agricultural) uses around the project site along with an educational facility (Hanna Academy). Primary contributions to ambient noise include vehicular traffic along Arnold Drive and Agua Caliente Road West. Birds, insects, and animals in the vicinity also contribute to the existing noise environment around the project site. See Figure 1 for a markup of sensitive land uses and noise measurement locations. Figures 4 and 5 present the continuous hourly  $L_{eq}$  data at locations surrounding the project site.

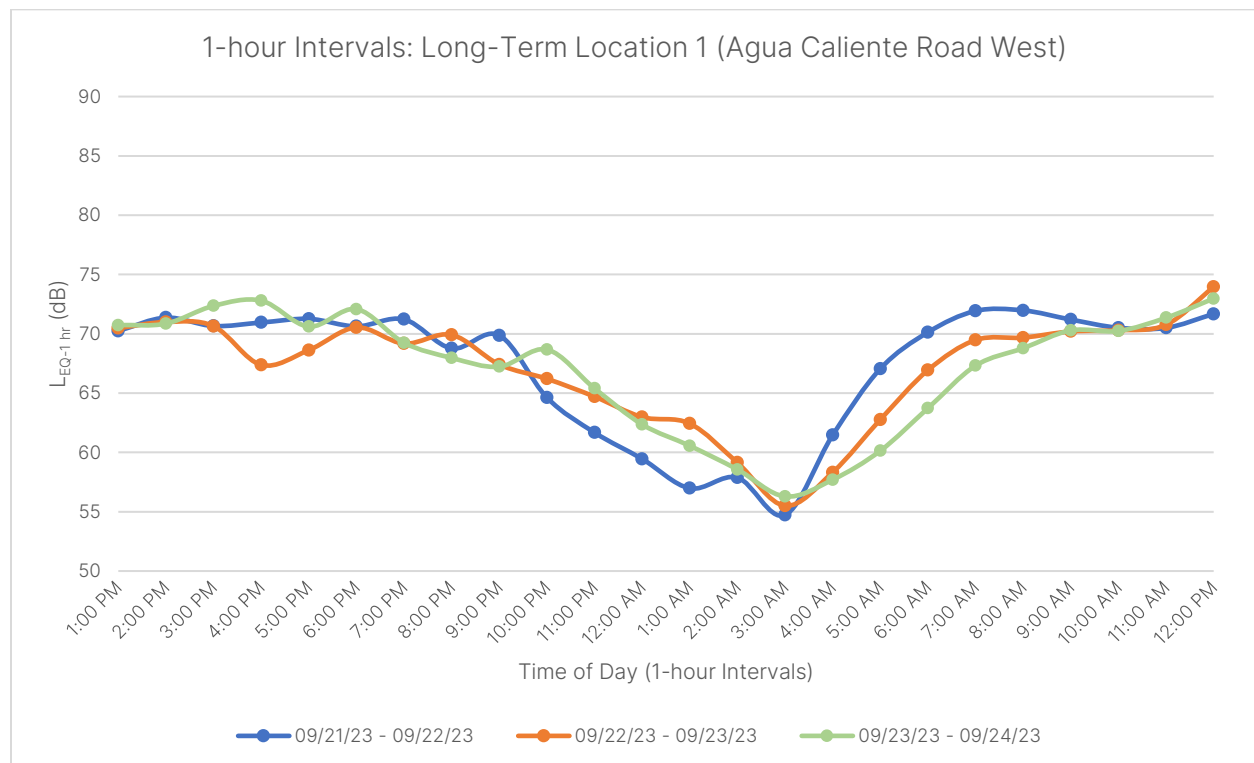


Figure 4: Continuous Noise Levels at LT-1 (Agua Caliente Road West)

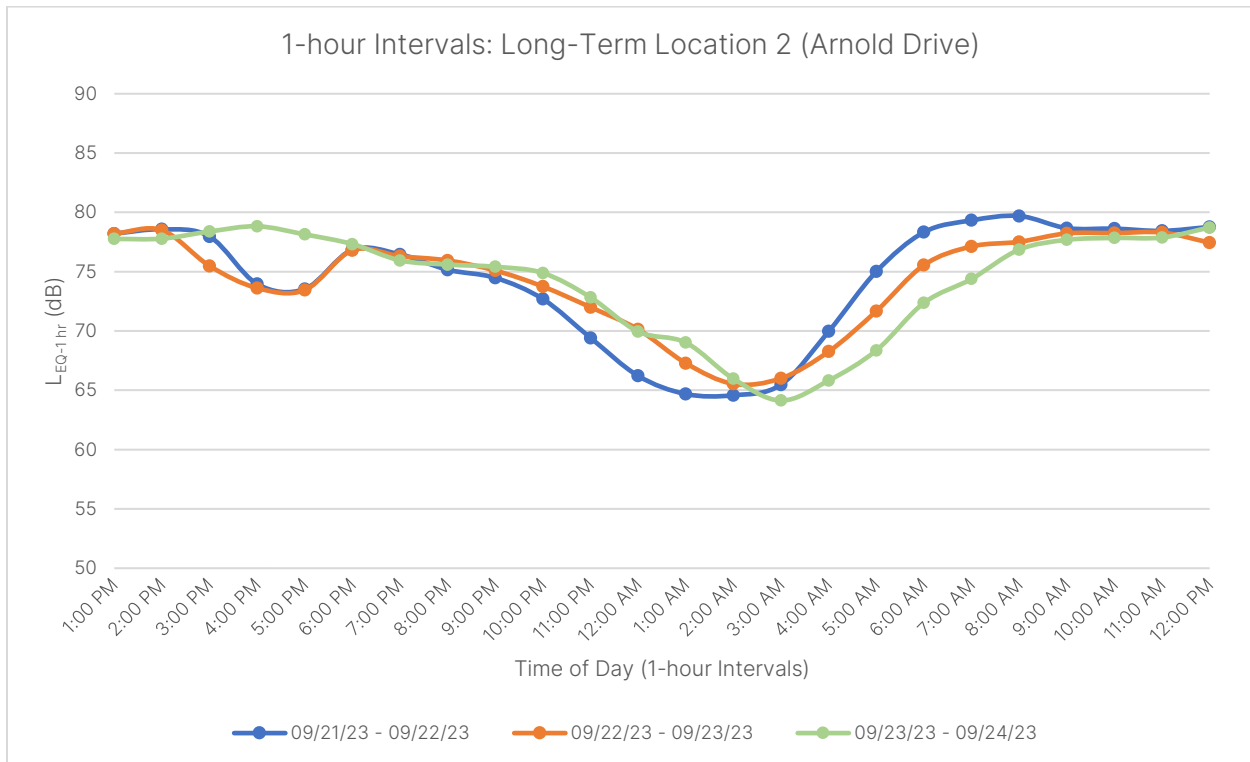


Figure 5: Continuous Noise Levels at LT-2 (Arnold Drive)

The project’s noise-sensitive receivers along Arnold Drive and Agua Caliente Road West are exposed to levels of up to 74 dB  $L_{dn}$ . The Noise Element of the 2020 Sonoma County General Plan, Policy NE-1b, specifies that efforts should be made to maintain an exterior noise level not exceeding 60 dB  $L_{dn}$  in outdoor activity areas or 65 dB  $L_{dn}$  when it is not possible to achieve the 60 dB  $L_{dn}$  standard. For mixed-use projects, exterior noise levels above 65 dB  $L_{dn}$  may be considered so long as the interior noise standards can be met. Interior noise levels may not exceed 45 dB  $L_{dn}$  with windows and doors closed or 45 dB  $L_{eq}$  in the worst-case hour for educational or commercial uses.

The ambient noise levels were determined based on the average of the four quietest 1-hour average ( $L_{eq}$ ) levels, as measured during the day or night. The results are presented in Table 2.

Table 3 presents the existing noise levels at the sensitive receivers (residences) closest to the project property line (see Figure 3). These modeled results were calibrated based on measured data.

Table 2: Ambient Noise Levels, Determined per Guidelines from the County of Sonoma

Measurement Location	Average of the Four Quietest Hours $L_{eq}$ -1-hour (dB)	Maximum 24-hour Noise Level $L_{dn}$ (dB)
Agua Caliente Road West (LT-1)	56	72
Arnold Drive (LT-2)	65	80

**Table 3: Calculated Noise Measurement Results**

Measurement Location	24-hour Noise Level L <sub>dn</sub> (dB)			
	Thursday, September 21 - Friday, September 22	Friday, September 22 - Saturday, September 23	Saturday, September 23 - Sunday, September 24	Average
Agua Caliente Road West (LT-1)	72	71	72	72
Arnold Drive (LT-2)	80	79	79	79

### 3.2 Other Noise Considerations

#### 3.2.1 Project-Generated Traffic/Parking Lot

As discussed in Section 2.9, calculations of peak hour traffic noise levels were performed and are found to be significantly lower than the ambient L<sub>dn</sub> surrounding the project site. Results are presented in Table 4. Noise contours representing “Existing” and “Existing + Project” noise levels can be seen in Figure 7 and Figure 8, respectively.

**Table 4: Project-Generated Traffic Noise Calculations (L<sub>dn</sub>)**

Sensitive Receiver (relative to project site)	Existing L <sub>dn</sub> , dB	Project-Generated Traffic L <sub>dn</sub> , dB	Existing + Project L <sub>dn</sub> , dB	Change, dB	Significant? (> 3 dB)
North Residence	57	49	58	1	No
West Residence	64	47	65	1	No
South Residence	66	51	66	0	No
Saint Leo's Catholic Church	59	48	59	0	No

#### 3.2.2 Emergency Generators

The project is currently in the early stages of design and the use and locations of emergency generators have not yet been defined. This item will be addressed pending refinement of the project design.

#### 3.2.3 Sleep Disturbance

While there are no widely accepted industry thresholds for sleep disturbance, delivery trucks could exceed the 45 dBA interior standard outlined in the County’s guidelines. Delivery truck routes should be carefully planned to be as far as feasible from sleeping areas (i.e., townhomes, apartments, senior living facilities, hotel). The hours of deliveries should also be limited to daytime hours to avoid sleep disturbance. The sleep disturbance analysis can be refined when truck routes, loading docks, and other project parameters are defined.

#### 3.2.4 Low Frequency Noise and Vibration

Pile driving, blasting, or use of other repetitive noise sources or mechanical equipment emitting significant low frequency noise or vibration are not anticipated. Therefore, a low-frequency analysis is not necessary.

### 3.2.5 Temporary Construction Noise

Given the early stages of the project, it is too preliminary to perform construction noise calculations. A more detailed construction noise study can be prepared when the project is more refined. The contractor should follow the County's prescriptive measures, as follows:

- Limit hours of construction to avoid the early morning and evening hours (7 AM to 7 PM on weekdays and 7 AM to 5 PM on weekends)
- Limit work to non-motorized equipment on Sundays and holidays
- Use sound blankets for loud operations such as pile driving, air compressors or other mechanical equipment, and consider pre-drilling holes prior to pile driving
- Site construction staging areas as far as practical from nearby sensitive receptors
- Require street legal mufflers on all construction equipment

### 3.2.6 Periodic Noise Events

Periodic noise events resulting from blasting, firearms ranges, hunting clubs, fireworks displays, or similar activities are not anticipated. This item is not applicable to the noise analysis.

## 3.3 Cumulative Noise Environment

The proposed project is expected to result in a minor increase in traffic volume in and around the project site; no other major sources of noise are planned. Therefore, there are no cumulative noise impacts and the "Existing + Project" data shown in Table 4 can be used to evaluate noise impacts.

## 3.4 CEQA Analysis

Per the CEQA Initial Study checklist, the following questions have been addressed:

Will the project result in:

1. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
  - No. Project generated 24-hour noise level increases are 1 dB or less.
2. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
  - No. No significant sources of vibration are located within the project vicinity.
3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
  - No substantial, permanent increase in ambient noise levels is expected.
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
  - Yes, a substantial temporary increase in ambient noise levels in the project vicinity is expected during project construction. A detailed construction noise control plan should be developed prior to project construction.
5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
  - The project site is not located in the vicinity of a public airport or public use airport. This item is not applicable.
6. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?
  - The project site is not located in the vicinity of a private airstrip. This item is not applicable.

## 3.5 Discussion of Noise Impacts

The existing noise environment surrounding the project site, exceeds the  $L_{dn}$  65 dB outdoor noise criterion outlined in Policy NE-1b from the Sonoma County General Plan (see Section 2.10.1).

Without mitigation, the affordable housing apartments directly facing Arnold Drive will be most affected by traffic noise. Other perimeter buildings (i.e., those facing Arnold Drive or Agua Caliente Road West) will also be at or above the County's exterior noise goals. Interior areas of the project site plan are expected to meet the County's exterior noise goals.

#### **4.0 Recommended Mitigations**

To meet the various noise criteria detailed in Section 2.10, we recommend the following:

1. Orient outdoor use spaces at residential and other sensitive uses to take advantage of the noise shielding provided by an intervening building. For example, locate outdoor use areas of the affordable housing units along Arnold Drive to be behind (east of) the residences. Shielding of buildings can provide 15 to 20 dB of noise reduction, which will meet the  $L_{dn}$  65 dB outdoor goal.
2. Locate loading docks away from sensitive receptors as much as feasible. Consider limiting truck delivery times to only the daytime (7 am to 10 pm) hours. Route trucks away from sensitive receptors.
3. Prepare a detailed construction noise control plan to reduce construction noise impacts to adjacent receivers.
4. Locate and specify project mechanical equipment to meet the County's property line noise limits.
5. Conduct a detailed building facade analysis to provide the design team with the recommended window, exterior door, and exterior wall STC rating/wall design to meet the interior noise criteria.

#### **5.0 Noise Impacts with Proposed Mitigations**

With the mitigation measures noted above, the project will meet the relevant noise criteria.

#### **6.0 Complex Monitoring**

When the project design is more refined, a detailed monitoring plan can be developed if it is determined that construction noise and/or operational noise has the potential to exceed the relevant noise criteria.

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This concludes our environmental noise study for the Hanna Center Housing Development project in Sonoma, CA. Please do not hesitate to contact us with questions.

## **Appendix A: Definitions of Acoustical Terms**

**A-Weighted Sound Level (dB or dBA):** A standard frequency weighting that filters the microphone signal in a manner which compares relative loudness of various sounds. A-weighting is standardized by the American National Standards Institute (ANSI). A 10-dB increase in sound level is generally perceived to be approximately twice as loud. All noise data in this report are A-weighted unless defined otherwise.

**Decibel (dB):** The most commonly used logarithmic scale for describing sound levels. A scale that measures sound level pressure defined as 20 times the logarithm of the ratio of the sound level pressure to a standard reference pressure level of 20  $\mu$ Pa. The term "Sound Level," "Noise Level" and "Sound Pressure Level" (SPL) all imply a standardized reference level near the threshold of human hearing (0 decibels).

**Day/Night Average Sound Level ( $L_{dn}$  or DNL):** A descriptor established by the U.S. Environmental Protection Agency to describe the average day-night A-weighted noise level with a 10 dB penalty applied to noise occurring during the nighttime hours (10 pm to 7 am) to account for the increased sensitivity of people during sleeping hours. A 10 dB increase in sound level is perceived by people to be twice as loud.

**Hertz (Hz):** The rate or frequency of air pressure fluctuations that we call sound. One hertz is equivalent to one complete cycle of pressure variation per second. One kilohertz (kHz) is 1,000 cycles per second.

**$L_{eq}$ :** The equivalent steady-state A-weighted sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same time period.

**$L_{max}$ :** The highest sound level in a stated period of time.



## Appendix B: Data Collected

Table 5 shows the measurement equipment used.

Table 5: Noise Measurement Instrumentation

Manufacturer	Model	ID No.	Serial No.	Calibration Date
Larson Davis	831	SF-2-FR	0002659	2022-05-20
Larson Davis	831	SF-3-F	0002989	2023-06-16



Figure 6: Long-Term Noise Measurement Photo

**Table 6: Project-Generated Traffic (Per Fehr & Peers)**

Land-Use	Code	Units	Quantity	Daily	Weekday						Weekend		
					AM			PM			Saturday		
					In	Out	Total	In	Out	Total	In	Out	Total
<b>Residential</b>													
Multifamily Housing (Low-Rise)	220	DU	250	1,678	24	76	100	81	47	128	51	52	103
<b>Senior Living</b>													
Assisted Living	254	DU	72	187	8	5	13	7	10	17	9	10	19
Senior Adult Living Housing - Multifamily	252	DU	200	648	14	26	40	28	22	50	35	29	64
<b>Lodging</b>													
Hotel	310	RMS	130	1,039	32	26	58	35	33	68	52	42	94
Time Share	265	DU	18	155	4	3	7	4	7	11	3	4	7
<b>Retail</b>													
Strip Retail Plaza (<40k)	822	KSF	10	652	17	12	29	39	39	78	34	32	66
<b>Institutional</b>													
Day Care Center	565	STU	99	400	39	35	74	34	39	73	7	4	11
Junior/Community College	540	STU	80	92	7	2	9	5	4	9	2	2	4
Total Raw Trip Generation (ITE Results)				4,851	145	185	330	233	201	434	193	175	368
Internal Capture Reduction				-252	-11	-15	-26	-20	-18	-38	-10	-9	-19
External Walk, Bike, and Transit Reductions				-181	-5	-6	-11	-9	-7	-16	-6	-5	-11
Total Reductions				-433	-16	-21	-37	-29	-25	-54	-16	-14	-30
Final Trip Generation				4,418	129	164	293	204	176	380	177	161	338



Figure 7: Noise Contours for Existing Traffic Noise Levels



Figure 8: Noise Contours for Existing + Project Traffic Noise Levels



Figure 9: Hanna 60 Acre Development Site Plan

**Appendix C: References**

Caltrans [Technical Noise Supplement to the Traffic Noise Analysis Protocol](#), September 2013.