Pleasant Hill Child Care

409 Boyd Road – Pleasant Hill, California

Environmental Noise Assessment

16 December 2016

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Salter Project Number: 16-0168

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INTRODUCTION

This report summarizes our environmental noise assessment for the planned day care center at 409 Boyd Road in Pleasant Hill, California. The project plans to remodel two of the three existing church buildings into a day care center with three classrooms for 72 children. The third building will remain a church building for religious services. The day care center will include an outdoor playground adjacent to Boyd Road and Kahrs Avenue. The site, on a corner lot, is located in a residential neighborhood.

The purpose of this assessment is to compare property line noise level estimates from day care activities, including children playing outdoors and traffic from vehicles dropping off and picking up children, with applicable City goals. For readers not familiar with the fundamental concepts of environmental noise, please refer to Appendix A, attached. Following is a summary of our findings:

- The noise environment at the site is consistent with the City's noise and land use compatibility guidelines for projects of this type.
- The project will include an outdoor playground in the existing field located at the corner of Boyd Road and Kahrs Avenue. Estimated noise from children in the planned playground is consistent with the Municipal Code limit of DNL 50 dB at the nearest adjacent residences.
- The traffic report for the project indicates that project-generated vehicle traffic in the vicinity during dropoff and pickup hours will increase by less than 7-percent. This corresponds with less than a 1 dB increase in DNL at nearby residences, which is less than significant.

PROJECT DESCRIPTION

The project will remodel two of the three existing church buildings into a day care center with three classrooms for 24 children each, or a total of 72 children, from ages 2 through 6 years old. The third building will remain as-is for religious services. The day care center will utilize the outdoor space along Boyd Road and Kahrs Avenue for a 3,750 square foot playground used during break times. The existing church site and surrounding land uses are shown in Figure 1, attached. The project will not include changes to the building shell or mechanical equipment. The proposed site plan and cover sheet dated 10 December 2015 identify the following:

- Daycare hours will be from 7:00 AM to 6:00 PM, Monday through Friday
- Typical drop off and pick up times are 7:00 AM to 9:00 AM, and between 3:00 PM and 6:00 PM
- Vehicles will drop off and pick up children by entering the site via a driveway on Kahrs Avenue and exiting the site via the driveway on Boyd Road
- The playground will be fenced with a 5-foot tall chain link fence and a rubberized surface and no play structure
- The playground will be used for outside break time as follows:
    - Morning outside time from 10:30 to 11:00 AM for 36 children, and 11:00 to 11:30 AM for 36 children
    - Afternoon outside time from 4:00 to 4:30 PM for 36 children, and 4:40 to 5:00 PM for 36 children
- The playground will be located adjacent to the daycare buildings, and approximately 60 feet from Boyd Road and 40 feet from Kahrs Avenue

ACOUSTICAL CRITERIA

Pleasant Hill General Plan

The Safety and Noise Element of the City of Pleasant Hill's 2003 General Plan (i.e., Table SN3) identifies noise and land use compatibility standards for various land uses. The City's "normally acceptable" exterior Day/Night Average Sound Levels (DNL[1]) are up to 70 dB[2] for schools and playgrounds.

Pleasant Hill Municipal Code

Section 18.50.060 of the Pleasant Hill Municipal Code limits noise generation in residential and neighborhood business districts to DNL 50 dB. In addition, the noise standard states the following:

- Noise that is produced for more than a cumulative period of five minutes in any hour may exceed the standard above by 5 dB
- Noise that is produced for more than a cumulative period of one minute in any hour may exceed the standard above by 10 dB

NOISE ENVIRONMENT

To quantify the existing noise environment, two monitors continuously measured noise levels at the site over a multi-day period between 31 March and 5 April 2016. Table 1, below, summarizes existing noise levels and Figure 1, attached, shows the approximate measurement locations.

Table 1: Summary of Noise Measurement Results – 31 March to 5 April 2016

Site	Location	DNL
L-1	Corner of Boyd Road and Kahrs Avenue Approx. 30' north of Boyd Road centerline, 80' west of Kahrs Avenue centerline	63 to 65 dB
L-2	Church Parking Lot Northwest corner of site	50 to 55 dB

ANALYSIS AND FINDINGS

This assessment considers project-generated noise from children on the outdoor playground, and from vehicles dropping off and picking up children. The California Environmental Quality Act (CEQA) does not define what noise level increase would be considered significant. Typically, in high noise environments a project is considered to have a significant impact if it would increase DNL by 3 dB or more where noise level exceeds the *normally acceptable* guideline from the General Plan. Where existing noise levels are well below the *normally acceptable* guideline, a somewhat higher increase (i.e., 5 dB) may be tolerated before the impact is considered significant. These criteria are used in the analysis below to determine if the project will result in a significant noise increase.

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[1] DNL (Day-Night Average Sound Level) – A descriptor for a 24-hour A-weighted average noise level. DNL accounts for the increased acoustical sensitivity of people to noise during the nighttime hours. DNL penalizes sound levels by 10 dB during the hours from 10 PM to 7 AM. For practical purposes, the DNL and CNEL are usually interchangeable. DNL is sometimes written as L_{dn}.

[2] A-Weighted Sound Level – The A-weighted sound pressure level, expressed in decibels (dB). Sometimes the unit of sound level is written as dB(A). A weighting is a standard weighting that accounts for the sensitivity of human hearing to the range of audible frequencies. People perceive a 10 dB increase in sound level to be twice as loud.

Land Use Compatibility

Environmental noise levels measured at the site ranged from DNL 50 to 65 dB, which falls under the City's *normally acceptable* category for schools and playgrounds (the City does not identify a separate land use category for child care centers).

Children in Outdoor Playground

The outdoor play yard will be used for approximately 1 hour in the morning and 50 minutes in the afternoon, and noise generation is not expected at other times. To estimate noise levels from children playing outdoors, we used data collected from an existing pre-school in May of 2008. Noise levels were measured at the edge of the playground area while approximately 25 toddler and pre-school age children were playing outdoors. Children ranged in distance from the microphone from approximately 5 feet to 50 feet. The average sound level for the 37-minute interval measured was L_{eq} 69 dB, and maximum sound levels ranged up to 84 dB.

As indicated above, up to 36 children are expected to use the future playground at a time. The nearest residences are located across Boyd Road and Kahrs Avenue, approximately 145 feet from the center of the planned playground. At this distance, the estimated DNL due to children in the playground, based on the noise levels identified above, is 50 dB. This is consistent with the City's Municipal Code limit of DNL 50 dB. Combined with the noise levels measured, the increase in DNL at these residences is approximately 1 dB, which is considered less than significant.

Note that this assessment analyzes average sound levels in terms of DNL. Corresponding estimated hourly average sound levels are approximately 57 to 58 dB at residences across Boyd Road and Kahrs Avenue, and maximum noise levels from individual children (e.g., with excited or raised voices) will be louder. This analysis assumes the Municipal Code limits for noise sources occurring for varying durations within an hour apply only to stationary noise sources, such as mechanical equipment, and have therefore not applied it to children playing outdoors.

Traffic Noise Associated with the Project

The Draft Traffic Impact Study Report for the project, prepared by TJKM and dated 8 December 2016, indicates the project will generate 315 daily vehicular trips, with 58 AM and PM peak-hour vehicle trips (31 inbound and 27 outbound in the AM, and 27 inbound and 31 outbound in the PM). In addition, it identifies peak-hour traffic volumes for two study intersections in the project vicinity. These are the intersections of Boyd Road and Soule Avenue, and the intersection of Soule Avenue and Patterson Boulevard. The project will increase peak-hour traffic volumes at these intersections by 1- to 7-percent, which corresponds with less than a 1 dB increase in DNL at residences along these roadways, which is less than significant.

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PLEASANT HILL CHILD CARE
NOISE MEASUREMENT LOCATIONS

FIGURE 1

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Appendix A

Fundamental Concepts of Environmental Noise

This section provides background information to aid in understanding the technical aspects of this report.

Three dimensions of environmental noise are important in determining subjective response. These are:

- The intensity or level of the sound
- The frequency spectrum of the sound
- The time-varying character of the sound

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB), with 0 dB corresponding roughly to the threshold of hearing.

The "frequency" of a sound refers to the number of complete pressure fluctuations per second in the sound. The unit of measurement is the cycle per second (cps) or hertz (Hz). Most of the sounds, which we hear in the environment, do not consist of a single frequency, but of a broad band of frequencies, differing in level. The name of the frequency and level content of a sound is its sound spectrum. A sound spectrum for engineering purposes is typically described in terms of octave bands, which separate the audible frequency range (for human beings, from about 20 to 20,000 Hz) into ten segments.

Many rating methods have been devised to permit comparisons of sounds having quite different spectra. Surprisingly, the simplest method correlates with human response practically as well as the more complex methods. This method consists of evaluating all of the frequencies of a sound in accordance with a weighting that progressively de-emphasizes the importance of frequency components below 1000 Hz and above 5000 Hz. This frequency weighting reflects the fact that human hearing is less sensitive at low frequencies and at extreme high frequencies relative to the mid-range.

The weighting system described above is called "A-weighting", and the level so measured is called the "A-weighted sound level" or "A-weighted noise level." The unit of A-weighted sound level is sometimes abbreviated "dBA." In practice, the sound level is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting characteristic. All U.S. and international standard sound level meters include such a filter. Typical sound levels found in the environment and in industry are shown in Figure A1.

Although a single sound level value may adequately describe environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise is a conglomeration of distant noise sources, which results in a relatively steady background noise having no identifiable source. These distant sources may include traffic, wind in trees, industrial activities, etc. and are relatively constant from moment to moment. As natural forces change or as human activity follows its daily cycle, the sound level may vary slowly from hour to hour. Superimposed on this slowly varying background is a succession of identifiable noisy events of brief duration. These may include nearby activities such as single vehicle pass-bys, aircraft flyovers, etc. which cause the environmental noise level to vary from instant to instant.

To describe the time-varying character of environmental noise, statistical noise descriptors were developed. "L10" is the A-weighted sound level equaled or exceeded during 10 percent of a stated time period. The L10 is considered a good measure of the maximum sound levels caused by discrete noise events. "L50" is the A-weighted sound level that is equaled or exceeded 50 percent of a stated time

period; it represents the median sound level. The "L90" is the A-weighted sound level equaled or exceeded during 90 percent of a stated time period and is used to describe the background noise.

As it is often cumbersome to quantify the noise environment with a set of statistical descriptors, a single number called the average sound level or "L_{eq}" is now widely used. The term "L_{eq}" originated from the concept of a so-called equivalent sound level which contains the same acoustical energy as a varying sound level during the same time period. In simple but accurate technical language, the L_{eq} is the average A-weighted sound level in a stated time period. The L_{eq} is particularly useful in describing the subjective change in an environment where the source of noise remains the same but there is change in the level of activity. Widening roads and/or increasing traffic are examples of this kind of situation.

In determining the daily measure of environmental noise, it is important to account for the different response of people to daytime and nighttime noise. During the nighttime, exterior background noise levels are generally lower than in the daytime; however, most household noise also decreases at night, thus exterior noise intrusions again become noticeable. Further, most people trying to sleep at night are more sensitive to noise. To account for human sensitivity to nighttime noise levels, a special descriptor was developed. The descriptor is called the DNL or L_{dn} (Day-Night Average Sound Level), which represents the 24-hour average sound level with a penalty for noise occurring at night. The L_{dn} computation divides the 24-hour day into two periods: daytime (7:00 am to 10:00 pm); and nighttime (10:00 pm to 7:00 am). The nighttime sound levels are assigned a 10 dB penalty prior to averaging with daytime hourly sound levels.

For highway noise environments, the average noise level during the peak hour traffic volume is approximately equal to the DNL.

The effects of noise on people can be listed in three general categories:

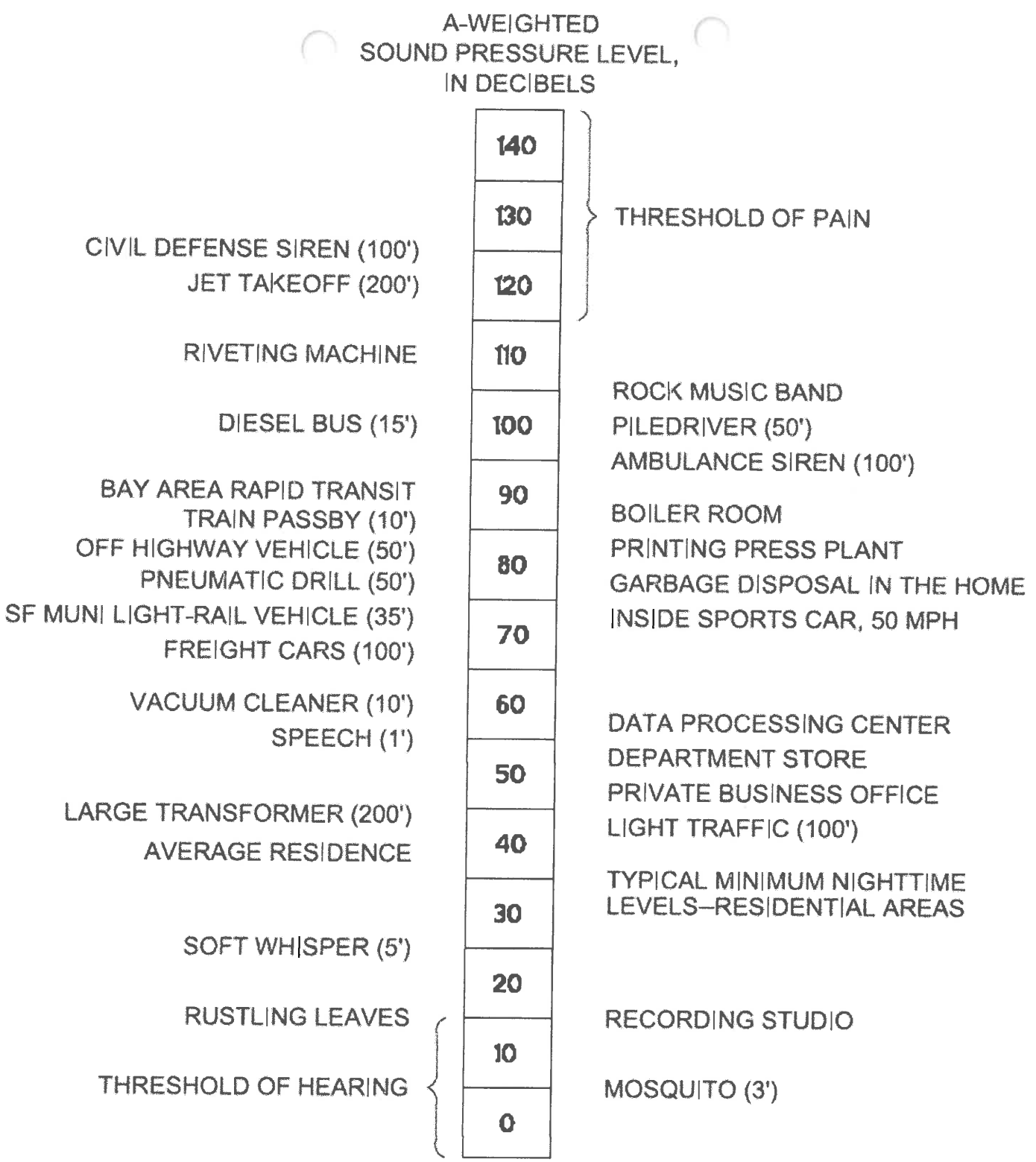
- Subjective effects of annoyance, nuisance, dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as startle, hearing loss

The sound levels associated with environmental noise usually produce effects only in the first two categories. Unfortunately, there has never been a completely predictable measure for the subjective effects of noise nor of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over time.

Thus, an important factor in assessing a person's subjective reaction is to compare the new noise environment to the existing noise environment. In general, the more a new noise exceeds the existing, the less acceptable the new noise will be judged.

With regard to increases in noise level, knowledge of the following relationships will be helpful in understanding the quantitative sections of this report:

Except in carefully controlled laboratory experiments, a change of only 1 dB in sound level cannot be perceived. Outside of the laboratory, a 3 dB change is considered a just-noticeable difference. A change in level of at least 5 dB is required before any noticeable change in community response would be expected. A 10 dB change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse community response.



(100') = DISTANCE IN FEET BETWEEN SOURCE AND LISTENER

TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

FIGURE A1

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