

MEMORANDUM

DATE: 26 September 2024

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FROM: Matthew Hsiung and Joshua M. Roper, PE, LEED® AP

SUBJECT: 640 Lakehaven Drive – Sunnyvale, CA
Environmental and Construction Noise Review

PROJECT: 18-0235

This memo summarizes our current review of environmental and construction noise for the residential project at 640 Lakehaven Drive in Sunnyvale, California. The project will consist of six 2-story single family detached houses located on the site between US Highway 101 (US 101) and Lakehaven Drive.¹ You have indicated a 12-foot-tall masonry noise barrier separates the site from the adjacent highway (US 101). We understand a prior environmental noise assessment was conducted for the project by others, and the results were summarized in a report dated 29 December 2016. The purpose of this memo is to review an alternative design and discuss construction noise.

The current proposed site plan, dated 31 January 2023, locates houses at a setback of approximately 5 feet from the existing noise barrier along US 101, with individual fenced rear yards perpendicular to the highway. Based on the noise levels identified in the prior report, transportation noise is expected to be approximately DNL 68 and 82 dB at the first and second stories of the nearest homes, respectively.

ENVIRONMENTAL NOISE

Outdoor Noise

The Sunnyvale General Plan identifies DNL 65 dB as the normally acceptable outdoor noise goal for residential yards, and states the following: “The City would consider allowing noise exposure levels above ‘normally acceptable’ levels, only after a detailed noise study is conducted, which includes noise reduction measures that are incorporated into the design, ensuring that receptors are not exposed to

¹ You have indicated the project is zoned R0 and not considered low-density residential (R1 zoning).

excessive noise levels that would interfere with the enjoyment of the intended use of the land, and that interior noise standards where people sleep are met.”²

The combination of shielding from both the existing highway noise barrier and future planned houses (i.e., project) will help to shield residential yards from freeway noise. Estimated traffic noise levels in rear yards are shown in Figure 1, attached, and range from DNL 62 to 68 dB, depending on location. Our estimates suggest that the height of the highway noise barrier would need to be increased by approximately 4 feet to reduce transportation noise in the yards to the City’s DNL 65 dB goal. However, you have indicated the barrier is on Caltrans property and it would not be feasible to increase the barrier height adjacent to the site.

We understand the City has the discretion to approve the project with the estimated noise levels included in Figure 1 with the following considerations:

- The project has oriented rear yards perpendicular to the highway, which increases shielding over what would be expected if the useable open space was located closer to the highway.
- The resulting levels, up to DNL 68 dB, are within the General Plan’s “normally acceptable” goal of DNL 70 dB for useable open space in private residential yards of mixed-use projects (i.e., residents will not be exposed to harmful noise levels).
- The neighboring residential site(s) to the east appear to be single family residential with similar exposure to highway noise.
- The project will incorporate noise reduction measures into the building shells to reduce interior noise levels to City goals in sleeping rooms and other habitable spaces.

Exterior-to-Interior Noise

The project will need to incorporate sound-rated construction to reduce interior noise levels to the City’s DNL 45 dB goal. This will include exterior walls, windows, and doors, and ensuring that vents and exhaust paths do not provide flanking paths. Specific sound insulation ratings will depend on finalized floor plans, elevations, and specific wall types which have not yet been determined. Therefore, they will need to be determined as the design progresses. The following comments provide initial input, based on drawings dated 31 January 2023.

- Figures 2 and 3, attached, provide minimum sound insulation ratings expected to reduce traffic noise to the interior noise goal³

² The outdoor noise goal is included in Figure 6-6 of the Sunnyvale General Plan.

³ Note that recommendations are based on environmental noise levels measured at the site by others. Since we did not conduct these measurements, we cannot ultimately be responsible for interior noise levels.

- Except where indicated otherwise, exterior wall assemblies are assumed to be equivalent to 3-coat stucco over wood sheathing, 2x4 wood studs with batt insulation in stud cavities, and 1 layer of gypsum board on the interior. Where the exterior walls have lap siding, install the siding over a base layer of gypsum board or plywood
- Where enhanced exterior wall assemblies are indicated, a second layer of gypsum board should be applied to unit interiors and walls should be staggered or double-stud, or use sound isolation clips⁴
- The exterior shell of units will need to be treated to maintain sound isolation. Maintain a ¼-inch gap around the perimeter of gypsum board assemblies, and at penetrations, and caulk airtight with acoustic sealant. Provide backdraft dampers on exhaust fans, including kitchen hoods. Treat roof vents and ventilation systems to maintain sound isolation
- Sound insulation ratings should be for the complete tested assembly, including glass and frame, and should be based on laboratory test reports for similar sized samples from an NVLAP accredited lab
- For reference, standard construction grade dual-pane windows and sliding glass doors typically have sound insulation ratings in the of STC 26 to 28. Different glazing combinations can increase these window ratings to approximately STC 35. Some specialty dual-sash windows with three or four total panes of glass can provide sound insulation ratings up to approximately STC 46

CONSTRUCTION NOISE

The site is located adjacent to residences, including single-family homes along South Lakehaven Terrace to the west, across Lakehaven Drive to the north, and adjacent to the east along Lakewood Drive. Construction of the project will include demolition of the existing single-story house on the site, on and off-site preparation and foundations, new building framing, and finishing. Construction is expected to begin around September of 2024 and generally last about a year with portions of the following Phases II and III progressing concurrently:

- Phase I: Demolition and site cleaning - 1 month
- Phase II: Offsite and on-site work – 6 months
- Phase III: Individual home construction - 9 months

Foundations will be slab on grade so construction will not include pile driving. Noise levels from construction activities will vary depending on the type of equipment being used, the process, and the

⁴ Sound isolation clips should be Pliteq GenieClip, Kinetics Isomax, or Pac International RSIC clips.

location. Table 1 below shows typical sound levels for various construction activities anticipated for this project at a reference distance of 50 feet.⁵

Table 1: Typical Construction Equipment Sound Levels

Equipment	Typical Sound Level 50 feet from Source
Concrete Pump and Mixer, Backhoe, Dozer, Impact Wrench, Loader, Pneumatic Tools, Air Compressors, Jack Hammers	80 to 88 dB(A)

Construction of the project will be subject to provisions in Section 16.08.030 of the Sunnyvale Municipal Code. Following is a list of measures that will be adopted by the contractor to reduce the impact of general construction noise on neighbors:

1. Consistent with Section 16.08.030 of the Sunnyvale Municipal Code, construction will be limited to between 7:00 AM and 6:00 PM, Monday through Friday, and between 8:00 AM and 5:00 PM on Saturdays. Construction will not occur on Sundays or federal holidays when City offices are closed.
2. Contractors shall utilize 'quiet' models of air compressors and other stationary noise sources where technology exists.
3. Internal combustion engine-driven equipment shall be equipped with mufflers which are in good condition and appropriate for the equipment.
4. Stationary noise-generating equipment, such as air compressors and portable power generators, shall be located as far away as possible from adjacent land uses including residences.
5. Staging areas and construction material areas shall be located as far away as feasible from adjacent residences.
6. Prohibit all unnecessary idling of internal combustion engines (engines will be turned off when not in use to avoid unnecessary idling).
7. Administrative controls will limit the volume on construction workers' radios, so they are not audible at adjacent residences.
8. The contractor shall designate a "noise disturbance coordinator/superintendent" who will be responsible for tracking and responding to any local complaints about construction noise. The noise disturbance coordinator/superintendent will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures are implemented to correct the problem.

⁵ Construction noise typically drops off at a rate of 6 dB(A) per doubling of distance. Therefore, corresponding noise levels at distances farther than 50 feet will be lower. For reference, the center of the project site is more than 50 feet from neighboring property lines.



9. The telephone number for the noise disturbance coordinator/superintendent will be posted at the construction site and included in any construction notices sent to neighbors.

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ⁱ Source: Table 12-1: Construction Equipment Noise Emission Levels, Transit Noise and Vibration Impact Assessment, US Department of Transportation, May 2006.





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FIGURE 1

Salter #
18-0235

MDH/JMR
09.26.24

**640 LAKEHAVEN DRIVE
ESTIMATED ENVIRONMENTAL NOISE LEVELS
IN RESIDENTIAL YARDS**

Comment: 7. Noise Study: Provide the following additional information,

a. Provide noise level (in decibels) in the center of lot 7.

SALTER: Lot 7 decibel rating is now included in the revised Noise Study dated September 26, 2024 included with this submission.

b. Sound Attenuation:

i. Existing Wall: Indicate the type of existing sound wall along freeway. Specifying the extent of mitigation this wall provides and possibility to reinforce or increase the height of this wall to meet the 65 dBA sound level in the center of the rear yards.

SDG: The existing sound wall adjacent and parallel to US Highway 101 is a 12' tall masonry wall and allows an approximate sound level of 68 DNL at ground level. To decrease the sound levels at ground level to the required 65 dBA would require an increase to the height of the wall an additional 4', making the wall a total of 16' in height. The cost and logistics to do this would be too cost prohibitive for a viable project.

ii. Other Measures: What additional measures should be included to bring the sound level to 65 dBA such that the proposal will be consistent with the General Plan?

[Correction] Any increase from the noise levels listed in the General Plan will make the proposal inconsistent with the General Plan. They will not be considered as a variance or deviation.

SDG: We have looked into many different options all of which are not viable solutions. We investigated an increase in tree density to mitigate the levels and found there would need to be a highly dense planting of very tall trees to a depth of 50' from the existing sound wall to accomplish a 3 dBA reduction.

We looked into acoustic blankets to cover the existing wall and this was determined not to be sufficient and is only a temporary solution.

Additionally, the option of replacing the existing freeway surface with a more sound deadening material was too cost prohibitive and not practical for the scale of this project.