Kimley»Horn

MEMORANDUM

To: Reema Mahamood, Planner, City of San José

From: Ace Malisos, Air Quality and Noise Manager, Kimley-Horn
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Subject: 551 Keyes Street Project – Acoustical Analysis

1.0 PURPOSE

The purpose of this memorandum is to identify the acoustical impacts associated with construction and operations of the proposed 551 Keyes Street project (project), located in the City of San José, California. This analysis has been undertaken to analyze whether the proposed project would result in any significant environmental impacts associated with construction and operational noise levels.

2.0 PROPOSED PROJECT DESCRIPTION

The proposed project is in the City of San José (City) in Santa Clara County, California. The project site is located at 551 Keyes Street. The site is located between South 12th Street on the west and open space on the east. North of the site is an existing three-story multi-family residential building while Keyes makes up the southern boundary. The proposed project site includes one parcel (Assessor Parcel Number 472-12-086) on approximately 0.90 gross acres.

The project site is currently an undeveloped vacant lot. The overall project site is flat and previously graded. The project site is surrounded by multi-family residential buildings to the northwest, commercial and residential uses to the southwest, greenspace and trails to the northeast, Happy Hollow Park and Zoo to the east, and multi-family residential uses to the southeast (across Keyes Street).

The proposed project would develop a 5-story residential building with 84 units of affordable housing over a one-story basement. The proposed project includes 90,912 square feet (sf) of total floor area consisting of resident housing, lobby, elevator, stairs, hallways, and a garage with a trash room and bicycle parking. Private and public open space is provided by the project, including 32 units having a balcony and a public greenspace in the northern portion of the project site. The proposed building would be 62 feet high. Vehicular access to the proposed project would be provided via a driveway on South 12th Street, along the western project boundary. The proposed project driveway would provide access to the first level parking garage. The parking garage would contain 64 spaces for residents. The project would also include 84 bicycle parking spaces.

Construction of the proposed project is anticipated to take approximately 19 months. No demolition is required as the site is currently vacant.

3.0 IMPACT ANALYSIS

Noise Impacts

Construction

Construction-related activities would temporarily increase ambient noise levels in the proposed project vicinity. Construction-related noise levels at and near the project site would fluctuate depending on the level and type of construction activity on a given day. During construction, exterior noise levels could affect the residential neighborhoods east of the construction site. Project construction would occur approximately 30 feet from existing multi-family residences adjacent to the northwest. However, construction activities would occur throughout the project site and would not be concentrated at a single point near sensitive receptors. Noise levels typically attenuate (or drop off) at a rate of 6 dB per doubling of distance from point sources, such as industrial machinery. During construction, exterior noise levels could affect the residential neighborhoods near the construction site.

Construction activities associated with development of the project would include site preparation, grading, paving, building construction, and architectural coating. Such activities would require graders, scrapers, and tractors during site preparation; graders, dozers, and tractors during grading; cranes, forklifts, generators, tractors, and welders during building construction; pavers, rollers, mixers, tractors, and paving equipment during paving; and air compressors during architectural coating. Grading and excavation phases of project construction tend to be the shortest in duration and create the highest construction noise levels due to the operation of heavy equipment required to complete these activities. It should be noted that only a limited amount of equipment can operate near a given location at a particular time. Equipment typically used during this stage includes heavy-duty trucks, backhoes, bulldozers, excavators, front-end loaders, and scrapers. Operating cycles for these types of construction equipment may involve one or two minutes of full-power operation followed by three to four minutes at lower power settings. Other primary sources of noise would be shorter-duration incidents, such as dropping large pieces of equipment or the hydraulic movement of machinery lifts, which would last less than one minute. Typical noise levels associated with individual construction equipment are listed in **Table 1: Typical Construction Noise Levels.**

Table 1: Typical Construction Noise Levels

Equipment	Typical Noise Level (dBA) at 50 feet from Source	Typical Noise Level (dBA) at 30 feet from Source[1]	Typical Noise Level (dBA) at 70 feet from Source[1]
Air Compressor	80	84	77
Backhoe	80	84	77
Compactor	82	86	79
Concrete Mixer	85	89	82
Concrete Pump	82	87	79
Concrete Vibrator	76	80	73
Dozer	85	89	82
Generator	82	86	79
Grader	85	89	82
Impact Wrench	85	89	82
Loader	80	84	77
Paver	85	89	82
Pneumatic Tool	85	89	82
Pump	77	81	74
Roller	85	89	82
Saw	76	80	73
Scraper	85	89	82
Shovel	82	86	79
Truck	84	88	81

[1] Calculated using the inverse square law formula for sound attenuation: $dBA_2 = dBA_1+20Log(d_1/d_2)$
Where: dBA_2 = estimated noise level at receptor; dBA_1 = reference noise level; d_1 = reference distance; d_2 = receptor location distance.
Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

Sensitive receptors near the project site include residential uses to the northwest and southwest. Noise impacts for mobile construction equipment are typically assessed as emanating from the center of the equipment activity or construction site.[1] For the proposed project, this center point would be approximately 30 feet from the nearest sensitive receptor structure. These sensitive uses may be exposed to elevated noise levels during project construction. These assumptions represent the worst-case noise scenario because construction activities would typically be spread out throughout the project site, and thus some equipment would be farther away from the affected receptors. In addition, construction noise levels are not constant, and construction activities and associated noise levels would fluctuate and generally be brief and sporadic, depending on the type, intensity, and location of construction activities. Construction noise levels at the project site would range between 80 dBA and 89 dBA at the sensitive receptors approximately 30 feet to the northwest. The highest anticipated

[1] Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual, September 2018. Available at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf

construction noise level of 89 dBA is expected to occur during the building construction and grading phases (dozers, graders, pavers, concrete mixer). The majority of construction would occur throughout the project site and would not be concentrated at a single point near sensitive receptors.

The project construction would comply with Section 20.100.450 of the Municipal Code, limiting construction hours within 500 feet of a residential unit to the hours of 7:00 a.m. to 7:00 p.m. on Monday through Friday. The Contractor would equip all construction equipment, fixed and mobile, with properly operating and maintained noise mufflers, consistent with manufacturer's standards.

Sensitive receptors near the project site include residences adjacent to the northwest and southwest. Construction activities would be limited to daytime hours when people would be out of their houses and would conform to the time-of-day restrictions of the City's Municipal Code. The City of San José requires that large or complex construction projects within 500 feet of residential land uses or within 200 feet of commercial land uses or offices involving substantial noise-generating activities lasting more than 12 months, prepare a construction noise logistics plan (Policy EC- 1.7).

The proposed project would be required to adhere to the Standard Permit Conditions which would ensure that all construction equipment is equipped with properly operating and maintained mufflers and other state required noise attenuation devices, helping to reduce noise at the source. The Standard Permit Conditions are required to ensure that construction noise levels do not exceed the City's standards and that time-of-day restrictions are adhered to. The proposed project would have no demolition, approximately six weeks of grading/excavation, no pile-driving or impact equipment and would last approximately 19 months. However, the loudest construction equipment would only operate for approximately four months. Therefore, with implementation of these conditions, construction noise impacts to nearby receptors would be less than significant.

Standard Permit Condition

The Project would be subject to the following construction related standard conditions:

- The Applicant shall prepare a Construction Noise Logistics Plan which will include the following:
  - Construction activities shall be limited to the hours between 7:00 AM and 7:00 PM, Monday through Friday, unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence (Municipal Code Section 20.100.450).
  - Notifying all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.
  - Designating a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and require that reasonable measures be implemented to correct the problem. Conspicuously post a

telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

- Construct solid plywood fences around ground-level construction sites adjacent to operational businesses, hotels, and other noise-sensitive land uses.
- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Unnecessary idling of internal combustion engines shall be strictly prohibited.
- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses. Temporary noise barriers could reduce construction noise levels by 5 dBA.
- Use "quiet" air compressors and other stationary noise sources where technology exists.
- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the Project site.
- A temporary noise control blanket barrier shall be erected, if necessary, along building facades facing construction sites. This condition shall only be necessary if conflicts occur which are irresolvable by proper scheduling. Noise control blanket barriers shall be rented and quickly erected.

These standard permit conditions would ensure that no significant adverse noise effects would occur.

Construction Traffic Noise

Construction noise may be generated by large trucks moving materials to and from the project site. Large trucks would be necessary to deliver building materials as well as remove dump materials. Excavation and cut and fill would be required. Soil hauling would be required as approximately 20,300 cubic yards (cy) of soil would be exported. Based on the California Emissions Estimator Model (CalEEMod) default assumptions for this project, as analyzed in 551 Keyes Street project Air Quality and Greenhouse Gas Emissions Analysis, the project would generate approximately 64 worker trips and 10 vendor trips per day for building construction. For grading, the model estimates approximately 2,541 hauling trips over 30 days which would result in approximately 85 daily hauling trips. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and vehicle mix do not also change) would result in a noise level increase of 3 dBA. Therefore, project construction trips would not double the existing traffic volume per day. Construction related traffic noise would not be noticeable and would not create a significant noise impact.

California establishes noise limits for vehicles licensed to operate on public roads using a pass-by test procedure. Pass-by noise refers to the noise level produced by an individual vehicle as it travels past a fixed location. The pass-by procedure measures the total noise emissions of a moving vehicle with a microphone. When the vehicle reaches the microphone, the vehicle is at full throttle acceleration at an engine speed calculated for its displacement.

For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB. The State pass-by standard for light trucks and passenger cars (less than 4.5 tons gross vehicle rating) is also 80

dB at 15 meters from the centerline. According to the FHWA, dump trucks typically generate noise levels of 77 dBA and flatbed trucks typically generate noise levels of 74 dBA, at a distance of 50 feet from the truck (FHWA, Roadway Construction Noise Model, 2006).

Operation

As discussed above, the closest sensitive receptors are residential uses located to the northwest of the project site. The City of San José stationary source exterior Zoning Ordinance Noise Standards for residential areas is 55 dBA L_{eq}. The land use compatibility standard for residential areas is also 55 dBA DNL to 60 dBA DNL for normally acceptable conditions. Generally, traffic volumes on project area roadways would have to approximately double for the resulting traffic noise levels to increase by 3 dBA. Therefore, permanent increases in ambient noise levels of less than 3 dBA are considered to be less than significant.

Traffic Noise

Implementation of the project would generate increased traffic volumes along study roadway segments. The project is expected to generate 379 net average daily trips, which would result in noise increases on project area roadways. In general, a traffic noise increase of less than 3 dBA is barely perceptible to people, while a 5-dBA increase is readily noticeable (Caltrans, *Technical Supplement to the Traffic Noise Analysis Protocol*, 2013). Generally, traffic volumes on project area roadways would have to approximately double for the resulting traffic noise levels to increase by 3 dBA. Therefore, permanent increases in ambient noise levels of less than 3 dBA are considered to be less than significant.

The nearest freeway to the site is Interstate 280 (I- 280). The freeway is located approximately 0.25 miles northwest of the Project site. The segment of I-280 closest to the Project site is approximately 20 feet higher than the site and roadway noise would be screened by tall trees and intervening structures. The primary noise source is local traffic on Keyes Street and South 12th Street.

To provide more detail on the existing noise environment, noise contours from the Existing Citywide Traffic Noise Contours (Figure 3.3-1 of the 2040 GP) were used. This figure shows that the Project site is within the 60-65 dBA DNL (24- hour average also referred to L_{dn}) contour. According to the General Plan EIR, Keyes Street is designated as a local street. Project traffic would traverse and disperse over project area roadways, where existing ambient noise levels already exist. Future development associated with the project would result in additional traffic on adjacent roadways, thereby potentially increasing vehicular noise near existing and proposed land uses. However, data from the City indicates that Keyes Street currently has a traffic volume of approximately 23,084 vehicles per day.[2] As the project would generate 379 net trips per day, it would not double the existing traffic

[2] City of San José, Average Daily Traffic, Available at: https://gisdata-csj.opendata.arcgis.com/datasets/average-daily-traffic/data?geometry=-121.880%2C37.339%2C-121.851%2C37.345

volumes on the surrounding roadways and would not generate a perceptible noise level change of 3.0 dBA. Therefore, impacts would be less than significant.

Stationary Noise Sources

Implementation of the project would create new sources of noise in the project vicinity from residential sources, mechanical equipment, parking lot noise, and landscape maintenance.

Residential Areas

Noise that is typical of lodging areas includes group conversations, pet noise, vehicle noise (see discussion below) and general maintenance activities. Noise from residential stationary sources would primarily occur during the "daytime" activity hours of 7:00 a.m. to 7:00 p.m. Furthermore, the residences would be required to comply with the noise standards set forth in the City's General Plan and Municipal Code.

The project includes common areas where groups of people could gather. Crowd noise is dependent on several factors including vocal effort, impulsiveness, and the random orientation of the crowd members. Crowd noise is estimated at 60 dBA at one meter (3.28 feet) away for raised normal speaking. This noise level would have a +5 dBA adjustment for the impulsiveness of the noise source, and a -3 dBA adjustment for the random orientation of the crowd members. Therefore, crowd noise would be 62 dBA at one meter from the source. Noise has a decay rate due to distance attenuation, which is calculated based on the Inverse Square Law. Based upon the Inverse Square Law, sound levels decrease by 6 dBA for each doubling of distance from the source. As a result, crowd noise would be 56.0 dBA at 6.56 feet and 52.3 dBA at 10 feet. Therefore, crowd noise at the closest existing sensitive receptors (located 20 feet away) would not exceed the City's 55 dBA standard.

For new multifamily residential projects, the City's 60 dBA DNL standard is applied to usable outdoor activity areas. An exterior L_{dn} of 65 dBA is acceptable to HUD. Based on the existing L_{dn} depicted in the General Plan EIR, the Project would be located in an area that exceeds the 60-dBA limit per the City standard and is at the upper limit of the HUD standard for outdoor spaces.

Mechanical Equipment

The project would generate stationary-source noise associated with mechanical equipment for heating, ventilation, and air conditioning (HVAC) units. The mechanical equipment would be roof mounted, however it would be centrally located, shielded by parapets, and more than 30 feet from the nearest sensitive receptor. HVAC units typically generate noise levels of approximately 52 dBA at 50 feet.[3] This noise level is below the City's 55 dBA exterior standard. The project would not place mechanical equipment near residential uses, and noise from this equipment would not be perceptible

[3] Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden. (2010). *Noise Navigator Sound Level Database with Over 1700 Measurement Values*.

at the closest sensitive receptor (existing multi-family residences northwest of the project site). Therefore, mechanical equipment noise would be less than significant.

Parking Areas

Traffic associated with parking areas is typically not of sufficient volume to exceed community noise standards, which are based on a time-averaged scale such as the CNEL scale. However, the instantaneous maximum sound levels generated by a car door slamming, engine starting up and car pass-bys range from 53 to 61 dBA[4] and may be an annoyance to adjacent noise-sensitive receptors. Parking lot noise can also be considered a "stationary" noise source.

Conversations in parking areas may also be an annoyance to sensitive receptors. Sound levels of speech typically range from 33 dBA at 48 feet for normal speech to 50 dBA at 50 feet for very loud speech.[5] It should be noted that parking lot noise are instantaneous noise levels compared to noise standards in the CNEL scale, which are averaged over time. As a result, actual noise levels over time resulting from parking lot activities would be far lower.

The proposed project includes a subterranean parking garage. Parking garage noise would be masked by the building structure and by the background noise from traffic along Keyes Street. Noise associated with parking lot activities is not anticipated to exceed the City's Noise Standards or the California Land use Compatibility Standards during operation. Therefore, noise impacts from parking lots would be less than significant.

Landscape Maintenance Activities

Development and operation of the project includes new landscaping that would require periodic maintenance. Noise generated by a gasoline-powered lawnmower is estimated to be approximately 70 dBA at a distance of 5 feet. Landscape Maintenance activities would be 58 dBA at the closest sensitive receptor approximately 20 feet away. Noise from landscaping equipment is generated at the surrounding uses under existing conditions. Maintenance activities would operate during daytime hours for brief periods of time as allowed by the City Municipal Code and would not permanently increase ambient noise levels in the project vicinity and would be consistent with activities that currently occur at the surrounding uses. Therefore, with adherence to the City's Municipal Code, impacts associated with landscape maintenance would be less than significant.

Groundborne Vibration Impacts

Increases in groundborne vibration levels attributable to the project would be primarily associated with construction-related activities. Construction on the project site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Ground vibration generated by construction equipment

[4] Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), 3-10, 1991.

[5] Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden. (2010). *Noise Navigator Sound Level Database with Over 1700 Measurement Values*.

spreads through the ground and diminishes in magnitude with increases in distance. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibrations from construction activities rarely reach levels that damage structures.

The nearest sensitive receptors are the residential uses located 20 feet northwest of the project site. Based on Federal Transit Administration (FTA) vibration data[6], at 20 feet the vibration velocities from construction equipment would not exceed 0.12 in/sec PPV, which is well below the FTA's 0.20 PPV threshold. It can be assumed that at a greater distance this vibration velocity would be even less. Therefore, at 50 feet, vibration levels would be reduced further. It is also acknowledged that construction activities would occur throughout the project site and would not be concentrated at the point closest to the nearest residential structure. Therefore, the project would not generate groundborne vibration that could be felt at surrounding uses. Project operations would not involve railroads or substantial heavy truck operations, and therefore would not result in vibration impacts at surrounding uses.

Airport Noise

The subject site is located within a 15-miles radius of three airports. The Norman Y. Mineta San Jose International Airport is located approximately 2 miles to the northwest; the Reid Hillview airport is located approximately 2.2 miles to the northeast; and Moffett Field is located approximately 10.8 miles to the northwest. The Norman Y. Mineta San Jose International Airport is located approximately 0.5 miles to the west; the Reid Hillview airport is located approximately 4.5 miles to the southeast; and Moffett Field is located approximately 8 miles to the northwest. According to the Existing/Baseline 2018 Noise Contour Map for the Norman Y. Mineta San Jose International Airport Noise Assessment for the Master Plan Environmental Impact Report, the Project site is outside the 60 dBA and Greater CNEL Contour for the airport.

Policy EC-1.11 from the General Plan requires safe and compatible land uses within the Norman Y. Mineta International Airport noise zone (defined by the 65 CNEL contour as set forth in State law) and encourage aircraft operating procedures that minimize noise. The Project site is outside this contour. The inserted figure below shows the 2018 Baseline. The 2037 60 dBA CNEL contours are the same. There are no significant adverse effects to noise from aircraft.

[6] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.