APPENDIX F

NOISE IMPACT ANALYSIS

NOISE IMPACT ANALYSIS

GLADSTONE SENIOR VILLAS PROJECT

AZUSA, CALIFORNIA

Prepared for:

Phil Martin & Associates
Attn: Phil Martin
4860 Irvine Boulevard, Suite 203
Irvine, CA 92620

Date:

July 14, 2017

Project No.: P17-027 N

NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally defined as unwanted sound. Sound is characterized by various parameters which describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The unit of sound pressure expressed as a ratio to the faintest sound detectable by a young person with excellent auditory sensitivity is called a decibel (dB).

Because sound or noise can vary in intensity by over one million times within the range of human hearing, decibels are on a logarithmic loudness scale similar to the Richter scale used for earthquake magnitude. Because the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called "A-weighting," written as dBA. Any further reference to decibels written as "dB" in this report should be understood to be A-weighted values.

Time variations in noise exposure are typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound pressure level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, State law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL).

CNEL-based standards apply to noise sources whose noise generation is preempted from local control (such as from on-road vehicles, trains, airplanes, etc.). Since local jurisdictions cannot regulate the noise generator, they exercise land use planning authority on the receiving property. Uses that are amenable to local control are generally considered "stationary sources." Local jurisdictions generally regulate the level of noise that one use may impose upon another though noise standards.

NOISE COMPATIBILITY GUIDELINES

General Plan noise standards are used by planners to evaluate the suitability of a given existing or proposed land use relative to its noise exposure. These guidelines are mainly advisory, except near airports, where state law prohibits construction of noise-sensitive uses in a high-noise area. They apply mainly to transportation activity noise impacts (vehicles, trains, planes, etc.) on adjacent land use. These guidelines are used in land use decisions because noise control from transportation is controlled by state or federal agencies and is not locally regulated.

The City of Azusa General Plan Noise Element contains guidelines on noise with classes of acceptability and has a number of overlapping compatibility noise levels within several criteria. In order to reduce the potential ambiguity of various conditional acceptabilites, the City of Azusa developed a more clear-cut matrix of acceptable noise levels in Chapter 88.31.020 of the Azusa Development Code shown in Table 1. An exterior noise exposure level of 65 dB CNEL is recommended for all noise sensitive uses.

Table 1
City of Azusa
Land Use Compatibility for Community Noise Environments

Noise Sensitive Land use	Outdoor Activity Area*	Interior Spaces
Residential	65 dB CNEL	45 dB CNEL
Transient Lodging	65 dB CNEL	45 dB CNEL
Hospitals, Extended Care	65 dB CNEL	45 dB CNEL
Theater, Auditorium	NA	45 dB CNEL
Meeting Facility, Public or Private	65 dB CNEL	45 dB CNEL
Offices	65 dB CNEL	45 dB CNEL
School, Library Museum	65 dB CNEL	45 dB CNEL
Playground, Park	70 dB CNEL	NA

*Where it is not possible to reduce noise in outdoor activity areas to 65 dB CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 70 dB CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

NOISE STANDARDS

The Azusa Municipal Code contains the City's noise standards (Section 46-405). The noise ordinance establishes exterior noise limits that cannot be exceeded at neighboring properties due to noise generated on private property as shown Table 2. The noise standards are in terms of noise levels that cannot be exceeded for a specified period of time.

The City's noise ordinance limits are stated in terms of a 30-minute limit with allowable deviations from this 50th percentile standard. The louder the level becomes, the shorter the time becomes that it is allowed to occur. Because residential uses such as the proposed project are minimally noise-generating, noise ordinance standards are rarely applied to such uses.

Table 2
Azusa Noise Standards

	Exterior Noise Standards	
Noise Zone	**Noise Level**	**Time Period**
All Residential	55 dB 50 dB	7:00 a.m.—10:00 p.m. 10:00 p.m.—7:00 a.m.
Professional Office and Public Institution	55 dB	Anytime
All Commercial Properties (but not Professional Office)	60 dB	Anytime
Industrial Properties	70 dB	Anytime

Maximum Noise Levels Not to be Exceeded

Maximum Noise Level Not to be Exceeded During Period of Time	Period of Time
Exterior noise standard plus 20 dB(A)	Any period of time
Exterior noise standard plus 15 dB(A)	Cumulative period of more than 1 minute in any hour
Exterior noise standard plus 10 dB(A)	Cumulative period of more than 5 minutes in any hour
Exterior noise standard plus 5 dB(A)	Cumulative period of more than 15 minutes in any hour
Exterior noise standard	Cumulative period of more than 30 minutes in any hour

The Noise Ordinance identifies specific activities that would be exempt from the provisions of the noise restrictions. Exempted activities include, but are not limited to, construction, repair, remodeling and grading, provided such activities adhere to the following permissible hours:

	Construction Hours
Days	**Allowable Hours**
Monday through Saturday	7:00 a.m. to 6:00 p.m. Extended construction hours may only be allowed by the review authority through conditions of approval between 6:00 p.m. and 10:00 p.m.
Sunday and National Holidays	Construction activities may only be allowed by the review authority through conditions of approval between 9:00 a.m. and 5:00 p.m.

EXISTING NOISE ENVIRONMENT

The project site is primarily affected by Gladstone Street traffic along the northern site perimeter. Traffic noise along the Orkney Street perimeter is minimal since this section of Orkney is a cul-de-sac at the proposed project site. The 210 Freeway, as a major traffic noise source, is 0.5 miles

from the site with multiple intervening structures. The freeway generates a minimal low frequency hum late at night, but not enough to measurably affect background levels.

The detailed noise impact study for a proposed new refuse transfer station (2010) concluded that then existing traffic noise along East Gladstone was 64 dB CNEL at 100 feet from the roadway centerline. The distance from the centerline to the City's 65 dB CNEL goal for usable outdoor space was calculated at 81 feet. Although these findings are dated, the study concluded that the City of Azusa is build out except for small in-fill projects such as the proposed senior villas. The ultimate noise contour along Gladstone Street is forecast to be less than +1 dB higher than the baseline. The threshold of human noise distinction, even in an acoustic laboratory, is around 1.5 dB. Future build-out traffic noise levels along the northern project perimeter will likely be indistinguishable from existing levels.

Because of the substantial passage of time since the previous traffic noise impact analysis along Gladstone, an updated noise measurement was conducted on July 10, 2017. Measurements were made at the Orkney Street cul-de-sac and at 50 feet from the Gladstone Street centerline. Measured levels were as follows (dB):

Location	Time	Leq	Lmax	Lmin	50% level
Orkney St.	12:00	47	56	42	45
Gladstone St.	12:20	62	70	44	58

Caltrans guidelines suggest that weighted 24-hour CNEL's are typically 3 dB higher than mid-day Leq levels. The above readings predict an existing level of 65 dB at 50 feet from the Gladstone Street centerline. This measurement is very similar to the historical model prediction of 67 dB CNEL at 50 feet. As a conservative estimate, the slightly higher model prediction was used to assess project façade traffic noise impacts to account for limited future noise impacts from 20% maximum traffic growth, a design noise loading of 69 dB CNEL at 50 feet from Gladstone Street was assumed for the proposed project.

NOISE IMPACTS

NOISE SIGNIFICANCE CRITERIA

Noise impacts are considered significant if they result in:

a. 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.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

For the proposed Gladstone Seniors Villa project, noise impacts would be considered excessive if they caused the residential standards shown in Table 1 to be exceeded at any adjacent residences. Vibration impacts would be considered potentially significant if the annoyance threshold level for residential uses were potentially to be exceeded or if construction activities were to create a substantial temporary increase in ambient noise levels at surrounding noise-sensitive uses.

The following standards will be applied to the proposed development:

- Usable exterior space noise exposures less than 65 dB CNEL
- Habitable interior space noise exposure less than 45 dB CNEL
- Construction activities limited to hours of lesser sensitivity

CONSTRUCTION NOISE IMPACTS

Figure 1 shows the range of noise emissions for various pieces of construction equipment. Temporary construction noise impacts will vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and its activity level.

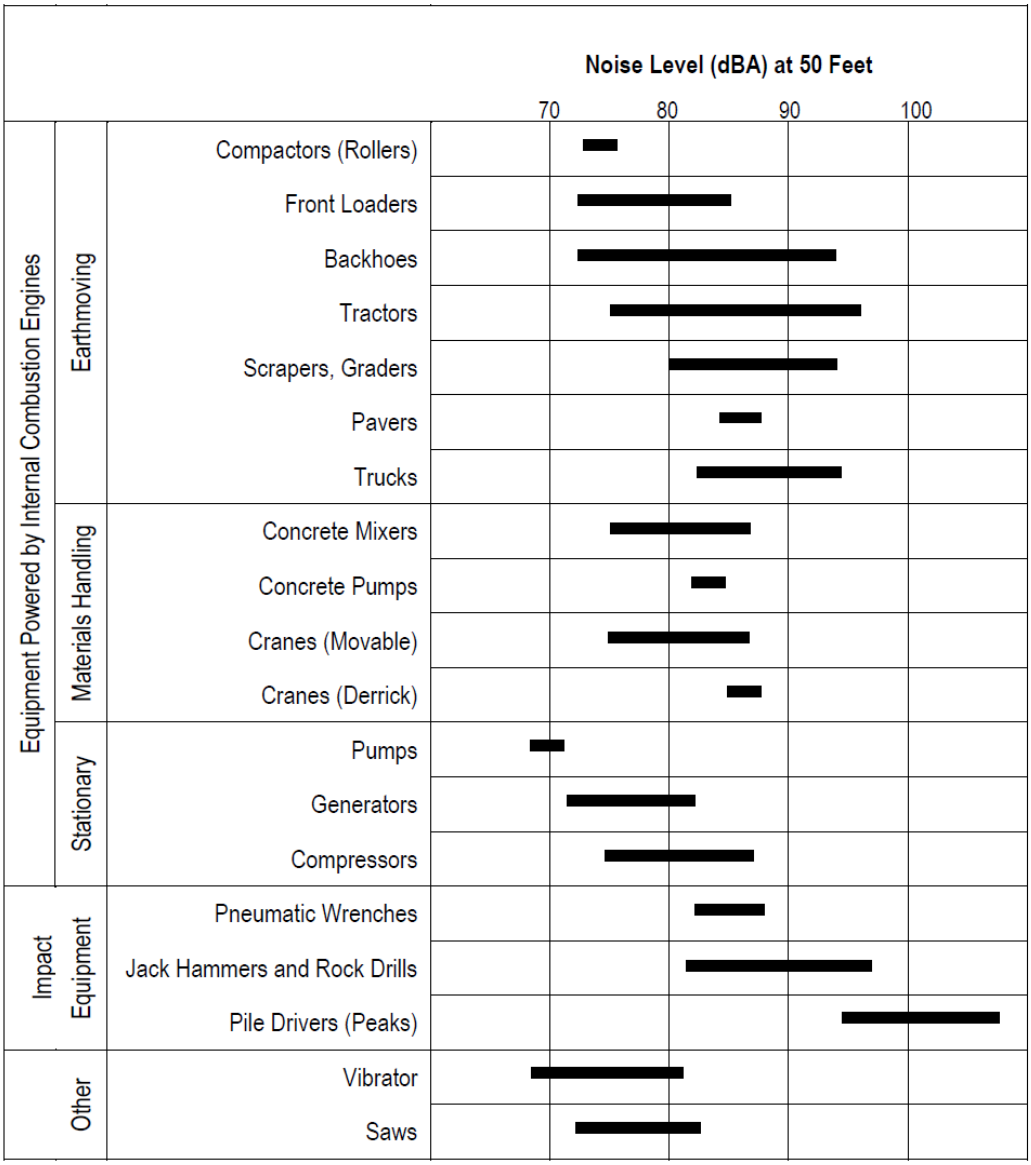
Much of the project site is flat and will not require extensive heavy grading. The primary construction equipment noise sources to develop the project will be during fine grading and paving activities where it is anticipated that loader/backhoes and a dozer will be employed. This equipment is seen to be the noisiest with equipment noise of about 85 dB(A) at 50 feet from the source.

Point sources of noise emissions are atmospherically attenuated by a factor of 6 dB per doubling of distance. This supposes a clear line-of-sight and no other machinery or equipment noise that would mask project construction noise. With buildings and other barriers to interrupt line-of-sight conditions, the potential "noise envelope" around individual construction sites is reduced.

The nearest noise sensitive uses for this project are the single-family homes north and south of the site. A multi-family development shares the eastern property line. Each of the off-site uses are somewhat protected from construction activity noise, but their proximity may create a temporary noise nuisance during the most intensive periods of activity (demolition of three existing homes, excavation of foundations and utilities, limited on-site earth movement for final grade). Each off-site sensitive receiver is partially noise-shielded by its location relative to the proposed construction site. The multi-family building to the east has no outdoor recreational space along the shared property line, and the closest new building construction would be more than 50 feet away separated by a block wall. The single-family homes south of Orkney Street are more than 70 feet from building construction and have their outdoor space in the rear yard additionally shielded by the homes themselves. The two homes on the east side of Conwell Avenue along the western site property line are the closest noise-sensitive off-site receivers. They are single-story homes with a

Figure 1

Typical Construction Equipment Noise Generation Levels



Source: EPA PB 206717, Environmental Protection Agency, December 31, 1971, "Noise from Construction Equipment and Operations."

solid rear-yard wall such that interior rooms and patio areas would be partially shielded from construction activity noise. Because of the pre-graded gentle slope of the site parcel, project construction will also not require the use of extremely noisy construction equipment. Construction activity noise impacts are thus not considered substantially intrusive.

The City of Azusa exempts construction noise from adherence to noise standards as long as activity occurs during permissible hours of 7:00 a.m. to 6:00 p.m. Monday through Saturday. Unless conditional approval is provided by the review authority, construction activities are not permitted outside the allowable time window or on Sundays and National Holidays.

AMBIENT TRAFFIC NOISE IMPACTS

The existing traffic noise at the façade of the planned units facing Gladstone Street is 66-67 dB CNEL. The anticipated increase associated with future buildout traffic would be less than +0.6 dB CNEL. Such a change is imperceptible within the range of human hearing. Based upon traffic noise computer modeling, the existing set-back from the Gladstone centerline is 80 feet to the 65 dB CNEL contour. Measured noise levels suggest that the modeled estimate may be a few decibels higher than observed short-term monitoring. The slightly higher (modeled) value was used for the impact analysis. At build-out, the ultimate 65 dB CNEL contour distance would increase to 90 feet. Any proposed exterior or balconies directly fronting Gladstone Street would thus marginally exceed the most stringent City of Azusa noise standard of 65 dB CNEL for usable outdoor residential space.

However, the proposed project incorporates a noise-sheltered interior community garden with outdoor seating, walking paths, etc. creating more than 1,500 square feet of noise-protected space per unit. Any outdoor amenities along the Gladstone frontage would logically be considered "excess" recreational space.

If any patio/deck space on the northern façade is considered necessary to meet the minimum exterior recreational space for each unit, a partial shield (solid base and transparent top) would achieve a noise level reduction to create noise levels of less than 65 dB CNEL. Given the size of the community garden, the acoustical treatment of any outdoor space facing Gladstone Street is perhaps redundant mitigation, but does not represent an excessively complex effort.

As noted above, noise levels at the facades of the planned northernmost units would be 67-68 dB CNEL. Structural attenuation of 22-23 dB would be needed to achieve the building code interior level of 45 dB CNEL. The hierarchy of residential construction noise reduction is as follows:

Open Windows (10%) – 12 dB

Closed Single Pane - 20 dB

Closed Dual Pane – 28 dB

CALGreen normally requires dual paned windows in new California residential construction. With closed dual paned windows, the California Building Code Standard will be met with a large margin of safety. A structural package designed to achieve an exterior to interior noise level reduction of 25 dB would include the following elements:

- Exterior walls shall have a minimum sound transmission class (STC) of at least STC-39.
- Stud walls shall be at least 4” in nominal depth finished on the outside with stucco.
- Interior walls shall be gypsum board or plaster at least ½” thick.
- Insulation material at least 3.5” thick shall be installed in the cavity space between studs.
- Windows shall meet current CalGreen requirements rating at least STC=28.
- Exterior doors shall be solid core at least 1.75” thick and fully weather-stripped.
- Roofs shall have an STC rating of at least STC=39.
- Ceilings shall be at least 0.5” thick.
- Insulation at least 3.5” thick shall be provided above the ceiling between joists.
- A mechanical ventilation system shall be installed to provide the minimum air circulation and fresh air supply specified in the California Building Code.

These requirements have been reviewed by the staff at Simon Lee and Associates (project architects), and are wholly consistent with planned construction specifications. With application of these requirements, indoor noise standards will be readily met.

ON-ROAD TRAFFIC NOISE IMPACTS

The proposed project would generate 187 daily net trips accessed via Gladstone Street. The existing street volume is around 11,000 average daily traffic (ADT). Future build-out traffic volumes are forecast to be 11,500 ADT because the City of Azusa is substantially built out. With limited additional growth and anticipated penetration of quiet electric cars into the future, travel fleet, negligible change in the baseline traffic noise environment is forecast.

The addition of 187 daily trips on to a 11,000 ADT baseline would increase overall traffic noise by +0.1 dB CNEL individually or cumulatively. The threshold of human perception even under ideal conditions is around 1.5 dB. No perceptible change in the traffic noise environment will result from project implementation.

RECREATIONAL SPACE NOISE IMPACTS

Outdoor uses may be noise-impacted by the ambient acoustic environment, or the uses themselves may impact the surrounding community. Because of the size of the proposed community garden, benches, paths, etc. noise-protection for outdoor uses at any individual units facing Gladstone Street, achievement of City minimum standards for private open space is not presumed necessary. If this is assumption is not correct, a combination of a solid base and an upper transparent shield to a combined height of 5.5 feet above the deck surface would meet that need.

An outdoor garden/park at a seniors complex is not a noise generator of substance. Uses will be passive in nature. Active recreation will be indoors within a community room. Noise

measurements along Orkney Street found that with only partial shielding of Gladstone Street traffic and negligible vehicles on the Orkney cul-de-sac, existing noise levels in the proposed garden area are in the low 50 dB CNEL range. The proposed 3-story building will additionally reduce the noise levels in the garden/park. Noise is not an issue both from passive park use impacting the neighbors or from ambient noise affecting outdoor enjoyment.

SUMMARY

Construction impacts are not expected to be significant at the closest off-site residences. However, the following construction practices are recommended:

- All construction and general maintenance activities, except in an emergency, shall be limited to the hours of hours of 7:00 a.m. to 6:00 p.m. Monday through Saturday.

- All on-site construction equipment shall have properly operating mufflers.

- All construction staging areas should be located as far away as practical from the nearest homes.

Traffic noise impacts from project-related traffic would be negligible. Any possible noise constraints from project implementation would derive from proposed residential uses on the northern project façade. Decks or patios directly fronting Gladstone Street would have traffic noise exposures exceeding the City of Azusa planning standard of 65 dB CNEL by several decibels. However, the project would include a noise-protected community garden providing more than 1,500 square feet of outdoor space per unit, including benches, walking paths and other amenities. With such a surplus of minimum outdoor space, individual space may not be required to incorporate traffic noise abatement. If noise shielding of private space facing Gladstone Street were required, a wrap-around barrier for such space (solid base and transparent top) to a total height of 5.5 feet would create outdoor levels of less than 65 dB CNEL.

Façade levels of up to 68 dB CNEL requires normal structural upgrades to meet the California Building Code. Meeting interior noise standards at the front of the northern tier of project homes requires an ability to close windows in those units for habitable rooms. When window closure is necessary, the building code requires provision of supplemental fresh air or 15 CFM per normal occupant. When building façade levels exceed 60 dB CNEL, as they marginally would in this case, additional documentation is required at plan check that verifies that indoor standards will be met and that noise transmission through shared wall assemblies meets code.