Construction Noise Study

for the

La Cañada Assisted Living Project

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EXECUTIVE SUMMARY

This construction noise assessment and impact analysis was prepared to evaluate whether the construction of the proposed Project would comply with the City of Glendale's and City of La Cañada Flintridge exterior noise standards. The assessment was conducted and compared to the noise standards set-forth by state and local agencies. As shown in the analysis below, with the implementation of the recommended noise reduction measure, construction noise levels would not exceed the City of La Cañada Flintridge exterior noise standard of 75 dBA for single-family residential uses. Consequently, in compliance with Section 8.36.050 of the Glendale Municipal Code (GMC), construction noise levels would not exceed more than 5 dBA above the actual ambient noise level.

PROJECT DESCRIPTION

The proposed Project includes the development of a new three-story 35,000 square-foot residential congregate living/medical facility with 79-beds, a 32 space semi-subterranean parking garage (below the new building), and a new approximate 36,780 square-foot parking garage (one level subterranean and two levels above grade) with 110 spaces on a 64,495 square-foot (0.53 acres) site consisting of three lots, located in the C2-1 (Community Commercial-Height District I) Zone.

The Project site is located at the northwest corner of Verdugo Boulevard and La Tour Way, as shown in **Figure 1: Project Site Location**. Surrounding the Project site are the State Route 2 (SR2)/Interstate 210 (I-210) freeway interchange to the north and west, City of La Cañada Flintridge developed with single-family residences to the east and across La Tour Way, commercial development in City of La Cañada Flintridge further west beyond the SR2/I-210 interchange, and the USC Verdugo Hills Hospital located within the C3-III (Commercial Service-Height District III) and PPD (Precise Plan of Development) zone. The Project site is currently developed with a four-story approximate 35,980 square-foot medical office building, constructed in 1984 and a surface parking lot. There are no protected indigenous trees specie on or within 20 feet of the site. The existing medical office building and the 36 parking spaces within the building will remain. Construction of the project will occur over three phases as follows:

- Phase I (March 2020 to June 2020): improve the site with a new driveway accessed from Verdugo Boulevard;
- Phase II (March 2020 to June 2020): construction of the proposed 110 space parking structure; and
- Phase III (July 2020 to September 2021): construction of the proposed residential congregate living/medical facility.

The Project's three phases will take place over a period of 8.5 months. The amount of soil export from the site will be approximately 8,000 cubic yards during Phase II and approximately 6,110 cubic yards during

Phase III (14,100 cubic yards total). Based on this estimate, the excavation material would require approximately 500 truck trips during Phase II, and approximately 382 truck trips during Phase III, assuming 16 cubic yards per truck for a total of 882 truck trips. Due to the nature of the project, excavation would not occur over the entire 103-week period but would be concentrated over approximately three weeks within the first eight weeks of both Phases II and III. The maximum number of haul truck trips per eight-hour work day is anticipated to be 33. The primary inbound haul route to the Project site is projected to be from the Verdugo Boulevard exit of the SR-2 Freeway, then right onto Verdugo, and the route would end at the Project site via the new driveway to be constructed at Phase I. The north side (west bound) Verdugo Boulevard would be used as the staging area and parking during the construction period.

FUNDAMENTALS OF SOUND

Because the human ear does not respond uniformly to sounds at all frequencies, sound-pressure level alone is not a reliable indicator of loudness. For example, the human ear is less sensitive to low and high frequencies than to the medium frequencies that more closely correspond to human speech. In response to the human ear's sensitivity to certain sound frequencies, the A-weighted noise level, referenced in units of dBA, was developed to better correspond with people's subjective judgment of sound levels. To support assessing a community reaction to noise, scales have been developed that average sound-pressure levels over time and quantify the result in terms of a single numerical descriptor. Several scales have been developed that address community noise levels. The equivalent sound level (Leq) is the average A-weighted sound level measured over a given time interval. Leq can be measured over any period but is typically measured for 1-minute, 15-minute, 1-hour, or 24-hour periods.

Table 1: Noise Descriptors, identifies various noise descriptors developed to measure sound levels over different periods of time.

Table 1
Noise Descriptors

Term	Definition
Decibel (dB)	The unit for measuring the volume of sound equal to 10 times the logarithm (base 10) of the ratio of the pressure of a measure sound to a reference pressure.
A-weighted decibel (dB[A])	A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).
Hertz (Hz)	The frequency of the pressure vibration, which is measured in cycles per second.
Kilo hertz (kHz)	One thousand cycles per second.
Equivalent sound level (Leq)	The sound level containing the same total energy as a time varying signal over a given time period. The Leq is the value that expresses the time averaged total energy of a fluctuating sound level. Leq can be measured over any time period, but is typically measured for 1-minute, 15-minute, 1-hour, or 24-hour periods.
Community noise equivalent level (CNEL)	A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments add 5 dBA for the evening, 7:00 PM to 10:00 PM, and add 10 dBA for the night, 10:00 PM to 7:00 AM. The 5 and 10 dB penalties are applied to account for increased noise sensitivity during the evening and nighttime hours. The logarithmic effect of adding these penalties to the 1-hour Leq measurements typically results in a CNEL measurement that is within approximately 3 dBA of the peak-hour Leq.[a]
Nighttime (Lnight)	Lnight is the average noise exposure during the hourly periods from 10:00 PM to 7:00 AM.
Sound pressure level	The sound pressure is the force of sound on a surface area perpendicular to the direction of the sound. The sound pressure level is expressed in dB.
Ambient noise	The level of noise that is all-encompassing within a given environment, being usually a composite of sounds from many and varied sources near to and far from the observer. No specific source is identified in the ambient environment.

[a] *California Department of Transportation, Technical Noise Supplement; A Technical Supplement to the Traffic Noise Analysis Protocol (Sacramento, California: November 2009), pp. N51–N54.*

SOURCE: Google Earth - 2019

FIGURE **1**

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Project Site Location

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A doubling of sound energy results in a 3 dBA increase in sound, which means that a doubling of sound wave energy (e.g., doubling the volume of traffic on a roadway) would result in a barely perceptible change in sound level. In general, changes in a noise level of less than 3 dBA are not noticed by the human ear.[1] Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. An increase of greater than 5 dBA is readily noticeable, while the human ear perceives a 10 dBA increase in sound level to be a doubling of sound volume.

Noise sources can generally be categorized into two types: (1) point sources, such as stationary equipment; and (2) line sources, such as a roadway. Sound generated by a point source typically diminishes (attenuates) at a rate of 6 dBA for each doubling of distance from the source to the receptor at acoustically hard sites, and at a rate of 7.5 dBA at acoustically soft sites.[2] A hard, or reflective, site consists of asphalt, concrete, or very hard-packed soil, which does not provide any excess ground-effect attenuation. An acoustically soft or absorptive site is characteristic of normal earth and most ground with vegetation. As an example, a 60 dBA noise level measured at 50 feet from a point source at an acoustically hard site would be 54 dBA at 100 feet from the source and would be 48 dBA at 200 feet from the source. Noise from the same point source at an acoustically soft site would be 52.5 dBA at 100 feet and 45 dBA at 200 feet from the source. Sound generated by a line source typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling of distance from the source to the receptor for hard and soft sites, respectively.[3] Noise levels generated by a variety of activities are shown in **Figure 2: Common Noise Levels**. Man-made or natural barriers can also attenuate sound levels.[4]

REGULATORY SETTING

State

The State of California, Office of Planning and Research has published, with regard to community noise exposure, recommended guidelines for land use compatibility. These guidelines rate land use compatibility in terms of being normally acceptable, normally unacceptable, and clearly unacceptable. Each jurisdiction is required to consider these guidelines when developing a general plan noise element and when determining acceptable noise levels within its community. These guidelines are representative of various land uses that include residential, commercial/mixed-use, industrial, and public facilities. **Figure 3: Land Use Compatibility to Noise**, identifies the acceptable limit of noise exposure for various land use categories within the County. Noise exposure for single-family uses is normally acceptable when

1 US Department of Transportation, Federal Highway Administration (USDOT, FHA), *Fundamentals and Abatement of Highway Traffic Noise* (Springfield, VA: Author, September 1980), 81.
2 USDOT, FHA, *Fundamentals and Abatement*, 97.
3 USDOT, FHA, *Fundamentals and Abatement*, 97.
4 US Department of Housing and Urban Development, Office of Community Planning and Development, *The Noise Guidebook* (n.d.), 21–23.

the CNEL at exterior residential locations is equal to or below 60 dBA; conditionally acceptable when the CNEL is between 55 to 70 dBA; and normally unacceptable when the CNEL exceeds 70 dBA. These guidelines apply to noise sources such as vehicular traffic, aircraft, and rail movements.

The California Noise Insulation Standards[5] require that interior noise levels from exterior sources be 45 dBA or less in any habitable room of a multiresidential-use facility (e.g., hotels, motels, dormitories, long-term care facilities, and apartment houses, except detached single-family dwellings) with doors and windows closed. Measurements are based on CNEL or Ldn (the day–night average), whichever is consistent with the noise element of the local general plan. Where exterior noise levels exceed 60 dBA CNEL, an acoustical analysis for new development may be required to show that the proposed construction will reduce interior noise levels to 45 dBA CNEL. If the interior 45 dBA CNEL limit can be achieved only with the windows closed, the residence must include mechanical ventilation that meets applicable Uniform Building Code (UBC) requirements.

Local

City of Glendale General Plan Noise Element

The City of Glendale General Plan Noise Element establishes noise criteria for the various land uses throughout the City.[6] The Land Use Compatibility to Noise identifies the acceptable limit noise exposure for various land-use categories within the City. Noise exposure for multifamily uses is "normally acceptable" when the CNEL at exterior residential locations is equal to or below 65 dBA, "conditionally acceptable" when the CNEL is between 60 to 70 dBA, and "normally unacceptable" when the CNEL exceeds 70 dBA. These guidelines apply to noise sources such as vehicular traffic, aircraft, and rail movements. The Noise Element established an interior noise level standard for multifamily uses of 45 dBA CNEL or less. The interior and exterior noise standards established in the Noise Element are shown in **Table 2: Interior and Exterior Noise Standards**. Compliance of these standards would be incorporated by conditions of approval or environmental mitigation measures and evaluated as part of City Development Review and building permit plan check.

5 California Code of Regulations, Title 24, sec. 3501 et seq.
6 City of Glendale, General Plan, Noise Element (2007).

Table 2
City of Glendale Interior and Exterior Noise Standards

Categories	Land Use Categories	Noise Standards	
	Uses	Interior CNEL	Exterior CNEL
Residential	Single Family	45[1]	65[2]
	Multi-Family	45[1]	65[3]
	Residential within Mixed Use	45[1]	--
Commercial	Hotel, Motel, Transient Lodging	45[1]	--
Institutional	Hospital, School, Classroom, Church, Library	45[1]	--
Open Space	Park	--	--

Note:
[1] Applies to the indoor environment excluding bathrooms, toilets, closets and corridors
[2] Applies to the outdoor environment limited to the private yard of single family residences (normally the rear yard).
[3] Applies to the patio area where there is an expectation of privacy (i.e., not a patio area which also serves as, or is adjacent to, the primary entrance to the unit).
[4] Only applies to parks where peace and quiet are determined to be of prime importance, such as hillside open space areas open to the public. Generally would not apply to urban parks or active use parks.
Source: City of Glendale, Noise Element of the General Plan, May 2007.

City of Glendale Municipal Code

Under Section 8.36.050 of the Noise Ordinance, where noise levels are below the presumed noise standards, the actual ambient noise level controls, and any noise more than 5 dBA above the actual ambient noise level is considered a violation. When the actual ambient noise level exceeds the presumed noise standard, the actual ambient noise level is used, and any noise more than 5 dBA above the actual ambient noise level is considered a violation of the Noise Ordinance. However, under the Noise Ordinance, the actual ambient noise levels are not allowed to exceed the presumed noise level by more than 5 dBA.

Section 8.36.080 prohibits construction activities from occurring during the “prohibited hours” that have been established in the Glendale Municipal Code (GMC). “Prohibited hours” refers to any time after the hour of 7:00 PM of any day; any time before the hour of 7:00 AM of any day; any time on Sunday; and any time on holidays. In accordance with Noise Ordinance, construction would be prohibited from 7:00 PM to 7:00 AM every night and from 7:00 PM on Saturday to 7:00 AM on Monday.

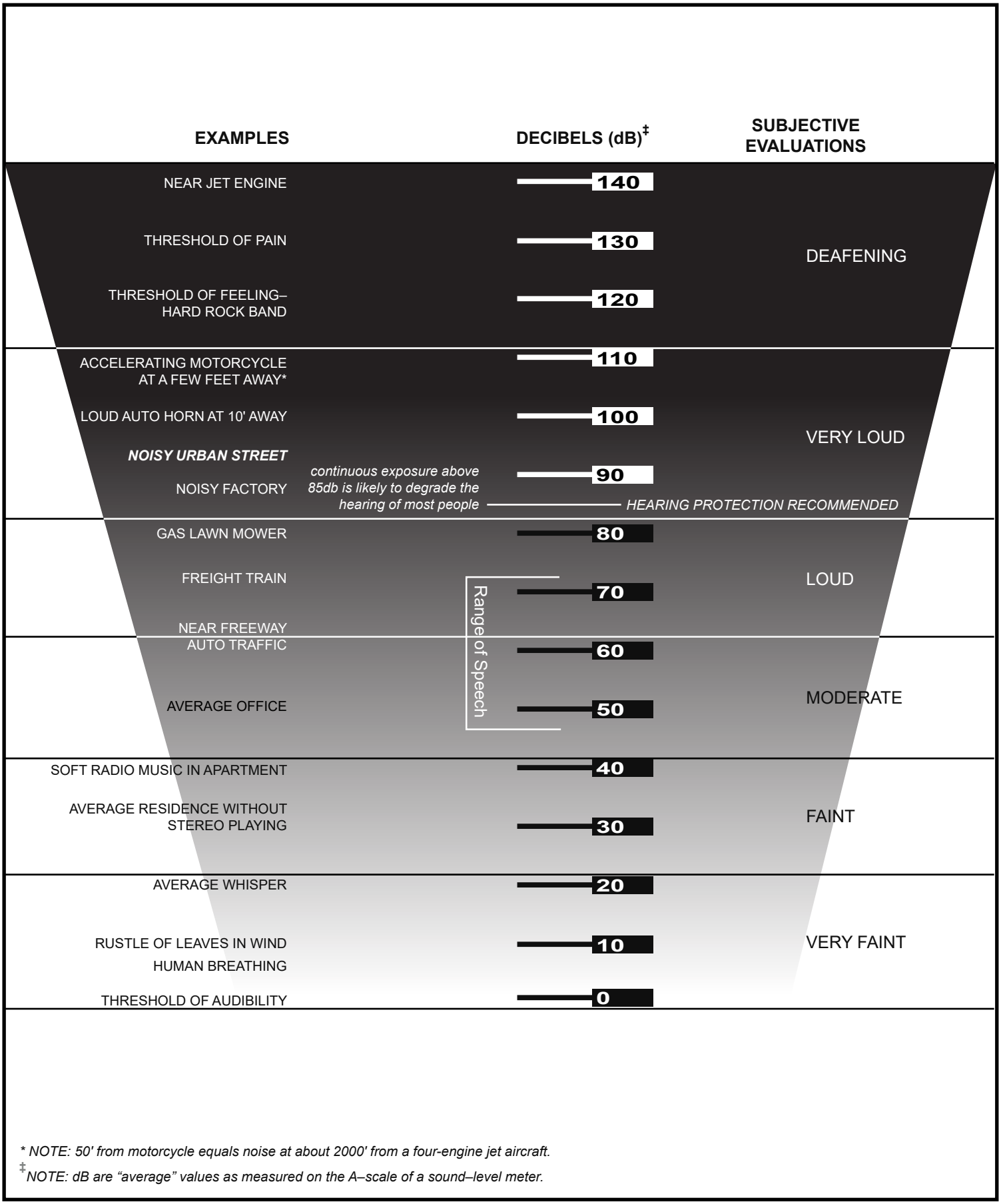
City of La Cañada Flintridge Municipal Code

When technically and economically feasible, temporary construction activity shall be conducted in such a manner that the one-hour average sound levels at affected properties shall not exceed the dBA levels listed in **Table 3: City of La Cañada Flintridge Exterior Noise Standards.**

Table 3
City of La Cañada Flintridge Exterior Noise Standards

	R-1 Zone	**R-3, RPD Mixed Use Zones**	**CPD, FCD, Public/Semi-Public, Open Space Zones**
	Single-Family Residential	**Multifamily Residential**	**Commercial**
Weekdays* 7:00 AM to 6:00 PM	75 dBA	80 dBA	85 dBA
Saturdays** 9:00 AM to 5:00 PM	60 dBA	65 dBA	70 dBA

Note:
** During Daylight Savings Time, weekday hours shall be from 7:00 AM to 7:00 PM*
*** Construction, except emergency work, is not permitted on Sundays or Holidays.*



** NOTE: 50' from motorcycle equals noise at about 2000' from a four-engine jet aircraft.*

‡NOTE: dB are "average" values as measured on the A–scale of a sound–level meter.

FIGURE **2**

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Common Noise Levels

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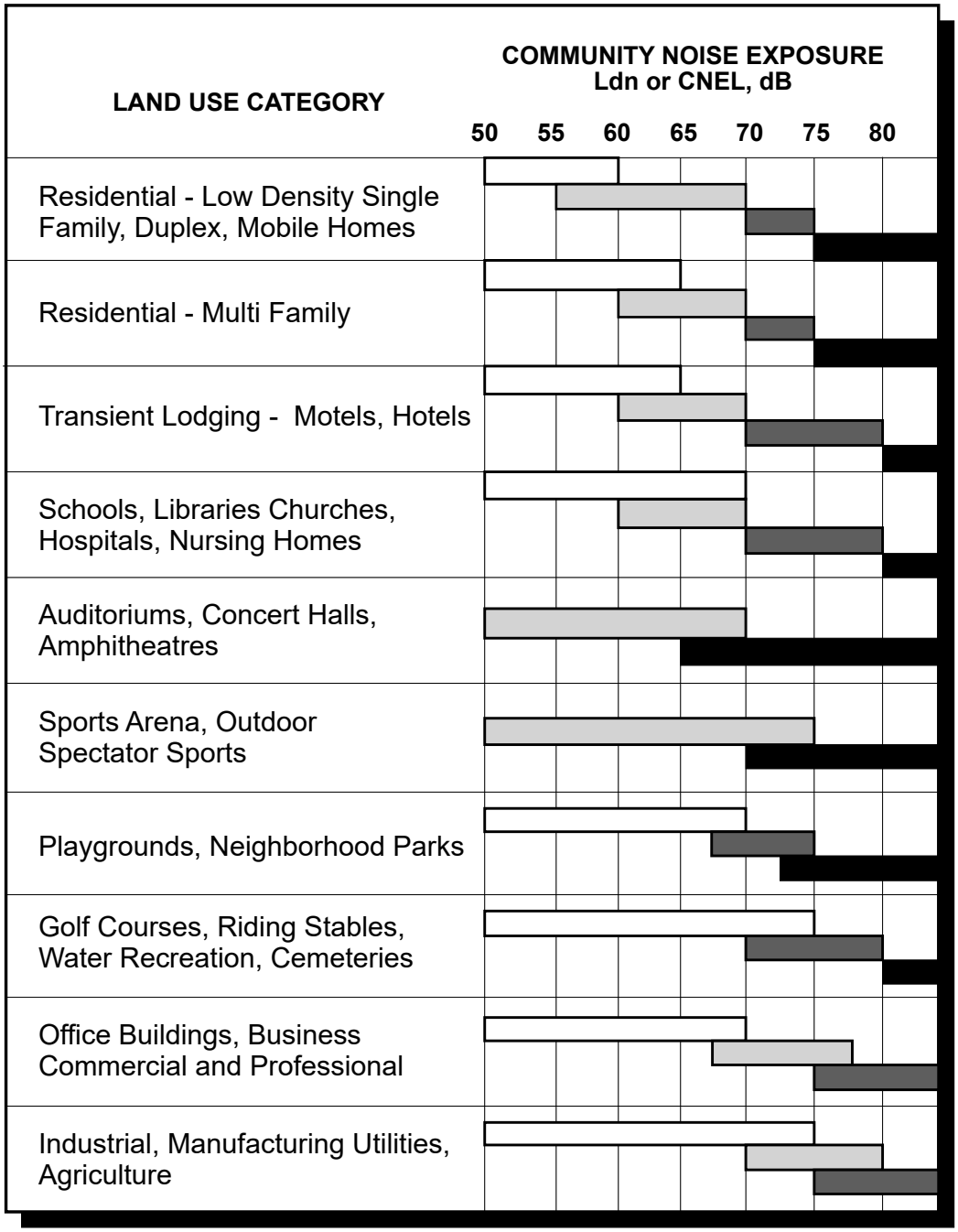

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise reduction features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

SOURCE: California Governor's Office of Planning and Research, State of California General Plan Guidelines, Appendix C: Guidelines for the Preparation and Content of Noise Elements of the General Plan, October 2003.

FIGURE **3**

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Land Use Compatibility to Noise

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METHODOLOGY

Ambient Noise Measurements

Three (3) short-term (15-minute) measurements were performed to document the existing noise environment. Noise measurements were taken with a Larson Davis Type 1 meter. This meter satisfies the American National Standards Institute standard for general environmental noise measurement instrumentation. Random incidence microphones with windscreens were used, given the outdoor (i.e., free field) conditions of monitoring. The sound level averages were measured as A-weighted, slow-time-weighted (1-minute period) sound pressure level variables, commonly used for measuring environmental sounds. Sound levels presented in this report are in terms of dBA. The location of each noise monitoring measurements is shown in **Figure 4: Ambient Noise Monitoring Locations**.

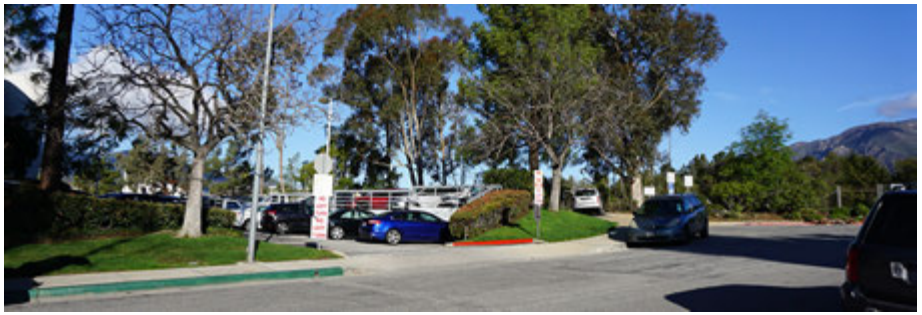
Construction Equipment Noise

Construction activities typically generate noise from the operation of equipment required for construction of various facilities. Noise impacts from on-site construction were evaluated by determining the noise levels generated by different types of construction activity, calculating the construction-related noise level at nearby noise-sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without Project related construction noise). The actual noise level would vary, depending upon the equipment type, model, the type of work activity being performed, and the condition of the equipment. Construction noise was assessed using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) which calculates noise levels for a variety of construction operations based on a compilation of empirical data and the application of acoustical propagation formulas.

Construction Traffic Noise

The analysis of construction traffic noise impacts focuses on off-site Project areas by: (1) identifying major roadways that may be used for construction worker commute routes or truck haul routes; (2) generally identifying the nature and location of noise-sensitive receptors along those routes; and (3) evaluating the traffic characteristics along those routes, specifically as related to existing traffic volumes. Construction traffic volume and road parameter data would be input into the TNM 2.5 model to calculate average noise levels for these trips. Construction trucks staging and hauling route noise impacts would be evaluated by determining the noise levels generated by different types of construction activity, calculating the construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise).

North



West

South

East

SOURCE: Google Earth - 2018

FIGURE **4a**

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Ambient Noise Monitoring Locations (Site 1)

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North

West

South

East

SOURCE: Google Earth - 2018

FIGURE **4b**

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Ambient Noise Monitoring Locations (Site 2)

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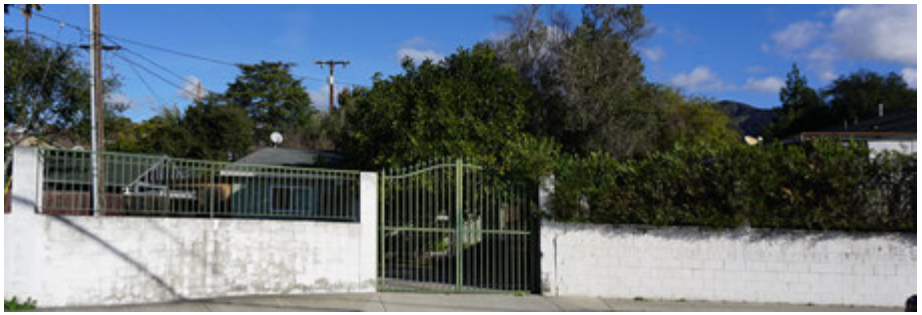

North

West

South

East

SOURCE: Google Earth - 2018

FIGURE **4c**

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Ambient Noise Monitoring Locations (Site 3)

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Construction Equipment Vibration

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. While ground vibrations from construction activities do not often reach the levels that can damage structures, fragile buildings must receive special consideration.

Impacts due to construction activities were evaluated by identifying vibration sources (i.e., construction equipment), measuring the distance between vibration sources and surrounding structure locations, and making a significance determination.

For quantitative construction vibration assessments related to building damage and human annoyance, vibration source levels for construction equipment is taken from the FTA *Transit Noise and Vibration Impact Assessment Manual.* Building damage would be assessed for each piece of equipment individually and assessed in terms of peak particle velocity. Ground-borne vibration related to human annoyance is assessed in terms of rms velocity levels.

The vibration source levels for various types of equipment would be based on data provided by the FTA.

ENVIRONMENTAL SETTING

Noise measurement data indicates that traffic noise propagating from Verdugo Boulevard, the SR-2 Verdugo off-ramp and the I-210 Freeway interchange are the primary sources of noise impacting the project site and the surrounding land uses. **Table 4: Ambient Noise Measurements**, contains the results of the noise monitoring conducted over a 15-minute period. As shown in **Table 2,** ambient noise levels range between a low of 62.8 dBA (Site 1) along La Tour Way to a high of 70.2 dBA (Site 3) along Verdugo Boulevard, east of La Tour Way.

Table 4
Ambient Noise Measurements

Site	Location	Leq	Lmax	Lmin
Site 1	Along La Tour Way, East of the Project Site	62.8	71.0	55.7
Site 2	Along Verdugo Boulevard, west of La Tour Way	69.9	77.3	55.7
Site 3	Along Verdugo Boulevard, east of La Tour Way	70.2	79.7	53.3

*Note: Refer to **Appendix A** for noise monitoring sheets.*

ANALYSIS

Construction Equipment Noise

This assessment analyzes the potential construction impacts from the proposed Project to the surrounding environment. As shown in **Table 5: Unmitigated Construction Exterior Noise Levels**, when compared to the ambient noise environment, construction noise levels increase by approximately 15.7 dBA at the residences adjacent to the east of the Project site along La Tour Way. Construction noise levels would be approximately 3.5 dBA above the exterior noise standard of 75 dBA for single-family residential R-1 Zone in the City of La Cañada Flintridge.

Under Section 8.36.050 of the City of Glendale Municipal Code, when the actual ambient noise levels (refer to **Table 4**) exceeds the presumed noise standard, the actual ambient noise level is used. Therefore, any noise more than 5 dBA above the actual ambient noise level would be considered a violation. As shown in **Table 5**, construction noise levels would increase noise levels by more than 5 dBA above the actual ambient, thus would be considered significant without mitigation. Implementation of mitigation measure **MM N-1** would include the use of optimal muffler systems for all equipment which would reduce construction noise levels by approximately 10 dB or more.[7] In addition, **MM N-1** would limit the location of construction equipment to be at the minimum 75 feet from the nearest sensitive receptor. As shown in **Table 6: Mitigated Construction Exterior Noise Levels**, construction noise levels would not increase by more than 5 dBA above the actual ambient noise level and would be consistent with Section 8.36.050 of the City of Glendale's Municipal Code. In addition, construction noise levels would be below the exterior noise standard of 75 dBA for single-family residential R-1 Zone in the City of La Cañada Flintridge.

Table 5
Unmitigated Construction Exterior Noise Levels

Receptor	Distance to Project site (feet)	Ambient Noise (dBA)	Predicted Construction Noise (Leq dBA CNEL)	Logarithmic Increase from Ambient (without Mitigation) (dBA)
Single Family Residential	60	62.8	78.5	+15.7

Source: FHWA RCNM
*Refer to **Appendix B** for output sheets.*

[7] FHWA, *Special Report – Measurement, Prediction, and Mitigation*, updated June 2018, accessed December 2018, https://www.fhwa.dot.gov/Environment/noise/construction_noise/special_report/hcn04.cfm

Table 6
Mitigated Construction Exterior Noise Levels

Receptor	Distance to Project site (feet)	Ambient Noise (dBA)	Predicted Construction Noise (Leq dBA CNEL)	Logarithmic Increase from Ambient (with Mitigation) (dBA)
Single Family Residential	75	62.8	66.6	+3.8

Source: FHWA RCNM
*Refer to **Appendix B** for output sheets.*

Construction Traffic Noise

Construction traffic would generate noise along access routes to and from the Project area. Construction activities would require the movement of heavy equipment throughout the Project area during respective construction phases and for each specialized construction activity (i.e., grading, building construction, paving, etc.). Construction staging, parking and equipment storage areas will be onsite within the proposed fenced in yards or within each phasing area. Construction-related trucks would be restricted to designated routes ensuring these vehicles utilize the nearby freeways and major arterials to the maximum extend and minimize use of local roadways. Primary haul routes would utilize Verdugo Boulevard to the SR-2 freeway. Off-site construction noise, as detailed in the methodology section above, has been forecasted using the FHWA TNM and is based on forecasted haul truck activity as well as the delivery of building materials, including concrete to the Project site. The FHWA TNM model was used to calculate the hourly Leq noise levels generated by construction-related trucks. Noise impacts were determined by comparing the predicted noise level with that of the existing ambient noise levels along the proposed Project's anticipated truck travel routes along Verdugo Boulevard.

As mentioned above, the proposed Project is expected to generate a maximum of 33 truck trips per day. Project truck trips would generate noise levels of approximately 57.3 dBA measured at a distance of 25 feet along Verdugo Boulevard. As shown in **Table 4**, the existing noise levels along Verdugo Boulevard range from 69.9 to 70.2 dBA. Construction traffic noise levels generated by truck trips would increase traffic noise levels along Verdugo Boulevard by up to approximately 0.2 dBA.[8] Therefore, the noise level increases by truck trips would be within the existing ambient noise levels and would be considered negligible.

[8] 57.3 dBA + 69.9 dBA = 70.1 dBA

Construction Equipment Vibration

Demolition and construction of the proposed Project may result in varying degrees of temporary groundborne vibration and noise, depending on the specific construction equipment used and activities involved. Groundborne vibration and noise levels associated with various types of construction equipment and activities are summarized in **Table 7: Vibration Source Levels for Construction Equipment**. Based on the types of construction activities associated with the proposed Project (e.g., site preparation, excavation, building erection) it is expected that maximum groundborne vibration and noise levels would be associated with the use of large dozers, drilling, or heavy construction trucks. Pile driving and clam shovel drop will not be an employed method of construction for new parking structure or residential congregate living/medical facility.

Table 7
Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft, in/sec	Approximate Lv* at 25 feet
Pile Driver (impact)*	Upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)*	Upper range	0.734	105
	typical	0.17	93
Clam shovel drop (slurry wall)*		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018.
Note:
RMS velocity in decibels, VdB in 1 micro/sec
PPV = peak particle velocity
** Pile Driving and Clam Shovel Drop would not be taking place on site.*

Maximum groundborne vibration and noise levels from operational-related activities (e.g. large dozers and dump trucks) would be less than those discussed above for construction-related activities. According to the FTA, levels associated with the use of a large dozer and hoe ram are 0.089 in/sec PPV and 87 VdB at 25 feet. Construction trucks are listed as 0.076 in/sec PPV and 86 VdB at 25 feet. Although residential uses located to the east along La Tour Way could experience increase vibration levels, these instances are

anticipated to be below the acceptable vibration decibel (85 VdB at 25 feet) because the single-family dwellings are approximately 60 feet away. Additionally, the utilization of large and small dozers, caisson drilling, trucks, and jackhammering would occur throughout the Project site and would not be concentrated or confined in any area directly adjacent to the nearest sensitive land uses. Thus, implementation of the proposed project would not result in the exposure of existing offsite receptors to excessive groundborne vibration levels.

In regards to groundborne vibration and noise levels for construction equipment on site, according to the Section 8.36.210 of the Glendale Noise Ordinance, operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of 0.01 inch-per-second RMS at or beyond the property boundary of the source if on private property of at 150 feet from the source if on a public space or public right-of-way shall be a violation. The Proposed Project would be constructed using typical construction techniques. No pile driving for construction will be necessary. Piles would be drilled and cast-in-place. Thus, significant vibration impacts from pile installation would not occur. Heavy construction equipment (e.g. bulldozers, excavators, dump trucks, graders, etc.) would generate a limited amount of groundborne vibration during construction activities at short distances away from the source. The use of equipment would most likely be limited to a few hours spread over 30 days during demolition/grading activities between Phase II and Phase II (15 days each phase, 30 days total). Post-construction on-site activities would be limited to mechanical equipment (e.g. air-handling unit and exhaust fans) that would not generate excessive groundborne vibration or groundborne noise.

MITIGATION MEASURES

The following mitigation measures are proposed to reduce construction noise levels to less than significant:

MM N-1 Construction Best Management Practices (BMPs)

- The Applicant shall require that the following construction best management practices (BMPs) be implemented by contractors to reduce construction noise levels:
    - Ensure that construction equipment is properly equipped with optimal muffler systems according to industry standards and in good working condition to reduce construction noise levels by approximately 10 dB or more.
    - Place noise-generating construction equipment and locate construction staging areas at the minimum 75 feet away from sensitive uses, where feasible.

- Implement noise attenuation measures to the extent feasible, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources.
- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.
- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, must be turned off when not in use for more than 30 minutes.
- Construction hours, allowable workdays, and the phone number of the job superintendent must be clearly posted at all construction entrances to allow for surrounding owners and residents to contact the job superintendent. If the City or the job superintendent receives a complaint, the superintendent must investigate, take appropriate corrective action, and report the action taken to the reporting party. Contract specifications must be included in the proposed Project construction documents, which must be reviewed by the City prior to issuance of grading permits.

APPENDIX A

Ambient Noise Measurements

Monitoring Location: Site 1
Monitoring Date: 3/4/2019

Monitoring Period

Time	LAeq	LASmax	LASmin
07:53:29	62.6	71.0	56.9
07:54:29	64.2	70.1	57.4
07:55:29	62.4	69.6	57.1
07:56:29	61.7	68.1	56.0
07:57:29	62.6	67.7	56.8
07:58:29	61.9	67.6	55.7
07:59:29	63.6	70.1	56.5
08:00:29	61.4	67.1	57.0
08:01:29	63.8	70.1	57.7
08:02:29	62.0	67.8	57.9
08:03:29	63.6	68.4	56.6
08:04:29	62.1	67.9	57.0
08:05:29	61.8	67.7	56.5
08:06:29	62.3	71.0	56.8
08:07:29	62.9	69.3	56.5
08:08:29	64.4	67.4	61.4
		71.0	55.7

15-minute LAeq **62.8**

Monitoring Location: Site 2
Monitoring Date: 3/4/2019

Monitoring Period

Time	LAeq	LASmax	LASmin
08:15:38	71.1	76.5	57.4
08:16:38	70.4	74.6	58.1
08:17:38	69.4	74.1	57.9
08:18:38	68.8	74.0	60.9
08:19:38	68.7	75.2	59.1
08:20:38	69.0	73.3	63.1
08:21:38	70.2	77.3	55.7
08:22:38	70.2	75.6	55.8
08:23:38	69.3	76.9	59.6
08:24:38	69.4	76.7	60.0
08:25:38	71.0	76.7	59.0
08:26:38	69.4	74.9	57.3
08:27:38	70.6	76.0	61.8
08:28:38	71.0	75.9	60.4
08:29:38	69.0	74.4	57.1
08:30:38	69.9	75.5	56.6
		77.3	55.7

15-minute LAeq **69.9**

Monitoring Location: Site 3
Monitoring Date: 3/4/2019

Monitoring Period

Time	LAeq	LASmax	LASmin
08:39:00	71.0	75.2	64.9
08:40:00	70.6	75.2	54.3
08:41:00	68.5	77.0	54.2
08:42:00	71.1	78.3	61.0
08:43:00	70.8	76.5	56.0
08:44:00	70.0	75.9	61.9
08:45:00	72.0	78.8	53.3
08:46:00	71.8	76.5	64.6
08:47:00	69.2	74.8	59.4
08:48:00	66.0	72.6	57.1
08:49:00	68.1	75.6	60.0
08:50:00	70.9	75.9	60.9
08:51:00	69.8	75.9	58.1
08:52:00	70.3	78.2	54.4
08:53:00	70.6	79.7	61.3
08:54:00	69.4	74.1	58.7
		79.7	53.3

15-minute LAeq **70.2**

APPENDIX B

Construction Noise Worksheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 3/4/2019
Case Description: Unmitigated Construction Noise

			---- Receptor #1 ----
	Baselines (dBA)		
Descriptior Land Use	Daytime	Evening	Night
Single-Fam Residential	62.8	62.8	62.8

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Excavator	No	40		80.7	60	0
Front End Loader	No	40		79.1	60	0
Backhoe	No	40		77.6	60	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	77.5	73.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	76	72	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	79.1	78.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 5/15/2019
Case Description: Mitigated Construction Noise

			---- Receptor #1 ----
	Baselines (dBA)		
Descriptior Land Use	Daytime	Evening	Night
Single-Fam Residential	62.8	62.8	62.8

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Excavator	No	40		80.7	75	10
Front End Loader	No	40		79.1	75	10
Backhoe	No	40		77.6	75	10

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	67.2	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	65.6	61.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	64	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	67.2	66.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.