APPENDIX G

Assessment of Environmental Noise

Veneklasen Associates
Consultants in Acoustics | Noise | Vibration | AV | IT

PRELIMINARY ASSESSMENT OF ENVIRONMENTAL NOISE

STATION SQUARE SOUTH DEVELOPMENT CEQA NOISE REPORT

April 3, 2018

By

Veneklasen Associates, Inc.
1711 16th Street
Santa Monica, CA 90404

Contents

ASSESSMENT OF ENVIRONMENTAL NOISE

1.0 INTRODUCTION

This report evaluates potential impacts associated with the construction and operation noise of the Station Square South Development project.

1.1 Project Description

The proposed project consists of a development on a 3.82-acre site which will include a five-story, multi-tiered residential building containing 296 residential units and a six-story parking structure. The project site is bounded by a recycling company to the east, Duarte Road to the south, a veterinary hospital and Magnolia Avenue to the west, and the Monrovia Gold Line station to the north, with the I-210 freeway three blocks beyond that.

1.2 Characteristics of Noise

Noise is usually defined as unwanted sound and can be an undesirable by-product of society's normal day-to-day activities. Sound becomes unwanted when it interferes with normal activities, causes actual physical harm, or has an adverse effect on health.

People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness." However, the sound pressure magnitude can be objectively measured and quantified using a logarithmic ratio of pressures which yields the level of sound, utilizing the measurement scale of decibels (dB). The decibel is generally adjusted to the A-weighted level (dBA) which de-emphasizes very low frequencies to better approximate the human ear's range of sensitivity. In practice, the noise level of a sound source is measured using a sound level meter that includes an electronic filter corresponding to the A-weighting curve. Table A.1 in Appendix A of this report defines the decibel along with other technical terms used in this analysis.

Even though the A-weighted scale accounts for the relative loudness perceived by the human ear and, therefore, is commonly used to quantify individual events or general community sound levels, the degree of annoyance or other response effects also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- Magnitude of the event sound level relative to the background noise
- Spectral (frequency) composition (e.g. presence of tones)
- Duration of the sound event
- Number of event occurrences, repetitiveness, and intermittency
- Time of day the event occurs.

In determining the daily level of environmental noise, it is important to account for the difference in human responses to daytime and nighttime noises. At night, exterior background noise levels are generally lower than daytime levels. However, most household noise also decreases at night, and exterior noise may become increasingly noticeable. Further, most people sleep at night and have greater sensitivity to noise intrusion. To account for human sensitivity to nighttime noise levels, a 24-hour descriptor, the Community Noise Equivalent Level (CNEL), has been developed. The CNEL divides the 24-hour day into a daytime period of 7:00 a.m. to 7:00 p.m., an evening period from 7:00 p.m. to 10:00 p.m., and a nighttime period of 10:00 p.m. to 7:00 a.m. In determining the CNEL, noise levels occurring during the evening period are increase by 5 dB, while noise levels occurring during the nighttime period are increased by 10 dB to account for the greater sensitivity during the evening and nighttime periods.

The effects of noise on people fall into three general categories:

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

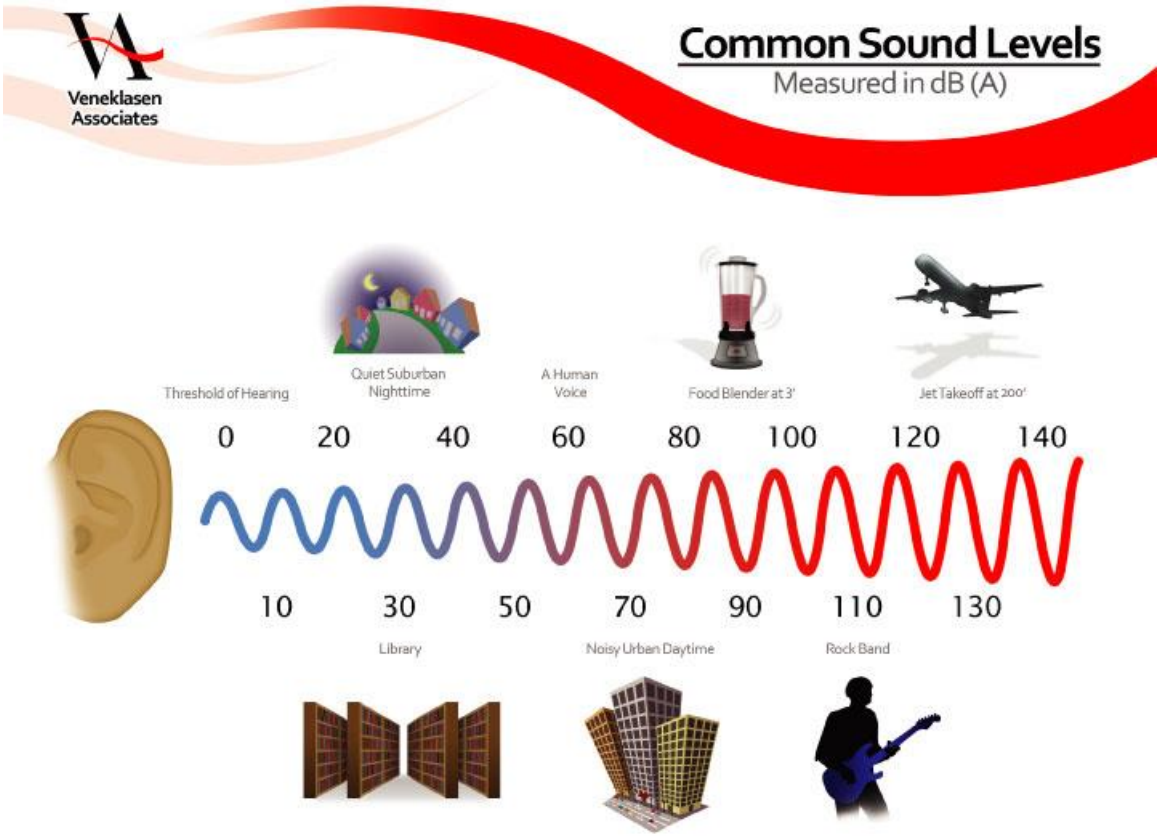
In most cases, the levels associated with environmental noise produce effects only in the first two categories. However, workers in industrial plants may experience noise effects in the last category. There is no completely effective way to measure the subjective effects of noise or the corresponding reactions of annoyance, because of the wide variation in individual thresholds of annoyance and degrees to which people become acclimated to noise. Thus, an important way of determining a person's subjective reaction to a new noise source is by comparison to the existing environment to which they are accustomed (the “ambient environment”). In general, the more the level of a noise event exceeds the prevailing ambient noise level, the less acceptable the noise source will be to those exposed to it.

With regard to increases in A-weighted noise levels, the following relationships are applicable to this analysis:

- Except in carefully controlled laboratory experiments, a 1 dB change cannot be perceived.
- Outside of a laboratory, a 3 dBA change will be generally perceivable by most people.
- A change in level of at least 5 dBA is considered a noticeable change by most people.
- A 10 dBA change will result in the perception of doubling or halving the loudness of the noise.

Common noise levels associated with various activities are shown on Figure 1, Common Noise Levels.

Figure 1 – Common Noise Levels



Noise sources are either "point sources", such as stationary equipment or individual motor vehicles, or "line sources", such as a roadway with a large number of mobile point sources (motor vehicles). Sound generated by a stationary 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.[1] For 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 it would be 48 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.[2] Man-made or natural barriers can also attenuate sound levels.

---

1 U.S. Department of Transportation, Federal Highway Administration, *Highway Noise Fundamentals*, (Springfield, Virginia: U.S. Department of Transportation, Federal Highway Administration, September 1980), p. 97. A "hard" or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt, concrete, and very hard packed soils. An acoustically "soft" or absorptive site is characteristic of normal earth and most ground with vegetation.

2 U.S. Department of Transportation, Federal Highway Administration, *Highway Noise Fundamentals*, (Springfield, Virginia: U.S. Department of Transportation, Federal Highway Administration, September 1980), p. 97.

The minimum attenuation of exterior to interior noise provided by typical structures is provided in Table 1, Outside to Inside Noise Attenuation.

Table 1 – Outside to Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows[1]
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Convalescent Homes	17	25
Offices	17	25
Theaters	20	30
Hotels/Motels	17	25

Source: Transportation Research Board, National Research Council, Highway Noise: A Design Guide for Highway Engineers*, National Cooperative Highway Research Program Report 117.*

[1] *As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.*

1.3 Characteristics of Vibration

Vibration is minute variation in pressure through structures and the earth, whereas, noise is minute variation in pressure through air. Some vibration effects can be caused by noise; e.g., the rattling of windows from truck pass-bys. This phenomenon is related to the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Ground-borne vibration attenuates rapidly as distance from the source of the vibration increases. Vibration amplitude can be measured as peak particle velocity (PPV), the maximum instantaneous peak amplitude in inches per second, or root-mean-square (RMS) velocity in inches per second or as vibration level in decibels (VdB) referenced to 1 micro-inch per second. The ratio between the PPV and the maximum RMS amplitude is termed the "crest factor." According to the Federal Transit Administration (FTA), the PPV level for construction equipment is typically 1.7 to 6 times greater than the RMS vibration level. The FTA uses a crest factor of 4 for the conversion of PPV levels to RMS vibration levels. For the purposes of ground-borne vibration analysis of impacts to existing structures, vibration velocity is described in terms of PPV. For the analysis of the human response to vibration, VdB is utilized.

The vibration velocity threshold of perception for humans is approximately 65 VdB, and a vibration velocity of 72 VdB is the preferred criteria for the maximum allowable vibration impact on residential projects at night[3]. For daytime, institutional land use, a vibration velocity of 84 VdB is commonly utilized for detailed analysis[3]. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are

[3] – U.S. Department of Transportation, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, (Washington, DC: U.S. Department of Transportation, Federal Transit Administration, May 2006), Table 8-3, p. 8-8.

construction equipment, steel-wheeled trains, and traffic on rough roads. Common ground-induced vibrations related to roadway traffic and construction activities pose no threat to buildings or structures. If a roadway is smooth, the ground-borne vibration from traffic is barely perceptible. The range of interest is from approximately 50 VdB, which is typically the background vibration velocity, to 94 VdB. This 94 VdB vibration level corresponds to 0.2 PPV, which is the general threshold where minor damage can occur in non-engineered timber and masonry buildings.

2.0 REGULATORY FRAMEWORK

Many government agencies have established noise regulations and policies to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise and ground-borne vibration. The City of Monrovia has adopted the Noise Element section of the General Plan, which is based in part on federal and State regulations and is intended to control, minimize, or mitigate environmental noise effects. The regulations and policies that are relevant to project construction and operation noise are discussed below.

2.1 Applicable State Noise Standards

The State of California has adopted noise compatibility guidelines for general land use planning. The types of land uses addressed by the State standards and the acceptable noise categories for each land use are included in the State of California General Plan Guidelines, which is published and updated by the Governor's Office of Planning and Research. The level of acceptability of the noise environment is dependent upon the activity associated with the particular land use. According to the State, an exterior noise environment up to 65 CNEL is "normally acceptable" for single and multi-family residential uses, up to 75 CNEL is "conditionally acceptable" with special noise insulation requirements, while 75 CNEL and above is identified as "clearly unacceptable" noise levels for residential and hotel uses, respectively.[4] These guidelines are typically used to ascertain compatibility with meeting the maximum allowable interior noise criteria. The maximum allowable interior noise level for residential structures is 45 CNEL.

The California Environmental Quality Act (CEQA) Guidelines establishes guidelines for the evaluation of significant impacts of environmental noise attributable to a proposed project. The guidelines ask whether the project would result in:

1. 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.

2. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

[4] – State of California, Governor's Office of Planning and Research, *General Plan Guidelines*, (Sacramento, CA: State of California, Governor's Office of Planning and Research, October 2003), p. 250.

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

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

5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

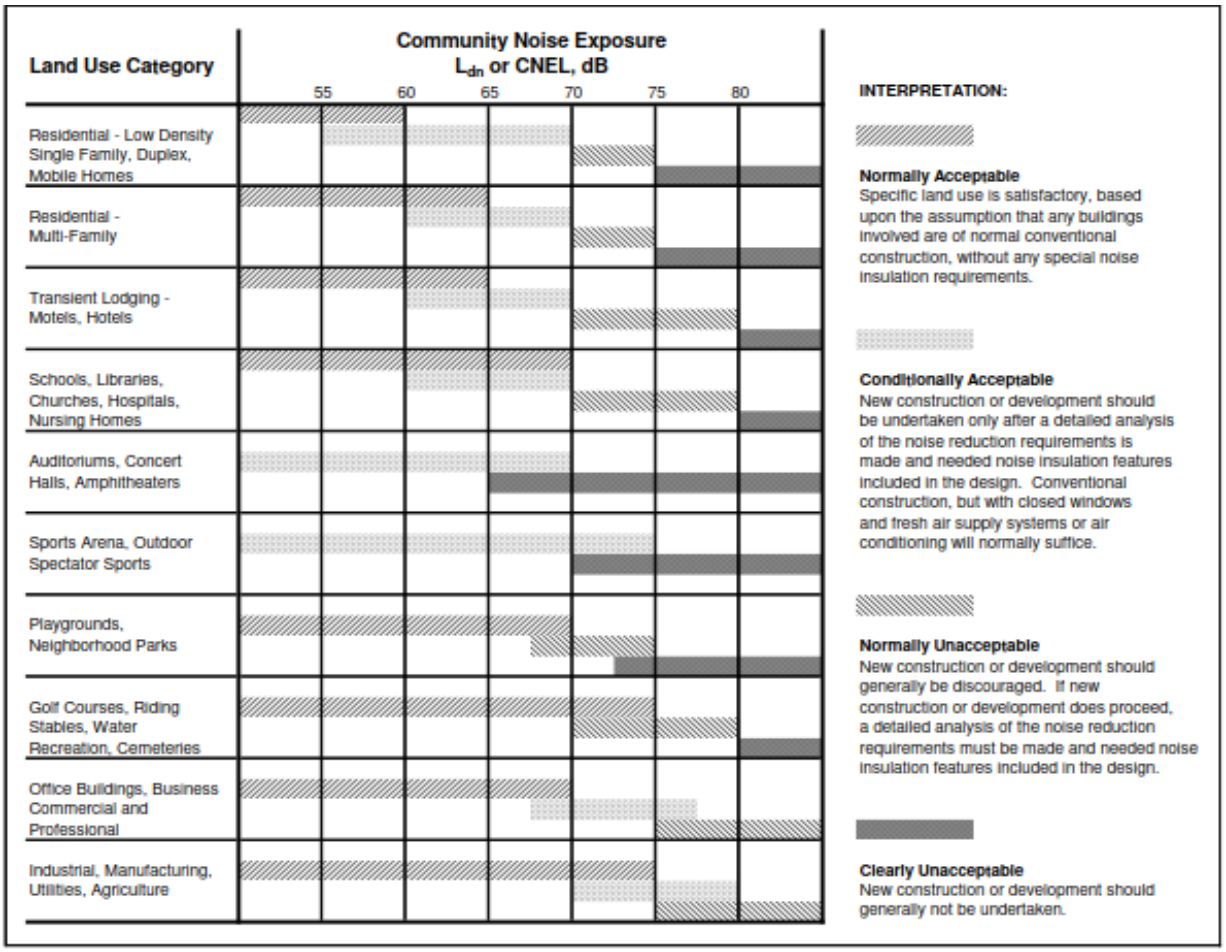
6. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

The CEQA Guidelines and the City's General Plan provide no definition of what constitutes a substantial noise increase. Typically, in high noise environments, if the CNEL due to the project would increase by 3 dBA at noise sensitive receptors, the impact is considered significant.

2.2 City of Monrovia General Plan – Noise Element

The City of Monrovia has adopted the Noise Element of the General Plan, which identifies noise level standards for various land uses. The City's goal is to identify and evaluate the potential for noise conflicts, and identify ways to reduce existing and potential noise impact. The Noise Element references the Land Use Compatibility Guidelines listed in Table 2 below for use in determining the compatibility of land uses when evaluating future development projects.

Table 2 – Maximum Allowable Environmental Noise Standards



Source: *State of California General Plan Guidelines.* Governor's Office of Planning and Research, 1998.

The Noise Element also references Section 1208A of the 1998 California Building Code (Title 24, Part 2, California Code of Regulations), establishing acceptable interior noise exposure. The code limits interior noise levels attributable to exterior sources to less than 45 CNEL within any habitable room. Additionally, future residential buildings or structures located where the existing noise level is greater than 60 CNEL shall require an acoustical analysis showing that the proposed design will limit the exterior noise to less than or equal to the required maximum limits on the interior.

Program No. 2 of the City of Monrovia Noise Element of the General plan states that the city will extend the California Building Code (Title 24, Part 2, Appendix Chapter 12, California Code of Regulations) requirements for noise mitigation in the design of new multi-family residential developments. The Noise Element lists reducing the exterior noise, installing sound rated windows, configuration of exterior walls and roofing systems, strategically locating vents, mail slots, etc., and installing forced air ventilation as acceptable measures for accomplishing the requirements.

Program No. 3 of the City of Monrovia Noise Element of the General Plan states that the city may implement a noise zoning code defining compatible land usage requirements based on the guidelines in Figure 2. This would require an analysis to determine whether or not the proposed development would be in compliance with the code. If the development is determined to be above the "Normally Acceptable" category (greater than 60 CNEL), noise control design steps are required. As stated above, this is typically used to ascertain the feasibility of meeting the indoor noise criteria for residential land uses.

While not specifically referenced in the City of Monrovia Noise Element of the General Plan, the California Building Code Requirements also defines noise levels at playgrounds and neighborhood parks up to 70 CNEL as "Normally Acceptable". This is understood to mean noise at outdoor use areas in general, including for smaller, residential land uses.

2.3 City of Monrovia General Plan – Land Use Element

Policy 6.1 of the City of Monrovia Land Use Element of the General Plan states that residences constructed near the Foothill Freeway (I-210) or near railroad tracks shall be designed to reduce the intrusion of sound into the dwelling.

Policy 6.2 of the City of Monrovia Land Use Element of the General Plan states that impacts of freeway noise upon future residential land uses shall be assessed and a strategy developed for any needed noise attenuation.

Policy 6.3 of the City of Monrovia Land Use Element of the General Plan states that impacts of railroad track noise upon future residential land uses shall be assessed and a strategy developed for any needed noise attenuation.

Policy 6.5 of the City of Monrovia Land Use Element of the General Plan requires an evaluation of existing commercial units on residential uses. Noise reduction strategies, such as block walls and restricted hours of operation, will be required as appropriate.

2.4 City of Monrovia General Plan & Municipal Code – Noise Ordinance

Program 1 of the City of Monrovia Noise Element of the General Plan states that the city will continue to implement and enforce the City of Monrovia's Noise Ordinance for control of unnecessary and unwanted noises. The City has adopted Chapter 9.44 of the Municipal Code as the Noise Ordinance.

The goal of the City's Noise Ordinance is to "control unnecessary, excessive and annoying noise and vibration in residential areas" generated by industrial, commercial, agricultural, and residential uses which are not subject to Federal and State noise regulations.

The Noise Ordinance does not specifically identify limitations for stationary noise sources such as mechanical equipment. However, Section 9.44.040 of the City of Monrovia Noise Ordinance establishes a general prohibition of

noise greater than specified maximum allowable noise levels. These are defined as the greater of the actual measured ambient noise level, or the presumed ambient levels shown in Table 3.

Table 3 – Maximum Allowable Noise Levels

Time	Allowable Noise Level - dBA
7:00am to 9:00pm	55
9:00pm to 7:00am	50
Source: City of Monrovia Noise Ordinance – Section 9.44.040	

Section 9.44.080(D) of the City of Monrovia Noise Ordinance exempts the handling of boxes, crates, containers, garbage cans, or other similar objects to the hours shown in Table 4.

Table 4 – Maximum Allowable Noise Levels

Allowable Hours	Day of Week
7:00am to 7:00pm	All days
Source: City of Monrovia Noise Ordinance – Section 9.44.080(D)	

Section 9.44.080(F) of the City of Monrovia Noise Ordinance exempts construction or demolition work to the hours shown in Table 5.

Table 5 – Maximum Allowable Noise Levels

Allowable Hours	Day of Week
7:00am to 7:00pm	Weekdays
9:00am to 6:00pm	Weekends and Holidays
Source: City of Monrovia Noise Ordinance – Section 9.44.080(E)	

2.5 City of Monrovia General Plan & Municipal Code – Performance Criteria

The City has adopted Chapter 17.32 Performance Standards for Zoning and Land Use. The Performance Standards describe general criteria applicable to land use.

Section 17.32.030 of the City of Monrovia Performance Criteria requires that the maximum sound level radiated by any use of facility, when measured at the boundary line of the property on which the sound is generated, shall not be obnoxious by reason of its intensity, pitch or dynamic characteristics, as determined by the city.

Section 17.32.040 of the City of Monrovia Performance Criteria prohibits causing any vibration which causes a noticeable tremor beyond the boundary line of the property on which the vibration exists.

2.6 Project Requirements

The above requirements for the project established by the Noise Ordinance are summarized in the following Table 6.

Table 6 – Specific Project Requirements

Activity	Standard
Exterior Noise at Multi Family Residences	70 CNEL
Interior Noise in Residences	45 CNEL
Construction Noise	Limited to the hours of: 9:00am – 6:00pm Sunday and holidays 7:00am – 7:00pm All other days
Operational Noise - Container/Garbage Noise	Limited to the hours of: 7:00am – 7:00pm All days
Operational Noise – All Others	- At residential property: Within the limits of the Maximum Allowable Noise Levels and Permitted Increases -Sound shall not be deemed "obnoxious" as determined by the city.
Vibration	- Shall not cause a noticeable tremor beyond the boundary line of the property on which the vibration exists (permanent sources).

3.0 ENVIRONMENTAL IMPACTS AND SIGNIFICANCE

3.1 Significance Thresholds

The following significance thresholds are used in this report to evaluate the significance of the project noise impacts:

- Project would expose persons to or generate noise levels in excess of standards established in the City's General Plan or Noise Ordinance.
- Project would result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. A substantial permanent increase in traffic noise would occur if the project would result in an increase of 3 dBA CNEL or more.
- Project would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Construction noise would be considered significant if it would take place outside of the allowable hours set forth in Table 4.

3.2 Impact 1. Noise levels in excess of standards

Would the project result in 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?

3.2.1 Methodology

Analysis of the existing and future noise environments presented in this section is based on technical reports, noise monitoring, and noise prediction modeling. Noise modeling procedures involved the calculation of existing and future vehicular noise levels along individual roadway segments. This was accomplished using the Federal Highway

Administration Highway Noise Prediction Model (TNM Version 2.5). The California Department of Transportation (Caltrans) published the "Technical Noise Supplement (TeNS)" in October of 1998 which defines how to predict traffic noise for projects in California. The TeNS, Section N-5520 requires that any traffic noise study conducted after March 30, 2000 utilize the calculation methods used by Federal Highway Administration (FHWA) TNM. This model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site conditions. The off-site traffic noise is analyzed on an increase in CNEL basis to determine the project's impact.

Traffic volumes utilized as data inputs to the noise prediction model were based on the data provided within the City of Monrovia Noise Element of the General Plan adjusted to account for a one percent growth rate per year, which is industry standard.

3.2.2 Existing Noise Levels

The proposed project is bounded by W. Duarte Road to the south, South Magnolia Avenue to the west, and the Monrovia Metro Gold Line Station to the north with I-210 Freeway beyond. The land uses surrounding the project are mainly commercial, with a recycling center to the east and a veterinary hospital to the west. Train pass-bys from the rail line to the north of the site and traffic from W. Duarte Road and South Magnolia Avenue are the primary sources of noise in the general area of the site. Operational noise from the recycling center as well as from the Monrovia Metro Gold Line Station are secondary sources. Only Metro Commuter trains utilize the rail. According the schedule provided by Metrolink, there are 180 commuter train pass-bys per day between the approximate hours of 3:00am and 2:00am. The I-210 freeway provides only a minor contribution to the overall noise level on site.

To establish existing short term ambient noise levels in areas surrounding the project site, a field monitoring study was conducted. Measurements were performed in and around the project site for documenting the ambient conditions. These include a survey of noise produced by the I-210 Freeway, Monrovia Gold Line Metro Station, adjacent commercial activity, and general traffic. Bruel & Kjaer Model 2270 Sound Level Meters, which satisfy the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation, were used for this purpose. Train pass-bys and vehicular traffic from West Duarte Road and South Magnolia Avenue are the predominant noise sources around the project site. Measurements were performed at several locations as shown on Figure 2. The measurements occurred at these locations between January 17, 2018 and January 19, 2018, as well as additional measurements on March 26, 2018. Noise readings were measured over 1-second and 5-minute intervals with "A" frequency fast time weighting. The weather conditions were normal and no anomalies were present during the survey periods.

Table 7, Existing Ambient Monitored Noise Levels, provides the noise level data associated with each monitoring period for each location. As shown, short term noise levels ranged from 57.6 dBA to 63.5 dBA and were dependent on the railroad and traffic activity. The noise levels at location 1, location 2, and location 3 were mainly due to traffic from W. Duarte Road and S. Magnolia Avenue. The noise levels measured at location 4 were mainly due to the high

volume of train pass-bys. Commuter trains are light rail type locomotives. On average, commuter train events last for 40 seconds.

Table 8, Existing Significant Event Noise Levels, provides noise level data associated with certain operational events that occurred around the project site. These include use of the PA system for the Monrovia Gold Line Metro Station as well as equipment and container noise from the adjacent recycling center.

Figure 2 – Station Square at Union Village Development Site and Noise Monitoring Locations

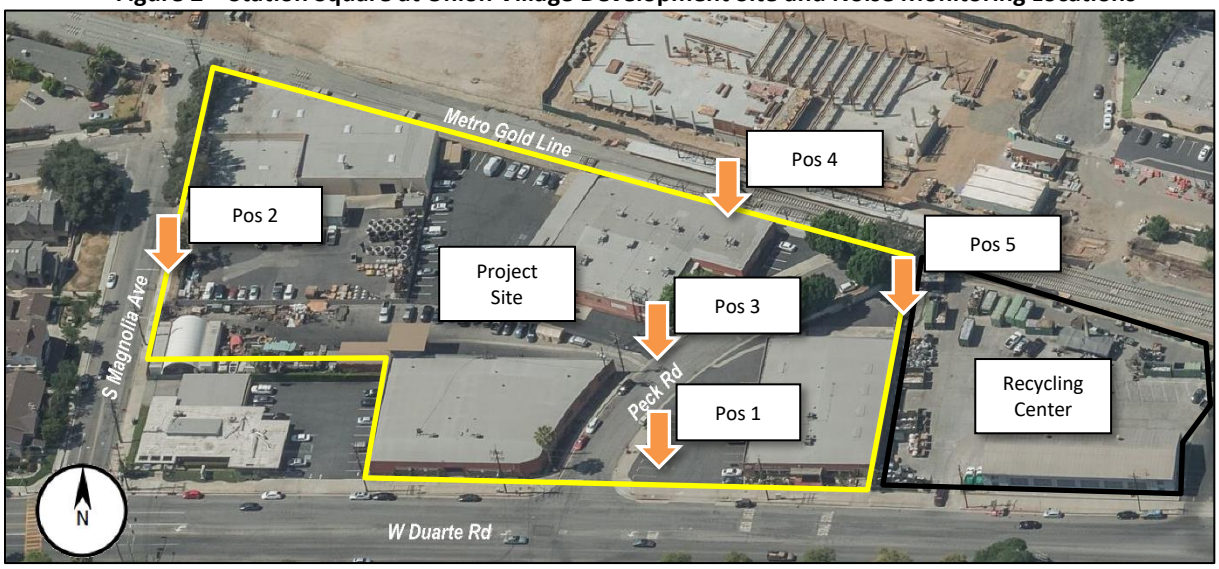


Table 7 – Existing Ambient Monitored Noise Levels

Position	Primary Noise Source	Time	Noise Level (dBA L_{eq})
Pos 1	Duarte Road	1:28pm – 2:28pm	63.5
Pos 2	Magnolia Avenue/Metro Gold Line	2:33pm – 3:39pm	61.3
Pos 3	Duarte Road/Metro Gold Line	3:44pm – 4:15pm (1/17/17) 12:07pm – 1:10pm (1/18/18)	57.6 58.2
Pos 4	Metro Gold Line	11:37am (1/17/18) – 1:00pm (1/19/18)	61.2 (24-hour)
Pos 5	Recycling Center	8:38am – 11:38am (3/26/18)	62.8

Notes:
Noise measurements taken between January 17, 2018 and January 19, 2018.
Source: Veneklasen Associates, 2018.

Table 8 – Existing Significant Event Noise Levels

Position	Primary Noise Source	Maximum Noise Level (dBA L_{eq})
Pos 3	Recycling Center Operations	86
Pos 4	Metro gold Line PA Operations	85

Notes:
Noise measurements taken between January 17, 2018 and January 19, 2018, and on March 26, 2018.
Source: Veneklasen Associates, 2018.

3.2.3 Future Interior Project Noise Levels

Based on the short term measurements and computer model calculations, the north and east property lines facing the railroad or recycling center may experience noise levels up to 68 CNEL, and the south and west property lines facing the roadways may experience noise levels up to 67 CNEL. From Table 1, interior noise levels may exceed 45 CNEL unless sound-rated windows and appropriate exterior façade assemblies are included in the project design. The project design should therefore incorporate noise attenuation features such as sound-rated windows into the design. The specific requirements will depend upon the details of the project plans.

Mitigation 1. The project will provide sound-rated windows and appropriate exterior façade assemblies to ensure City and State interior noise level standards are met. Exterior façade assemblies may include insulation, specific stud requirements, etc. A detailed acoustical analysis of the project will be completed by a qualified acoustical consultant to define the exact mitigation required such that the interior noise level standards per the City and State are satisfied. The acoustical analysis of exterior to interior noise is a routine plan check and permitting requirement per the State of California Building Code.

This impact is less than significant with mitigation.

3.2.4 Future Exterior Project Noise Levels – Railroad Analysis

The proposed project is located adjacent a Metro Gold Line Station. While the project itself does not generate any noise levels in relation to train activity, residents will be subject to the existing noise conditions currently experienced on site. The exterior CNEL along the Metro Gold Line will not exceed the exterior noise level standards set forth by the City of Monrovia. Furthermore, as previously stated, CNEL was developed to account for human sensitivity to nighttime noise levels relative to sleep disturbance. The metric provides an increase in evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) by 5 dB and 10 dB, respectively, to account for the greater sensitivity during the evening and nighttime periods. The exterior common areas and private patios/balconies for the project are not intended to be sleeping spaces for residents. Therefore, it can be concluded that CNEL is not an appropriate metric for analyzing the impact of noise on these areas. Since the exterior noise levels at the site are controlled by train events and train station operation, an analysis of the following is an appropriate method to determine a

significant impact: the average A-weighted level, duration, and frequency of the train events compared to potential health risks.

On average, a commuter train event has an average level of 85 dBA. The average duration of a commuter train events last for 34 seconds. No more than 10 commuter train events are anticipated per hour based on the schedules available. Therefore, residents will be exposed to an average noise level of 85 dBA for a maximum of 6 minutes each hour assuming the resident is outside for every train event in the hour. For the remainder of the hour, the average ambient noise level is 58 dBA. The amount of exposure time experienced due to commuter trains does not correlate to any potential health risks while residents are using the exterior areas of the project. For reference, the Occupational Safety and Health Administration (OSHA) Standard 1910.95 requires protection and/or mitigation measures for workers exposed to noise levels beginning at 85 dBA for longer than 8 hours (the "action level").

Given the train noise exposure is a maximum of 85 dBA for a duration of 6 minutes per hour, this does not correlate to any potential risks to health while at the exterior of the property. Therefore, the impact of noise on exterior common areas and private patios is less than significant.

3.2.5 Future Exterior Project Noise Levels – Commercial Operations Analysis

The exterior CNEL noise level from commercial operation of the adjacent recycling center does not exceed the average, exterior noise level standards set forth by the City of Monrovia. The noise exposure does include high impact noise from container loading/unloading as well as heavy truck activity at maximum levels at the property line of 86 dBA.

While this level of noise may be deemed disruptive to human activity, the operating hours of the recycling center are listed as 8am-5pm. This is within the allowable hours for such activities as listed in Section 9.44.080(D) of the City of Monrovia Noise Ordinance.

The impact will be less than significant.

3.3 Impact 2. Excessive ground-borne vibration

Would the project result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

The City of Monrovia does not specify explicit criteria for new developments impacted by ground-borne vibration from railroads. Vibration measurements were conducted to collect data from train pass-bys. The average levels of train events measured at the site, as shown in Table 9, do not exceed the aforementioned 72 VdB criteria for residential sensitive use categories. This impact is less than significant.

Table 9 – Average Measured Vibration Levels of Train Events at Site

Event	Maximum Measured Vibration Level (VdB)	Vibration Criteria for Residential, Night Use (VdB)
Train Pass-by	60.9	72

Sources:
1. Vibration criteria from U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, (Washington, DC: U.S. Department of Transportation, Federal Transit Administration, May 2006), Page 7-8.
2. Vibration measurements from Veneklasen Associates taken between January 17, 2018 and January 19, 2018.

The City of Monrovia does not set specific limits on vibration due to construction equipment. The City Performance Criteria does prohibit activities that would produce a "noticeable tremor" at the property line of the source creation. However, this type of criteria and the intent of its language is traditionally understood to apply to permanent sources on residential zones. For the purposes of this report, a "noticeable tremor" is understood to mean significant levels of vibration that would deter normal human activities. Construction activities that historically produce significant vibration levels (demolition, grading, earthworks) for the subject project are expected to occur for no greater than 7-9 weeks in total. Furthermore, the current adjacent properties to the project site are located in commercial use zones.

Using vibration levels of typical construction equipment given in the *Transit Noise and Vibration Impact Assessment* document published by the Federal Transit Administration (FTA), vibration levels at receivers nearest the project site were calculated to be as indicated in Table 10. The distance loss was calculated using equations for ground-borne vibration published by the FTA, and two distances were used: from the center of the VCA Animal hospital, the building whose employees would be subject to the vibration, and the nearest residential building to the project site across S. Magnolia Avenue. These levels were compared to FTA criteria for institutional land uses. It should be noted that the FTA criteria does describe vibration levels of 84 VdB as "feelable" and 78 VdB as "barely feelable", however these levels are considered adequate for commercial land uses and daytime residential uses respectively. The calculated vibration levels for use of construction equipment do not exceed the 84 VdB criteria at the calculated distance of 45 feet, and the 78 VdB criteria at the calculated distance of 65 feet.

Based on these calculations and the FTA criteria, construction equipment would be used at a distance greater than 45 feet, where feasible. Since this is the minimum distance necessary to meet vibration criteria, the construction vibration impact would be less than significant.

Table 10 – Calculated Vibration Levels of Typical Construction Equipment to Nearest Sensitive Receptor

Equipment	Vib. Level at 25ft (VdB)	Vib. Level at Residential Receptor (VdB)	Vib. Level at Office/Institutional Receptor (VdB)	Vib. Criteria for Residential Daytime Use (VdB)	Vib. Criteria for Office/Institutional Use (VdB)
Jack Hammer	79	66.6	69.9	78	84
Loaded Trucks	86	73.6	76.9	78	84
Large Bulldozer	87	74.6	77.9	78	84

Sources:
1. Equipment vibration levels from U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, (Washington, DC: U.S. Department of Transportation, Federal Transit Administration, May 2006), Table 12-2.
2. Vibration criteria from U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, (Washington, DC: U.S. Department of Transportation, Federal Transit Administration, May 2006), Table 8-3, p. 8-8.

3.4 Impact 3. Permanent increase in ambient noise levels

Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

3.4.1 Increase due to project traffic

The traffic study provided by LSA Consultants indicates that the cumulative project trip generation for the year 2019 will be 3,368 net daily trips. The existing ambient levels measured at the site equate to between 62-67 CNEL along Duarte and Magnolia. The traffic model of the site's trip generation by itself produces a 61.4 CNEL. The noise levels generated by the site due to traffic causes less than a 3 CNEL increase in the existing ambient levels at the site, and therefore the impact due to project traffic is less than significant.

3.4.2 Operational Noise

The project is expected to include outdoor mechanical equipment, such as split-system outdoor condensing units for example. Based on published sound power data for units of typical residential size, the noise level will be less than 50 dBA at a distance of 30 feet from the equipment. Therefore, based on these calculations, the residential split-system condensing units will be located a minimum of 30 feet from the nearest residential property, with the final distance determined by the operating conditions and radiated noise of the exact equipment selected. The operational noise impact would be less than significant.

3.5 Impact 4. Temporary increase in ambient noise levels

Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Construction of the project will generate temporary increased noise levels at the property line of the project site. The following measures are identified to reduce the potential effects of construction noise on adjacent properties.

They have been separated via the City of Monrovia Noise Ordinance requirements for construction, and standard practices for acoustical control.

Mitigation 3.

City of Monrovia Noise Ordinance for Mitigating Construction Noise:

- Limit construction activity, including haul truck deliveries, to the hours listed in Table 3 (7:00 am to 7:00 pm on weekdays, 9:00am to 6:00pm on weekends and holidays).

Standard Practices for Mitigating Construction Noise:

- Schedule highest noise-generating activity and construction activity away from noise-sensitive land uses.
- Prohibit and post signs prohibiting unnecessary idling of internal combustion engines.
- Locate all stationary noise-generating equipment such as air compressors and portable generators as far as practicable from noise-sensitive land uses.
- Utilize "quiet" air compressors and other stationary equipment where available.
- Designate a noise disturbance coordinator who would respond to neighborhood complaints about construction noise by determining the cause of the noise complaints and require implementation of reasonable measures to correct the problem. Post a contact telephone number at the construction site.
- If construction outside of the hours indicated is desired, the appropriate permitting must be obtained.

The construction will be limited to the hours indicated in Table 3, unless appropriate permitting is obtained. In order to ensure a less than significant impact of noise to neighboring noise-sensitive areas, the previously noted mitigation measures shall be incorporated into the project. This impact is less than significant with the mitigation measures presented.

3.6 Impact 5. Airport noise exposure

For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The project is not within two miles of a public airport or public use airport. Therefore, there is no impact.

3.7 Impact 6. Private airstrip noise exposure

For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

The project is not within the vicinity of a private airstrip. Therefore, there is no impact.

4.0 SUMMARY

4.1 Summary of significance of impacts

CEQA Noise Impact Question		No Impact	Less Than Significant	Less Than Significant with Mitigation	Potentially Significant
1	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?			X	
2	Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?		X		
3	A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?		X		
4	A substantial temporary or periodic increase in ambient noise levels in the project vicinity about levels existing without the project?			X	
5	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	X			
6	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	X			

4.2 Summary of Mitigation Measures

Mitigation 1. The project will provide sound-rated windows and appropriate exterior façade assemblies to ensure City and State interior noise level standards are met. Exterior façade assemblies may include insulation, specific stud requirements, etc. A detailed acoustical analysis of the project will be completed by a qualified acoustical consultant to define the exact mitigation required such that the interior noise level standards per the City and State are satisfied. The acoustical analysis of exterior to interior noise is a routine plan check and permitting requirement per the State of California Building Code.

Mitigation 2.

City of Monrovia Noise Ordinance for Mitigating Construction Noise:

- Limit construction activity, including haul truck deliveries, to the hours listed in Table 3 (7:00 am to 7:00 pm on weekdays, 9:00am to 6:00pm on weekends and holidays).

Standard Practices for Mitigating Construction Noise:

- Schedule highest noise-generating activity and construction activity away from noise-sensitive land uses.
- Prohibit and post signs prohibiting unnecessary idling of internal combustion engines.
- Locate all stationary noise-generating equipment such as air compressors and portable generators as far as practicable from noise-sensitive land uses.
- Utilize “quiet” air compressors and other stationary equipment where feasible and available.
- Designate a noise disturbance coordinator who would respond to neighborhood complaints about construction noise by determining the cause of the noise complaints and require implementation of reasonable measures to correct the problem. Post a contact telephone number at the construction site.
- If construction outside of the hours indicated is desired, the appropriate permitting must be obtained.

APPENDIX A

Table A.1 – Definitions of Noise-Related Terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound equivalent to 20 times the logarithm, to the base 10, of the ratio of the pressure of the sound to the reference pressure of 20 μPa.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured in an A-weighting filter network. The A-weighting de-emphasizes the very low frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are in the A-weighted scale.
L_0 (L_{max}), L_2, L_8, L_{25}, L_{50}	The A-weighted noise levels that are exceeded 0 percent (maximum noise level), 2 percent, 8 percent, 25 percent, and 50 percent of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the stated measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 P.M. to 10:00 P.M., and after addition of 10 decibels to noise levels in the night between 10:00 P.M. and 7:00 A.M.
Day-Night Noise Level, DNL, Ldn	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 P.M. and 7:00 A.M.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Impulsive Noise	Sound of short duration. Typically associated with an abrupt onset and rapid decay (i.e., gun-shots, etc.).
Pure Tones	A sound wave, residing over a small range of frequencies, which has a sinusoidal behavior over time.
VdB	Unit of measurement used by FHWA to describe ground-borne vibration. Equivalent to 20 times the logarithm, to the base 10, of the ratio of the root mean square ground-borne velocity to the reference of reference of $1x10^{-6}$ in/sec.