Appendix E

Environmental Noise and Vibration Assessment

Environmental Noise & Vibration Assessment

Magnolias Apartments

Morgan Hill, California

BAC Job # 2021-123

Prepared For:

Raney Planning & Management

Attn: Nick Pappani
1501 Sports Drive
Sacramento, CA 95834

Prepared By:

Bollard Acoustical Consultants, Inc.

Dario Gotchet, Senior Consultant

September 21, 2021

BOLLARD
Acoustical Consultants

CEQA Checklist

NOISE AND VIBRATION **– Would the Project Result in:**	**NA – Not Applicable**	**Potentially Significant Impact**	**Less than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a) Generation of substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				**X**	
b) Generation of excessive groundborne vibration or groundborne noise levels?				**X**	
c) For a project located within the vicinity of a private airstrip or 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**

Introduction

The proposed Magnolias Apartments (project) is located north of Wright Avenue between Del Monte Avenue and Monterey Road in Morgan Hill, California. The project proposes the construction of an affordable housing development that would consist of one 5-story apartment building with approximately 66 residential units. Existing land uses in the immediate project vicinity include commercial to the south, school to the east, and residential to the north and west. In addition, an existing Union Pacific Railroad (UPRR) and Caltrain track is located approximately 500 feet to the east of the project area. The project area and site plan are shown on Figures 1 and 2, respectively.

The purposes of this assessment are to quantify the existing noise and vibration environments, identify potential noise and vibration impacts resulting from the project, identify appropriate mitigation measures, and provide a quantitative and qualitative analysis of impacts associated with the project. Specifically, impacts are identified if project-related activities would cause a substantial increase in ambient noise levels at existing sensitive uses in the project vicinity, or if traffic, railroad, or project-generated noise or vibration levels would exceed applicable federal, state, or City of Morgan Hill standards at existing or proposed noise-sensitive uses.

Noise and Vibration Fundamentals

Noise

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are designated as sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or Hertz (Hz). Definitions of acoustical terminology are provided in Appendix A.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals of pressure) as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in decibel levels correspond closely to human perception of relative loudness. Noise levels associated with common noise sources are provided in Figure 3.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable and can be approximated by filtering the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}). The L_{eq} is the foundation of the day-night average noise descriptor, DNL (or L_{dn}), and shows very good correlation with community response to noise.

The day-night average sound level (DNL) is based upon the average noise level over a 24-hour day, with a +10-decibel weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because DNL represents a 24-hour average, it tends to disguise short-term variations in the noise environment. DNL-based noise standards are commonly used to assess noise impacts associated with traffic, railroad, and aircraft noise sources.

Vibration

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, while vibration is usually associated with transmission through the ground or structures. As with noise, vibration consists of an amplitude and frequency. A person's response to vibration will depend on their individual sensitivity as well as the amplitude and frequency of the source.

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration in terms of velocity in inches per second peak particle velocity (IPS, PPV) or root-mean-square (VdB, RMS). Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity as well as RMS velocities. As vibrations travel outward from the source, they excite the particles of rock and soil through which they pass and cause them to oscillate. Differences in subsurface geologic conditions and distance from the source of vibration will result in different vibration levels characterized by different frequencies and intensities. In all cases, vibration amplitudes will decrease with increasing distance. The maximum rate, or velocity of particle movement, is the commonly accepted descriptor of the vibration "strength".

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does frequency. Generally, as the duration and vibration frequency increase, the potential for adverse human response increases.

According to the Transportation and Construction-Induced Vibration Guidance Manual (Caltrans, June 2004), operation of construction equipment and construction techniques generate ground vibration. Traffic traveling on roadways can also be a source of such vibration. At high enough amplitudes, ground vibration has the potential to damage structures and/or cause cosmetic damage. Ground vibration can also be a source of annoyance to individuals who live or work close to vibration-generating activities. However, traffic, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage.

Legend

- Project Area Boundary (Approximate)
- Railroad Track
- Long-Term Noise Measurement Sites
- Vibration Measurement Sites

N

Scale (Feet)

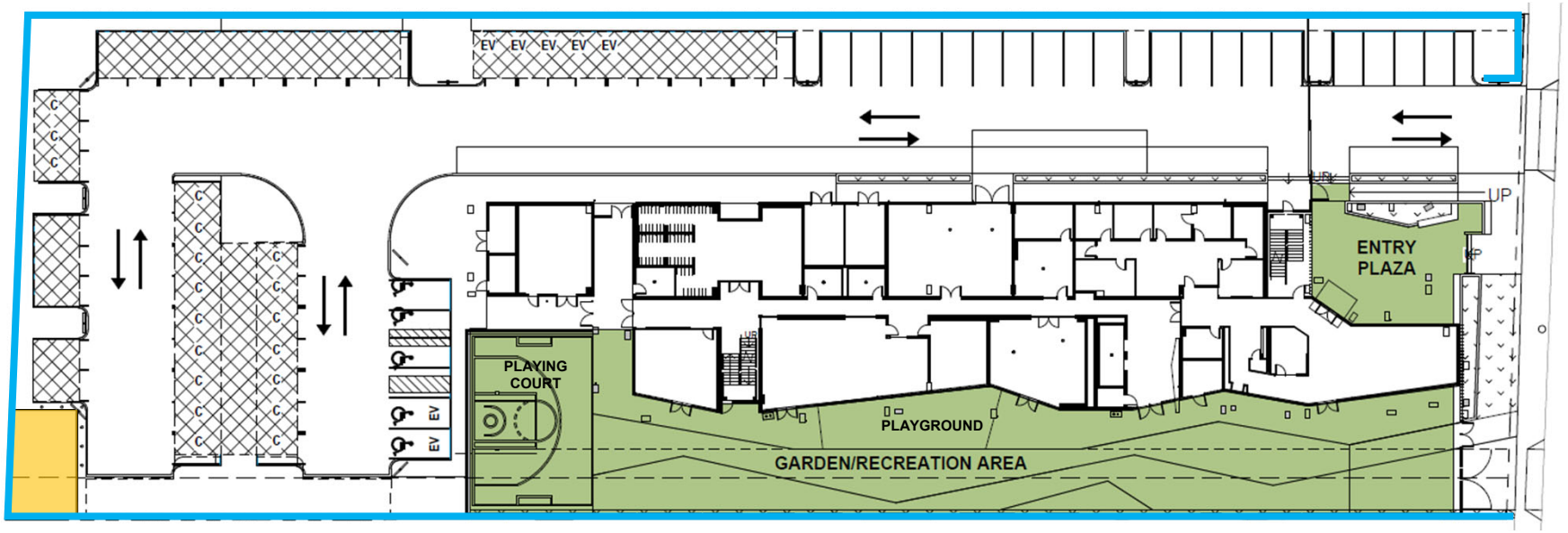
0 100 200

Magnolias Apartments
Morgan Hill, California

Project Area

Figure 1

BOLLARD Acoustical Consultants



Legend

- Proposed Continuous CMU Wall (Various Heights – Minimum 6-Feet)
- Proposed Common Outdoor Areas
- Proposed Emergency Generator Area

N

Scale (Feet)

0 25 50

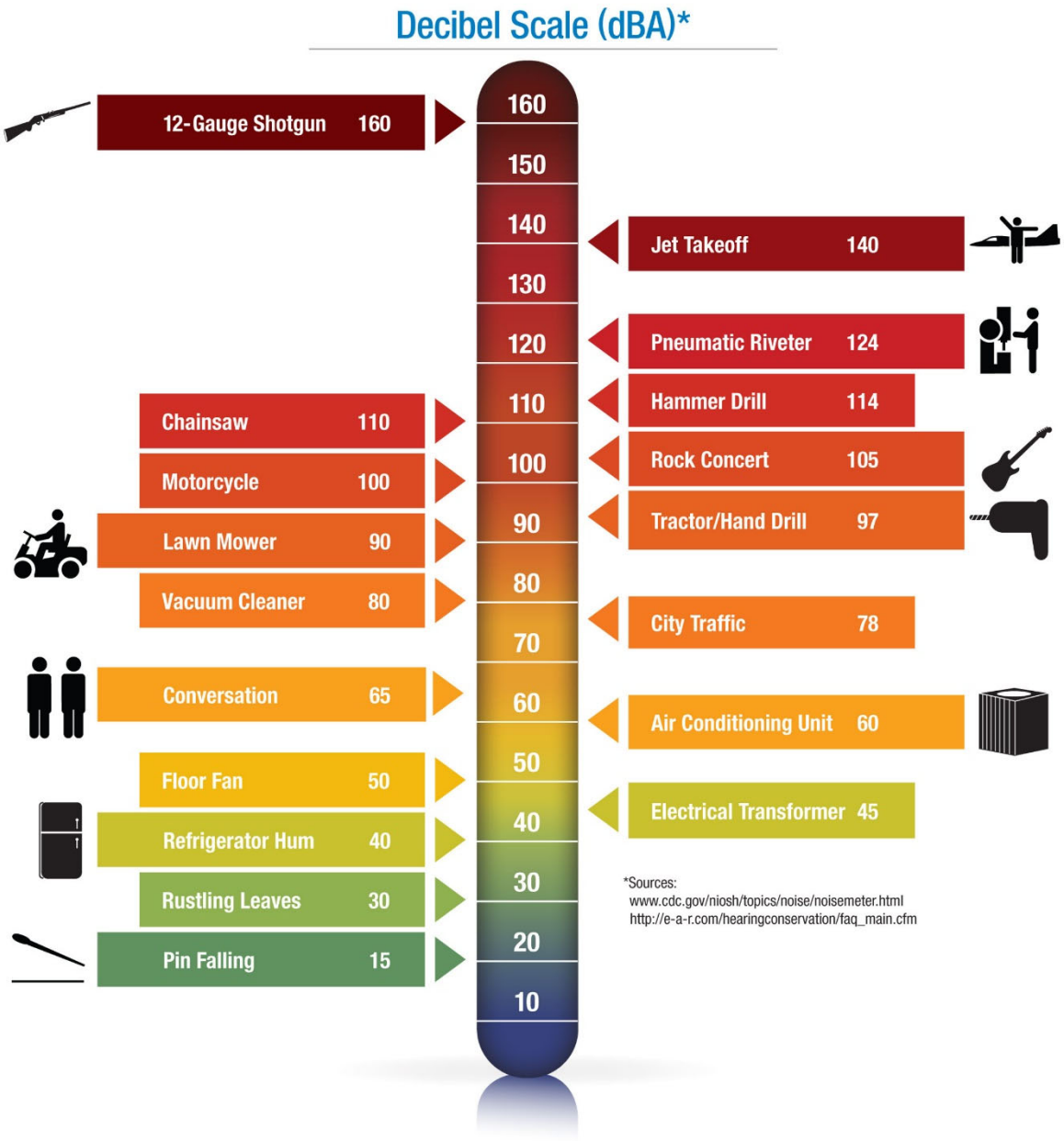
Magnolias Apartments
Morgan Hill, California

Site Plan – Ground Level

Figure 2

BOLLARD Acoustical Consultants

Figure 3
Noise Levels Associated with Common Noise Sources



Regulatory Setting: Criteria for Acceptable Noise and Vibration Exposure

Federal

There are no federal noise or vibration criteria which would be directly applicable to this project. However, the City of Morgan Hill does not currently have a policy for assessing noise impacts associated with increases in ambient noise levels at existing uses resulting from project on-site noise sources. As a result, the following federal noise criteria was applied to the project.

Federal Interagency Commission on Noise (FICON)

The Federal Interagency Commission on Noise (FICON) has developed a graduated scale for use in the assessment of project-related noise level increases. The criteria shown in Table 1 was developed by FICON as a means of developing thresholds for impact identification for project-related noise level increases. The FICON standards have been used extensively in recent years in the preparation of the noise sections of Environmental Impact Reports that have been certified in many California cities and counties.

The use of the FICON standards is considered conservative relative to thresholds used by other agencies in the State of California. For example, the California Department of Transportation (Caltrans) requires a project-related traffic noise level increase of 12 dB for a finding of significance, and the California Energy Commission (CEC) considers project-related noise level increases between 5 to 10 dB significant, depending on local factors. Therefore, the use of the FICON standards, which set the threshold for finding of significant noise impacts as low as 1.5 dB, provides a very conservative approach to impact assessment for this project.

Table 1
Significance of Changes in Cumulative Noise Exposure

Ambient Noise Level Without Project (DNL)	Change in Ambient Noise Level Due to Project
<60 dB	+5.0 dB or more
60 to 65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more
Source: Federal Interagency Committee on Noise (FICON)	

Based on the FICON research, as shown in Table 1, a 5 dB increase in noise levels due to a project is required for a finding of significant noise impact where ambient noise levels without the project are less than 60 dB DNL. Where pre-project ambient conditions are between 60 and 65 dB DNL, a 3 dB increase is applied as the standard of significance. Finally, in areas already exposed to higher noise levels, specifically pre-project noise levels in excess of 65 dB DNL, a 1.5 dB increase is considered by FICON as the threshold of significance.

State of California

California Environmental Quality Act (CEQA)

The State of California has established regulatory criteria that are applicable to this assessment. Specifically, Appendix G of the State of California Environmental Quality Act (CEQA) Guidelines are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. According to Appendix G of the CEQA guidelines, the project would result in a significant noise or vibration impact if the following occur:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or other applicable standards of other agencies?

B. Generation of excessive groundborne vibration or groundborne noise levels?

C. For a project located within the vicinity of a private airstrip or 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?

It should be noted that audibility is not a test of significance according to CEQA. If this were the case, any project which added any audible amount of noise to the environment would be considered significant according to CEQA. Because every physical process creates noise, the use of audibility alone as significance criteria would be unworkable. CEQA requires a substantial increase in noise levels before noise impacts are identified, not simply an audible change.

California Department of Transportation (Caltrans)

The City of Morgan Hill does not currently have adopted standards for groundborne vibration. As a result, the vibration impact criteria developed by the California Department of Transportation (Caltrans) was applied to the project. The Caltrans criteria applicable to damage and annoyance from transient and continuous vibration typically associated with construction activities are presented in Tables 2 and 3. Equipment or activities typical of continuous vibration include: excavation equipment, static compaction equipment, tracked vehicles, traffic on a highway, vibratory pile drivers, pile-extraction equipment, and vibratory compaction equipment. Equipment or activities typical of single-impact (transient) or low-rate repeated impact vibration include impact pile drivers, blasting, drop balls, “pogo stick” compactors, and crack-and-seat equipment (California Department of Transportation 2013).

Table 2
Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (inches/second)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = Peak Particle Velocity

Source: California Department of Transportation, Transportation and Construction Vibration Manual (2013)

Table 3
Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (inches/second)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.40	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = Peak Particle Velocity

Source: California Department of Transportation, Transportation and Construction Vibration Manual (2013)

Local

Morgan Hill 2035 General Plan

The Safety, Services, and Infrastructure Element of the Morgan Hill 2035 General Plan contains goals and policies to ensure that city residents are not subjected to noise beyond acceptable levels. The General Plan goals and policies which are applicable to the project are reproduced below.

GOAL SSI-8

Prevention of noise from interfering with human activities or causing health problems.

Policies

SSI-8.1 **Exterior Noise Level Standards.** Require new development projects to be designed and constructed to meet acceptable exterior noise level standards (see Table 4), as follows:

- Apply a maximum exterior noise level of 60 dBA DNL in residential areas where outdoor use is a major consideration (e.g., backyards in single-family housing developments and recreation areas in multi-family housing projects). Where the City determines that providing a DNL of 60 dBA or lower cannot be achieved after the application of reasonable and feasible mitigation, a DNL of 65 dBA may be permitted.

- Indoor noise levels should not exceed a DNL of 45 dBA in new residential housing units.

- Noise levels in new residential development exposed to an exterior DNL of 60 dBA or greater should be limited to a maximum instantaneous noise level (e.g., trucks on busy streets, train warning whistles) in bedrooms of 50 dBA. Maximum instantaneous noise levels in all other habitable rooms should not exceed 55 dBA. The maximum outdoor noise level for new residences near the railroad shall be 70 dBA DNL, recognizing that train noise is characterized by relatively few loud events.

SSI-8.2 **Impact Evaluation.** The impact of a proposed development project on existing land uses should be evaluated in terms of the potential for adverse community response based on significant increase in existing noise levels, regardless of compatibility guidelines.

SSI-8.5 **Traffic Noise Level Standards.** Consider noise level increases resulting from traffic associated with new projects significant if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

SSI-8.6 **Stationary Noise Level Standards.** Consider noise levels produced by stationary noise sources associated with new projects significant if they substantially exceed existing ambient noise levels.

SSI-8.7 **Other Noise Sources.** Consider noise levels produced by other noise sources (such as ballfields) significant if an acoustical study demonstrates they would substantially exceed ambient noise levels.

SSI-8.9 **Site Planning and Design.** Require attention to site planning and design techniques other than sound walls to reduce noise impacts, including a) installing earth berms, b) increasing the distance between the noise source and the receiver, c) using non-sensitive structures such as parking lots, utility areas, and garages to

shield noise-sensitive areas, d) orienting buildings to shield outdoor spaces from the noise source, and e) minimizing the noise at its source.

GOAL SSI-9

Protection from noise associated with motor vehicles and railroad activity.

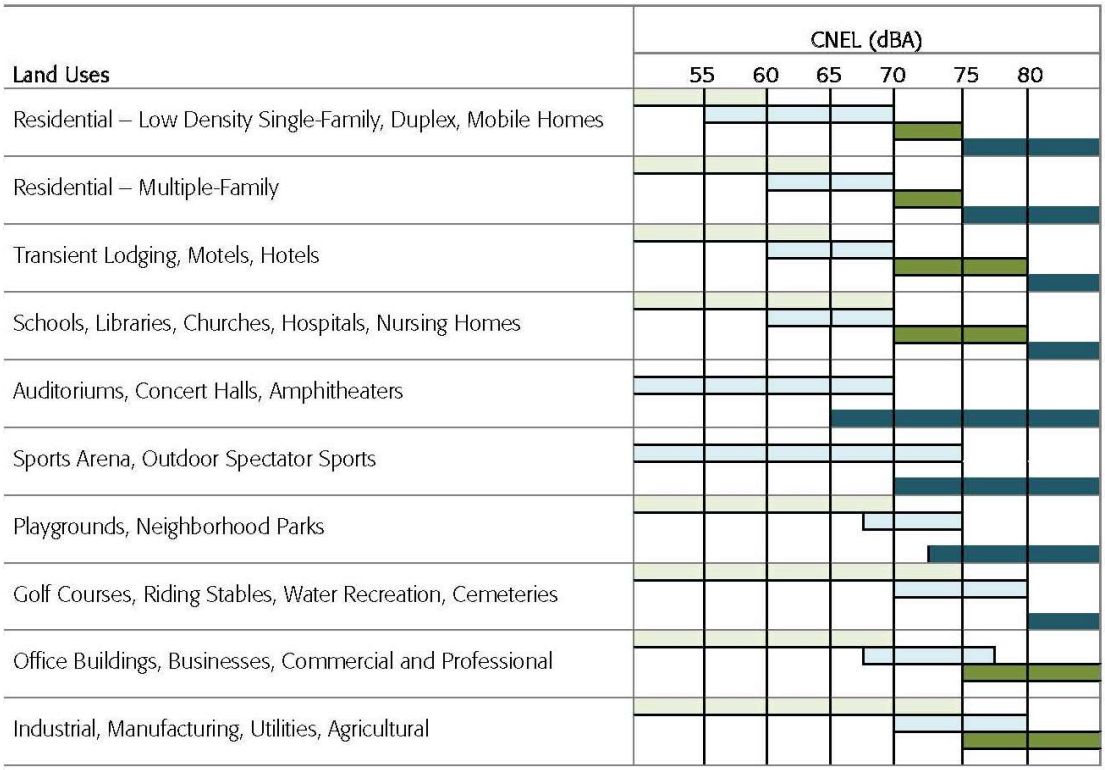
SSI-9.2 **Noise Barrier Dimensions.** If noise barriers are deemed the only effective mitigation for development along major transportation corridors, require an acoustical analysis to determine necessary dimensions.

SSI-9.3 **Sound Wall Design.** The maximum height of sound walls shall be eight feet. Residential projects adjacent to the freeway shall be designed to minimize sound wall height through location of a frontage road, use of two sound walls or other applicable measures. Sound wall design and location shall be coordinated for an entire project area and shall meet Caltrans noise attenuation criteria for a projected eight-lane freeway condition. If two sound walls are used, the first shall be located immediately adjacent to the freeway right-of-way and the second shall be located as necessary to meet Caltrans noise requirements for primary outdoor areas. The minimum rear yard setback to the second wall shall be 20 feet.

SSI-9.6 **Earth Berms.** Allow and encourage earth berms in new development projects as an alternative to sound walls if adequate space is available.

SSI-9.7 **Sound Barrier Design.** Require non-earthen sound barriers to be landscaped, vegetated, or otherwise designed and/or obscured to improve aesthetics and discourage graffiti and other vandalism.

Table 4
State of California Land Use Compatibility Guidelines for Community Noise Environments



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 the 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 does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable:
New construction or development generally should not be undertaken.

Source: Governor's Office of Planning and Research, General Plan Guidelines 2003.

Morgan Hill Municipal Code

The provisions of the Morgan Hill Municipal Code which would be most applicable to this project are reproduced below. The complete text of the municipal code sections pertaining to noise are provided in Appendix B.

Chapter 8.28 of the Municipal Code provides an enumeration of unlawful noise sources (i.e., animals, birds, auto body repairs, blowers, fans, combustion engines, construction activities, exhausts, loudspeakers). Chapter 8.28 does not, however, provide quantitative performance standards. Section 8.28.040(D) exempts construction noise provided the activities are limited to a specific time frame. Section 8.28.040(D) is reproduced below:

> "Construction activities" are defined as including but not limited to excavation, grading, paving, demolition, construction, alteration or repair of any building, site, street or highway, delivery or removal of construction material to a site, or movement of construction materials on a site. Construction activities are prohibited other than between the hours of seven a.m. and eight p.m., Monday through Friday and between the hours of nine a.m. to six p.m. on Saturday. Construction activities may not occur on Sundays or federal holidays. No third person, including but not limited to landowners, construction company owners, contractors, subcontractors, or employers, shall permit or allow any person working on construction activities which are under their ownership, control or direction to violate this provision.

Section 18.46.090 of the Municipal Code establishes acceptable noise level criteria for non-transportation noise sources, which would include activities associated with the project's on-site activities. The Municipal Codes' quantitative exterior noise standards are provided below in Table 5. Based on feedback from Morgan Hill planning staff in previous projects over the years, the Table 5 standards are interpreted as being hourly average (L_{eq}) noise level standards.

Table 5
Noise Level Performance Standards

Receiving Land Use	Maximum Noise Level at Lot Line of Receiving Use[1,2]
Industrial and Wholesale	70 dBA
Commercial	65 dBA
Residential or Public/Quasi Public	60 dBA

[1] The planning commission may allow an additional 5 dBA noise level at the lot line if the maximum noise level shown above cannot be achieved with reasonable and feasible mitigation.

[2] Noise standards shown above do not apply to noise generated by vehicle traffic in the public right-of-way or from temporary construction, demolition, and vehicles that enter or leave the site of the noise-generating use (e.g., construction equipment, trains, trucks).

Source: Morgan Hill Municipal Code

Environmental Setting – Existing Ambient Noise and Vibration Environment

Noise-Sensitive Land Uses in the Project Vicinity

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the primary intended use of the land. Places where people live, sleep, recreate, worship, and study are generally considered to be sensitive to noise because intrusive noise can be disruptive to these activities.

The noise-sensitive land uses which would potentially be affected by the project consist of residential and school uses located to the north, east and west of the project area. Existing commercial uses are located south of the project area. However, commercial uses are typically not considered to be noise-sensitive, but rather noise-generating. The project area and surrounding land uses are shown on Figure 1.

Existing Traffic Noise Levels along Project Area Roadway Network

The FHWA Traffic Noise Model (FHWA-RD-77-108) was used to develop existing noise contours expressed in terms of DNL for major roadways within the project study area. The FHWA model predicts hourly L_{eq} values for free-flowing traffic conditions. Estimates of the hourly distribution of traffic for a typical 24-hour period were used to develop DNL values from L_{eq} values.

Traffic data in the form of AM and PM peak hour movements for existing (2018/2019) conditions were obtained from a traffic memorandum prepared by Hexagon Transportation Consultants, Inc. Average daily traffic volumes were conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions. Using these data and the FHWA Model, traffic noise levels were calculated. The traffic noise level at 100 feet from the roadway centerline and distances from the centerlines of selected roadways to the 60 dB, 65 dB, and 70 dB DNL contours are summarized in Table 6.

In many cases, the actual distances to noise level contours may vary from the distances predicted by the FHWA Model. Factors such as roadway curvature, roadway grade, shielding from local topography or structures, elevated roadways, or elevated receivers may affect actual sound propagation. It is also recognized that existing sensitive land uses within the project vicinity are located varying distances from the centerlines of the local roadway network. The 100-foot reference distance is utilized in this assessment to provide a reference position at which changes in existing and future traffic noise levels resulting from the project can be evaluated. Appendix C contains the FWHA Model inputs for existing conditions.

Table 6
Existing Traffic Noise Modeling Results

Seg.	Intersection	Direction	DNL 100 Feet from Roadway	Distance to Contour (feet)		
				70 dB DNL	65 dB DNL	60 dB DNL
1	Monterey Rd / Cochrane Rd	North	67	60	129	279
2		South	62	31	68	145
3		East	66	51	110	237
4		West	50	4	9	20
5	Monterey Rd / Old Monterey Rd	North	63	32	69	148
6		South	62	31	68	146
7		East	--	--	--	--
8		West	57	14	30	64
9	Monterey Rd / Wright Ave	North	63	32	70	150
10		South	61	27	58	125
11		East	39	1	2	4
12		West	57	13	27	59

Blank cell = no traffic data was provided
Source: FHWA-RD-77-108 with inputs from Hexagon Transportation Consultants, Inc.

Existing Overall Ambient Noise Environment within the Project Area

The existing ambient noise environment within the project area is defined primarily by noise from traffic on Monterey Road, activities at nearby commercial uses to the south (automotive and small engine repair businesses), and to a lesser extent by intermittent railroad operations on the railroad track located approximately 500 feet to the east. To generally quantify existing ambient noise environment within the project area, BAC conducted long-term (72-hour) ambient noise level measurements from July 15th to 18th, 2021. The noise survey locations are shown on Figure 1, identified as sites LT-1 through LT-3. Photographs of the noise survey locations are provided in Appendix D.

Larson Davis Laboratories (LDL) Model LxT precision integrating sound level meters were used to complete the long-term noise level measurements. The meters were calibrated immediately before use with an LDL Model CA200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all specifications of the American National Standards Institute requirements for Type 1 sound level meters (ANSI S1.4). The ambient noise level survey results are summarized below in Table 7. The detailed results of the ambient noise survey are contained in Appendix E in tabular format and graphically in Appendix F.

Table 7
Summary of Long-Term Noise Survey Measurement Results – July 15-18, 2021[1]

Site Description[2]	Date	DNL	Average Measured Hourly Noise Levels (dBA)			
			Daytime[3]		Nighttime[4]	
			L_{eq}	L_{max}	L_{eq}	L_{max}
LT-1: Southwest end of the project area adjacent to commercial uses	7/15-7/16	63	62	78	55	70
	7/16-7/17	60	60	77	51	68
	7/17-7/18	60	59	77	51	66
LT-2: Along southern project property line adjacent to commercial uses	7/15-7/16	56	57	76	44	62
	7/16-7/17	54	54	73	44	60
	7/17-7/18	56	54	72	47	62
LT-3: Adjacent to commercial uses, approximately 120' from centerline of Monterey Rd	7/15-7/16	59	56	74	51	70
	7/16-7/17	57	56	74	48	66
	7/17-7/18	56	55	74	48	66

[1] Detailed summaries of the noise monitoring results are provided in Appendices E and F.
[2] Long-term noise survey locations are shown on Figure 1.
[3] Daytime hours: 7:00 a.m. to 10:00 p.m.
[4] Nighttime hours: 10:00 p.m. to 7:00 a.m.
Source: Bollard Acoustical Consultants, Inc. (2021)

The Table 7 data indicate that measured day-night average and average hourly noise levels were generally consistent at each individual site throughout the monitoring period.

Existing Ambient Vibration Environment

During a site visit on July 19th, 2021, vibration levels were below the threshold of perception at the project site. Nonetheless, to quantify existing vibration levels at the project site, BAC conducted short-term (10-minute) vibration measurements at the locations identified on Figure 1 (sites V-1 through V-3). Photographs of the vibration survey equipment are provided in Appendix D.

A Larson-Davis Laboratories Model LxT precision integrating sound level meter equipped with a PCB Electronics vibration transducer was used to complete the vibration measurements. In the analysis of the vibration measurement data, it was revealed that measured maximum vibration levels at the project site were below 0.001 in/sec PPV.

Impacts and Mitigation Measures

Thresholds of Significance

For the purposes of this report, a noise and vibration impact is considered significant if the project would result in:

- **Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or other applicable standards of other agencies?**

  For this project, compliance with the applicable noise level standards established in the Morgan Hill General Plan and Municipal Code is required. For increases in off-site traffic noise, General Plan Policy SSI-8.5 considers noise level increases resulting from traffic associated with new projects significant if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

  Existing residential, commercial, and school land uses are located within the immediate project vicinity. For noise generated by project on-site activities, the Municipal Code establishes exterior noise level limits of 60 and 65 dB L_{eq} for residential/public and commercial land uses (Table 5). In addition, General Plan Policy SSI-8.6 considers noise levels produced by stationary noise sources associated with new projects significant if they substantially exceed existing ambient noise levels. The primary noise sources associated with proposed on-site activities have been identified as activities within the proposed outdoor garden/recreation area (i.e., playing court and playground), parking area movements, on-site vehicle circulation (through parking aisles), rooftop mechanical equipment (HVAC), and an emergency standby generator. Because it is reasonably assumed that activities within the playing court and playground would occur during daytime hours only (7:00 a.m. to 10:00 p.m.), the daytime ambient noise level data presented in Table 7 would serve as the baseline ambient noise level environment in the project vicinity for those noise sources. The remaining identified on-site activities were assessed relative to the daytime and nighttime ambient noise level data in Table 7. However, the General Plan does not provide guidelines for determining a substantial noise increase relative to ambient conditions. As a result, for noise generated by on-site activities and the determination of a substantial noise increase relative to ambient conditions, the FICON criteria presented in Table 1 were used.

  According to the FICON criteria shown in Table 1, a 5 dB increase in noise levels due to a project is required for a finding of a significant noise impact where ambient day-night average noise levels without the project are less than 60 dB DNL. Where pre-project ambient conditions are between 60 and 65 dB DNL, a 3 dB increase is applied as the standard of significance. Finally, in areas already exposed to higher noise levels, specifically pre-project noise levels in excess of 65 dB DNL, a 1.5 dB increase is considered by FICON as the threshold of significance. As indicated in Table 7, the measured day-night average noise levels at the project site ranged from 54 to 63 dB DNL (arithmetic mean of 58 dB DNL). Based on an arithmetic mean of 58 dB DNL, a 5 dB increase in noise levels due to project on-site activities is required for a finding of a significant impact.

- **Generation of excessive groundborne vibration or groundborne noise levels?**

  Vibration level exposure at existing off-site or proposed on-site sensitive receptors were assessed relative to the Caltrans groundborne impact vibration criteria provided in Table 2.

- **For a project located within the vicinity of a private airstrip or 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.**

  Because the project site is not located within 2 miles of a public use airport or in the vicinity of a private airstrip or airport land use plan, consideration of noise impacts relative to this CEQA criterion would not be warranted for this evaluation.

Noise Impacts Associated with Project-Generated Increases in Off-Site Traffic

With development of the project, traffic volumes on the local roadway network will increase. Those increases in daily traffic volumes will result in a corresponding increase in traffic noise levels at existing uses located along those roadways. The FHWA Model was used with traffic input data from a traffic memorandum prepared by Hexagon Transportation Consultants, Inc. to predict project traffic noise level increases relative to existing and future (cumulative) conditions.

Impact 1: Increases in Existing Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for Existing and Existing Plus Project conditions in the project area roadway network were obtained from the traffic memorandum prepared by Hexagon Transportation Consultants, Inc. Average daily traffic (ADT) volumes were conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions.

Existing versus Existing Plus Project traffic noise levels on the local roadway network are shown in Table 8. The following section includes an assessment of predicted traffic noise levels relative to the increase significance noise criteria contained in Policy SSI-8.5 of the Morgan Hill General Plan. The Table 8 data are provided in terms of DNL at a standard distance of 100 feet from the centerlines of the project-area roadways. Appendix C contains the FWHA Model inputs.

Table 8
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
Existing Versus Existing Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			E	E+P	Increase	
1	Monterey Rd / Cochrane Rd	North	66.7	66.7	0.0	No
2		South	62.4	62.5	0.1	No
3		East	65.6	65.7	0.1	No
4		West	49.6	49.6	0.0	No
5	Monterey Rd / Old Monterey Rd	North	62.5	62.6	0.1	No
6		South	62.5	62.5	0.0	No
7		East	--	--	--	--
8		West	57.1	57.1	0.0	No
9	Monterey Rd / Wright Ave	North	62.7	62.7	0.0	No
10		South	61.5	61.5	0.0	No
11		East	39.1	40.2	1.1	No
12		West	56.5	56.5	0.0	No

Blank cell = no traffic data was provided

Source: FHWA-RD-77-108 with inputs from Hexagon Transportation Consultants, Inc.

As indicated in Table 8, the proposed project's contribution to traffic noise level increases is predicted to satisfy the applicable General Plan Policy SSI-8.5 increase significance criteria along all the roadway segments evaluated in the existing conditions analysis. As a result, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (Existing versus Existing Plus Project conditions) are identified as being ***less than significant***.

Impact 2: Increases in Cumulative Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for Cumulative and Cumulative Plus Project conditions in the project area roadway network were obtained from the traffic memorandum prepared by Hexagon Transportation Consultants, Inc. Average daily traffic (ADT) volumes were conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions.

Cumulative versus Cumulative Plus Project traffic noise levels on the local roadway network are shown in Table 9. The following section includes an assessment of predicted traffic noise levels relative to the increase significance noise criteria contained in Policy SSI-8.5 of the Morgan Hill General Plan. The Table 9 data are provided in terms of DNL at a standard distance of 100 feet from the centerlines of the project-area roadways. Appendix C contains the FWHA Model inputs.

Table 9
Traffic Noise Modeling Results and Project-Related Traffic Noise Increases
Cumulative Versus Cumulative Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			C	C+P	Increase	
1	Monterey Rd / Cochrane Rd	North	67.7	67.7	0.0	No
2		South	63.2	63.2	0.0	No
3		East	66.5	66.5	0.0	No
4		West	49.6	49.6	0.0	No
5	Monterey Rd / Old Monterey Rd	North	63.3	63.4	0.1	No
6		South	63.3	63.3	0.0	No
7		East	--	--	--	--
8		West	58.0	58.0	0.0	No
9	Monterey Rd / Wright Ave	North	63.5	63.5	0.0	No
10		South	62.2	62.2	0.0	No
11		East	39.1	40.2	1.1	No
12		West	56.9	56.9	0.0	No

Blank cell = no traffic data was provided
Source: FHWA-RD-77-108 with inputs from Hexagon Transportation Consultants, Inc.

The Table 9 data indicate that the proposed project's contribution to traffic noise level increases is predicted to satisfy the applicable General Plan Policy SSI-8.5 increase significance criteria along all the roadway segments evaluated in the cumulative conditions analysis. As a result, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (Cumulative versus Cumulative Plus Project conditions) are identified as being ***less than significant***.

Off-Site Noise Impacts Associated with On-Site Noise Sources

The primary noise sources associated with the project's on-site activities have been identified as activities within the proposed outdoor garden/recreation area (i.e., playing court and playground), parking area movements, on-site vehicle circulation (through the parking aisles), rooftop mechanical equipment (HVAC), and an emergency standby generator. It should be noted that the project proposes two (2) common space roof decks on the 5th floor of the apartment building. However, based on the roof deck capacities, elevated locations, and shielding that would be provided by proposed intervening features (i.e., solid roof deck walls and building envelope), noise impacts associated with people conversating within the proposed roof decks are not expected at nearby existing off-site land uses. Therefore, this assessment does not include an impact discussion associated with project roof deck noise exposure at off-site uses.

The nearest existing off-site land uses to the project have been identified as residential, commercial, and school. As a result, the Morgan Hill Municipal Code noise level limits applicable to residential, commercial, and public (school) uses presented in Table 5 of this report were applied to project on-site noise sources. Analyses of noise exposure from the above-identified on-site noise sources at those land uses are provided in the following section. Satisfaction of the

Municipal Code noise level standards at the nearest off-site land uses would ensure for compliance of the noise level limits at more distant land uses.

Finally, the project site plans indicate that a continuous (solid) CMU wall is proposed for construction along the north, south, and west project property lines. The location of the proposed wall is shown on Figure 2. The site plans further indicate that the proposed continuous wall will vary in height but will be a minimum of 6-feet-tall. Based on a review of construction details provided in the site plans, the proposed wall would perform as an effective noise barrier. The following analyses of project on-site activity noise levels at off-site land uses include consideration of the noise attenuation that would be provided by the proposed continuous CMU wall. For the purposes of this assessment, the noise attenuation achieved from a 6-foot-tall solid wall along the property line was conservatively applied to project on-site noise levels, which is estimated to be approximately 6 dB.

Impact 3: Playing Court Noise at Existing Off-Site Uses

The project proposes a playing court (basketball) within the outdoor garden/recreation area, as identified on Figure 2. The primary noise source associated with outdoor playing court use is participant shouting. BAC file data indicate that average noise levels of similar sized outdoor playing courts are approximately 55 dB L_{eq} at a distance of 50 feet from the focal point of the court area. Based on the reference noise level above, and assuming standard spherical spreading loss (-6 dB per doubling of distance), playing court noise exposure at the nearest existing off-site land uses was calculated and the results of those calculations are presented in Table 10. The results presented in Table 10 include consideration of the noise attenuation that would be provided by the proposed continuous CMU wall along the project property line as discussed in this report and as indicated on Figure 2.

Table 10
Predicted Playing Court Noise Levels at Existing Off-Site Uses

Receiver[1]	Distance from Playing Court (ft)[2]	Predicted Exterior Noise Levels, L_{eq} (dB)[3]
Residential – West	160	39
Residential – North	120	41
Commercial – South	30	53
School – East	400	37

[1] Existing land use locations are identified on Figure 1.
[2] Distances scaled from center of playing court to receiver property lines using provided site plans.
[3] Predicted noise levels at residential and commercial uses include a -6 dB offset to account for the proposed CMU wall along the property lines. No offset was applied at the school use to the east.
Source: Bollard Acoustical Consultants, Inc. (2021)

For noise generated by on-site activities, the Morgan Hill Municipal Code establishes exterior noise level standards of 60 and 65 dB L_{eq} for residential/public and commercial uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. As indicated in Table 10, project playing court noise levels are predicted to satisfy the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential, commercial, and school land uses.

Noise measurement sites LT-1 through LT-3 on Figure 1 were selected to be representative of the ambient noise level environment within the project vicinity, including contributions from adjacent Monterey Road traffic, railroad operations to the east, and nearby commercial activities. As shown in Table 7, measured daytime hourly average noise levels in the project vicinity ranged from 54 to 62 (arithmetic mean of 57 dB L_{eq}). As discussed previously, a 5 dB increase in noise levels due to project on-site activities would be required for a finding of a significant impact relative to the FICON increase significance criteria.

Given the arithmetic mean of measured daytime hourly average noise levels cited above, and based on the FICON criteria, a significant noise impact would be identified if predicted hourly average noise levels due to the project would exceed 62 dB L_{eq} at existing off-site land uses (i.e., 5 dB above ambient). Based on the data presented in Table 10, the increase in ambient daytime noise levels resulting from project playing court activities is calculated to be 0.1 dB L_{eq} at the nearest residential uses to the north and west. In addition, the project-generated increase in ambient daytime noise levels is calculated to be 1.9 dB L_{eq} at the nearest commercial use to the south. Finally, noise measurement site LT-1 was located nearest to the school use to the east. Relative to the arithmetic mean of measured daytime hourly noise levels at site LT-3, the project-generated increase in ambient daytime noise levels is calculated to be 0.1 dB L_{eq} at the school use to the east.

Because noise exposure from project playing court activities is predicted to satisfy applicable Morgan Hill Municipal Code noise level standards at the nearest existing off-site land uses, and because noise level exposure from playing court activities is not expected to significantly increase ambient noise levels at those uses relative to the FICON criteria, this impact is identified as being ***less than significant.***

Impact 4: Playground Noise at Existing Off-Site Uses

The project proposes a playground within the outdoor garden/recreation area, as identified on Figure 2. For the assessment of playground noise impacts, noise level data collected by BAC staff at various outdoor play areas in recent years was utilized. The primary noise source associated with play area use is shouting children. BAC file data indicate that average noise levels of similar sized outdoor play areas range from approximately 50 to 55 dB L_{eq} at a distance of 50 feet from the focal point of the playground area. Based on a reference noise level of 55 dB L_{eq} at 50 feet, and assuming standard spherical spreading loss (-6 dB per doubling of distance), playground noise exposure at the nearest existing off-site land uses was calculated and the results of those calculations are presented in Table 11. The results presented in Table 11 include consideration of the noise attenuation that would be provided by the proposed continuous CMU wall along the project property line as discussed in this report and as indicated on Figure 2.

Table 11
Predicted Playground Noise Levels at Existing Off-Site Uses

Receiver[1]	Distance from Playground (ft)[2]	Predicted Exterior Noise Levels, L_{eq} (dB)[3,4]
Residential – West	270	34
Residential – North	120	31
Commercial – South	30	53
School – East	300	39

[1] Existing land use locations are identified on Figure 1.
[2] Distances scaled from center of playground area to receiver property lines using provided site plans.
[3] Predicted noise levels at residential and commercial uses include a -6 dB offset to account for the proposed CMU wall along the property lines. No offset was applied at the school use to the east.
[4] Predicted noise levels at residential use to the north have include an additional adjustment of -10 dB to account for significant shielding that would be provided by the proposed intervening apartment building.
Source: Bollard Acoustical Consultants, Inc. (2021)

For noise generated by on-site activities, the Morgan Hill Municipal Code establishes exterior noise level standards of 60 and 65 dB L_{eq} for residential/public and commercial uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. The Table 11 data indicate that project playground noise levels are predicted to comply with the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential, commercial, and school land uses.

Noise measurement sites LT-1 through LT-3 on Figure 1 were selected to be representative of the ambient noise level environment within the project vicinity, including contributions from adjacent Monterey Road traffic, railroad operations to the east, and nearby commercial activities. The Table 7 data indicate that measured daytime hourly average noise levels in the project vicinity ranged from 54 to 62 (arithmetic mean of 57 dB L_{eq}). As discussed previously, a 5 dB increase in noise levels due to project on-site activities would be required for a finding of a significant impact relative to the FICON increase significance criteria.

Given the arithmetic mean of measured daytime hourly average noise levels cited above, and based on the FICON criteria, a significant noise impact would be identified if predicted hourly average noise levels due to the project would exceed 62 dB L_{eq} at existing off-site land uses (i.e., 5 dB above ambient). Based on the data presented in Table 11, the increase in ambient daytime noise levels resulting from project playground activities is calculated to be less than 0.1 dB L_{eq} at the nearest residential uses to the north and west. In addition, the project-generated increase in ambient daytime noise levels is calculated to be 1.6 dB L_{eq} at the nearest commercial use to the south. Finally, noise measurement site LT-1 was located nearest to the school use to the east. Relative to the arithmetic mean of measured daytime hourly noise levels at site LT-3, the project-generated increase in ambient daytime noise levels is calculated to be less than 0.1 dB L_{eq} at the school use to the east.

Because noise exposure from project playground activities is predicted to satisfy applicable Morgan Hill Municipal Code noise level standards at the nearest existing off-site land uses, and because noise level exposure from playground activities is not expected to significantly increase

ambient noise levels at those uses relative to the FICON criteria, this impact is identified as being ***less than significant.***

Impact 5: Parking Movement Noise at Existing Off-Site Uses

As a means of determining potential noise exposure due to project parking lot activities, Bollard Acoustical Consultants, Inc. (BAC) utilized specific parking lot noise level measurements conducted by BAC. Specifically, a series of individual noise measurements were conducted of multiple vehicle types arriving and departing a parking area, including engines starting and stopping, car doors opening and closing, and persons conversing as they entered and exited the vehicles. The results of those measurements revealed that individual parking lot movements generated mean noise levels of approximately 70 dB SEL at a reference distance of 50 feet.

To compute hourly average (L_{eq}) noise levels generated by parking lot activities, the approximate number of hourly operations and distance to parking area is required. According to the project site plan, the project proposes parking stalls on the north and west sides of the apartments building. The hourly average noise level generated by parking lot movements is computed using the following formula:

$$Peak\ Hour\ L_{eq} = 70+10*\log (N) - 35.6$$

Where 70 is the mean Sound Exposure Level (SEL) for an automobile parking lot arrival or departure, N is the number of parking lot operations in a given hour, and 35.6 is 10 times the logarithm of the number of seconds in an hour. Using the information provided above, and assuming standard spherical spreading loss (-6 dB per doubling of distance), project parking activity noise exposure at the nearest off-site existing land uses was calculated and the results of those calculations are presented in Table 12. The results presented in Table 12 include consideration of noise attenuation that would be provided by the proposed continuous CMU wall along the project property line as discussed in this report and as indicated on Figure 2.

The results presented in Table 12 include an analysis of noise exposure associated with the closest parking stalls to adjacent land uses. It was conservatively assumed for the purposes of this analysis that those nearest parking stalls could either fill or empty during a given peak hour (although it is likely that parking area activity would be more spread out). The number of parking stalls utilized in the analysis are footnoted in Table 12.

Table 12
Predicted Parking Activity Noise Levels at Existing Off-Site Uses

Receiver[1]	Distance from Nearest Parking Stalls (ft)[2]	Predicted Exterior Noise Levels, L_{eq} (dB)[3,4]
Residential – West	15	50
Residential – North	15	56
Commercial – South	25	45
School – East	200	32

[1] Existing land use locations are identified on Figure 1.
[2] Distances scaled from nearest parking stalls to receiver property lines using provided site plans.
[3] Predicted noise levels at residential and commercial uses include a -6 dB offset to account for the proposed CMU wall along the property lines. No offset was applied at the school use to the east.
[4] Number of parking stalls in analysis: Residential-West (10), Residential-North (40), Commercial-South (10), School-East (10).
Source: Bollard Acoustical Consultants, Inc. (2021)

For noise generated by on-site activities, the Morgan Hill Municipal Code establishes exterior noise level standards of 60 and 65 dB L_{eq} for residential/public and commercial uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. As indicated in Table 12, project parking activity noise levels are predicted to satisfy the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential, commercial, and school land uses.

Noise measurement sites LT-1 through LT-3 on Figure 1 were selected to be representative of the ambient noise level environment within the project vicinity, including contributions from adjacent Monterey Road traffic, railroad operations to the east, and nearby commercial activities. As shown in Table 7, measured daytime hourly average noise levels in the project vicinity ranged from 54 to 62 (arithmetic mean of 57 dB L_{eq}). The Table 7 data also indicate that measured nighttime hourly average noise levels ranged from 44 to 55 dB L_{eq} (arithmetic mean of 49 dB L_{eq}). As discussed previously, a 5 dB increase in noise levels due to project on-site activities would be required for a finding of a significant impact relative to the FICON increase significance criteria.

Given the arithmetic means of measured daytime and nighttime hourly average noise levels cited above, and based on the FICON criteria, a significant noise impact would be identified if predicted project-generated hourly average noise levels would exceed either 62 dB L_{eq} (during daytime hours) or 54 dB L_{eq} (during nighttime hours) at existing off-site land uses (i.e., 5 dB above ambient). Based on the data presented in Table 12, the increase in ambient daytime noise levels resulting from project parking activities is calculated to range from less than 0.1 dB to 2.1 dB L_{eq} at the nearest residential, commercial, and school uses. During nighttime hours (10:00 p.m. to 7:00 a.m.), however, it is reasonable to assume that parking activity on the project site will be significantly less than that which occurs during daytime hours. For the purposes of this analysis, it was assumed that on-site parking movements during nighttime hours would be approximately 50% less than those occurring during daytime hours. Based on this assumption and the Table 12 data, the increase in ambient nighttime noise levels resulting from project parking activities is calculated to range from less than 0.1 dB to 4.8 dB L_{eq} at the nearest residential, commercial, and school uses.

Because noise exposure from project parking movements is predicted to satisfy applicable Morgan Hill Municipal Code noise level standards at the nearest existing off-site land uses, and because noise level exposure from parking activities is not expected to significantly increase ambient noise levels at those uses relative to the FICON criteria, this impact is identified as being ***less than significant.***

Impact 6: On-Site Vehicle Circulation Noise at Existing Off-Site Uses

The FHWA Model was utilized with daily trip generation data obtained from the traffic memorandum prepared by Hexagon Transportation Consultants, Inc. to quantify noise associated with on-site traffic circulation noise generated by the interior roadways of the project site (parking area drive aisles) at existing off-site land uses. The on-site vehicle circulation route (through parking aisles) is shown on Figure 2.

According to the traffic memorandum, the proposed project is expected to generate approximately 23 vehicle trips during the AM peak hour (6 inbound, 17 outbound) and 30 vehicle trips during the PM peak hour (18 inbound, 12 outbound). Based on this trip generation data, worst-case on-site traffic circulation noise exposure would be associated the PM peak hour. Based on 30 vehicle trips during a given worst-case hour, and assuming an on-site vehicle speed of less than 25 mph through the parking aisles, project-generated on-site traffic circulation noise exposure at the nearest off-site existing land uses was calculated and the results of those calculations are presented in Table 13.

Table 13
Predicted On-Site Vehicle Circulation Noise Levels at Existing Off-Site Uses

Receiver[1]	Distance from On-Site Circulation Route (ft)[2]	Predicted Exterior Noise Levels, L_{eq} (dB)[3,4]
Residential – West	30	43
Residential – North	30	43
Commercial – South	30	43
School – East	130	34

[1] Existing land use locations are identified on Figure 1.
[2] Distances scaled from nearest parking aisle to property lines using provided site plans.
[3] Predicted noise levels at residential and commercial uses include a -6 dB offset to account for the proposed CMU wall along the property lines. No offset was applied at the school use to the east.
[4] Predicted hourly average (Leq) noise levels based on a 30 total vehicle trips during a worst-case peak hour.
Source: Bollard Acoustical Consultants, Inc. (2021)

For noise generated by on-site activities, the Morgan Hill Municipal Code establishes exterior noise level standards of 60 and 65 dB L_{eq} for residential/public and commercial uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. The Table 13 data indicate that project on-site vehicle circulation noise levels are predicted to comply with the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential, commercial, and school land uses.

Noise measurement sites LT-1 through LT-3 on Figure 1 were selected to be representative of the ambient noise level environment within the project vicinity, including contributions from

adjacent Monterey Road traffic, railroad operations to the east, and nearby commercial activities. The Table 7 data indicate that measured daytime hourly average noise levels in the project vicinity ranged from 54 to 62 (arithmetic mean of 57 dB L_{eq}). The Table 7 data also indicate that measured nighttime hourly average noise levels ranged from 44 to 55 dB L_{eq} (arithmetic mean of 49 dB L_{eq}). As discussed previously, a 5 dB increase in noise levels due to project on-site activities would be required for a finding of a significant impact relative to the FICON increase significance criteria.

Given the arithmetic means of measured daytime and nighttime hourly average noise levels cited above, and based on the FICON criteria, a significant noise impact would be identified if predicted project-generated hourly average noise levels would exceed either 62 dB L_{eq} (during daytime hours) or 54 dB L_{eq} (during nighttime hours) at existing off-site land uses (i.e., 5 dB above ambient). Based on the data presented in Table 13, the increase in ambient daytime noise levels resulting from project on-site vehicle circulation is calculated to range from less than 0.1 dB to 0.2 dB L_{eq} at the nearest residential, commercial, and school uses. During nighttime hours (10:00 p.m. to 7:00 a.m.), however, it is reasonable to assume that on-site vehicle circulation on the project site will be significantly less than that which occurs during daytime hours. For the purposes of this analysis, it was assumed that on-site vehicle circulation during nighttime hours would be approximately 50% less than that occurring during daytime hours. Based on this assumption and the Table 13 data, the increase in ambient nighttime noise levels resulting from project on-site vehicle circulation is calculated to range from less than 0.1 dB to 0.8 dB L_{eq} at the nearest residential, commercial, and school uses.

Because noise exposure from project on-site vehicle circulation is predicted to satisfy applicable Morgan Hill Municipal Code noise level standards at the nearest existing off-site land uses, and because noise level exposure from on-site vehicle circulation is not expected to significantly increase ambient noise levels at those uses relative to the FICON criteria, this impact is identified as being ***less than significant.***

Impact 7: Rooftop Mechanical Equipment (HVAC) Noise at Existing Off-Site Uses

The project proposes locating air-conditioning equipment (condensers) on the roof of the apartment building (above the 5th floor). HVAC equipment at the rooftop locations would be completely shielded from view of existing adjacent off-site uses by the building structure and rooftop parapets.

It is our understanding that specific HVAC equipment models have not yet been selected for the project. To quantify project HVAC equipment noise level exposure at existing off-site uses, BAC utilized sound level data for Carrier Model CH14NB-024 Single-Stage Heat Pumps (condensers). Based on the experience of BAC in previous projects including apartment building rooftop-mounted HVAC equipment, it is expected that similar-sized condensers would likely be installed at the project site. Appendix G contains the manufacturer's noise level data for these units.

BAC utilized the Appendix G reference sound power levels with accepted sound propagation (-6 dB per doubling of distance) to predict the level of mechanical equipment noise which would be expected at the property lines of the existing adjacent off-site uses. The results of that analysis are provided in Table 14.

Table 14
Predicted HVAC Equipment Noise Levels at Existing Off-Site Uses

Receiver[1]	Predicted Exterior Noise Level, L_{eq} (dB)[2,3]
Residential – West	28
Residential – North	39
Commercial – South	41
School – East	29

[1] Existing land use locations are identified on Figure 1.
[2] Predicted overall equipment sound level exposure from all proposed condenser units.
[3] Predicted noise levels include a -10 dB offset to account for significant shielding provided by building structure and rooftop parapets.
Source: Bollard Acoustical Consultants, Inc. (2021)

For noise generated by on-site activities, the Morgan Hill Municipal Code establishes exterior noise level standards of 60 and 65 dB L_{eq} for residential/public and commercial uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. As indicated in Table 14, project HVAC equipment noise levels are predicted to satisfy the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential, commercial, and school land uses.

Noise measurement sites LT-1 through LT-3 on Figure 1 were selected to be representative of the ambient noise level environment within the project vicinity, including contributions from adjacent Monterey Road traffic, railroad operations to the east, and nearby commercial activities. As shown in Table 7, measured daytime hourly average noise levels in the project vicinity ranged from 54 to 62 (arithmetic mean of 57 dB L_{eq}). The Table 7 data also indicate that measured nighttime hourly average noise levels in the project vicinity ranged from 44 to 55 dB L_{eq} (arithmetic mean of 49 dB L_{eq}). As discussed previously, a 5 dB increase in noise levels due to project on-site activities would be required for a finding of a significant impact relative to the FICON increase significance criteria.

Given the arithmetic means of measured daytime and nighttime hourly average noise levels cited above, and based on the FICON criteria, a significant noise impact would be identified if predicted project-generated hourly average noise levels would exceed either 62 dB L_{eq} (during daytime hours) or 54 dB L_{eq} (during nighttime hours) at existing off-site land uses (i.e., 5 dB above ambient). Based on the data presented in Table 14, the increase in ambient daytime and nighttime noise levels resulting from project HVAC equipment is calculated to range from less than 0.1 to 0.4 dB L_{eq} at the nearest residential uses to the north and west. In addition, the project-related increase in ambient daytime and nighttime noise levels is calculated to range from 0.1 to 0.6 dB L_{eq} at the nearest commercial use to the south. Finally, noise measurement site LT-1 was located nearest to the school use to the east. Relative to the arithmetic means of measured hourly noise levels at site LT-3, the project-generated increase in ambient daytime and nighttime noise levels is calculated to be less than 0.1 dB L_{eq} at the school use to the east.

Because noise exposure from project rooftop mechanical equipment is predicted to satisfy applicable Morgan Hill Municipal Code noise level standards at the nearest existing off-site land

uses, and because noise level exposure from project HVAC equipment is not expected to significantly increase ambient noise levels at those uses relative to the FICON criteria, this impact is identified as being ***less than significant.***

Impact 8: Emergency Standby Generator Noise at Existing Off-Site Uses

The project proposes the installation of an emergency standby generator to provide power to the development during emergencies resulting in power outages. The generator will be located within an outdoor fenced enclosure on the southwest end of the project property, as shown in Figure 2.

It is our understanding that a specific generator model has not yet been selected for the project. To quantify project emergency generator noise level exposure at existing off-site uses, BAC utilized sound level data for a Cummins Model DQDAB (275 kW) standby diesel generator. Based on the experience of BAC with similar multi-family residential projects including emergency generators, it is expected that a similar-sized generator would likely be installed at the project site. Equipment manufacturer documentation, which is provided as Appendix H, indicate that the Cummins Model DQDAB has a reference noise level of 90 dB at a distance of 23 feet (equipped with a weather protective enclosure).

BAC utilized the reference noise level provided above with accepted sound propagation (-6 dB per doubling of distance) to predict the level of emergency generator noise which would be expected at the property lines of the existing adjacent off-site uses. The results of that analysis are provided in Table 15. The results presented in Table 15 include consideration of the noise attenuation that would be provided by the proposed continuous CMU wall along the project property line as discussed in this report and as indicated on Figure 2.

Table 15
Predicted Emergency Standby Generator Noise Levels at Existing Off-Site Uses

Receiver[1]	Distance from Generator (ft)[2]	Predicted Exterior Noise Level, L_{eq} (dB)[3]
Residential – West	10	92
Residential – North	130	70
Commercial – South	20	86
School – East	550	62

[1] Existing land use locations are identified on Figure 1.
[2] Distances scaled from center of generator enclosure to property lines using provided site plans.
[3] Predicted noise levels at residential and commercial uses include a -6 dB offset to account for the proposed CMU wall along the property lines. No offset was applied at the school use to the east.
Source: Bollard Acoustical Consultants, Inc. (2021)

For noise generated by on-site activities, the Morgan Hill Municipal Code establishes exterior noise level standards of 60 and 65 dB L_{eq} for residential/public and commercial uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. The Table 15 data indicate that project emergency generator noise levels are predicted to exceed the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential, commercial, and school land uses.

Noise measurement sites LT-1 through LT-3 on Figure 1 were selected to be representative of the ambient noise level environment within the project vicinity, including contributions from adjacent Monterey Road traffic, railroad operations to the east, and nearby commercial activities. The Table 7 data indicate that measured daytime hourly average noise levels in the project vicinity ranged from 54 to 62 (arithmetic mean of 57 dB L_{eq}). The Table 7 data also indicate that measured nighttime hourly average noise levels in the project vicinity ranged from 44 to 55 dB L_{eq} (arithmetic mean of 49 dB L_{eq}). As discussed previously, a 5 dB increase in noise levels due to project on-site activities would be required for a finding of a significant impact relative to the FICON increase significance criteria.

Given the arithmetic means of measured daytime and nighttime hourly average noise levels cited above, and based on the FICON criteria, a significant noise impact would be identified if predicted project-generated hourly average noise levels would exceed either 62 dB L_{eq} (during daytime hours) or 54 dB L_{eq} (during nighttime hours) at existing off-site land uses (i.e., 5 dB above ambient). Based on the data presented in Table 15, the increase in ambient daytime and nighttime noise levels resulting from the project emergency generator is calculated to range from 12.2 to 42.5 dB L_{eq} at the nearest residential uses to the north and west. In addition, the project-related increase in ambient daytime and nighttime noise levels is calculated to range from 28.2 to 36.4 dB L_{eq} at the nearest commercial use to the south. Finally, noise measurement site LT-1 was located nearest to the school use to the east. Relative to the arithmetic means of measured hourly noise levels at site LT-3, the project-generated increase in ambient daytime and nighttime noise levels is calculated to range from 7.6 to 13.6 dB L_{eq} at the school use to the east.

As mentioned previously, a specific generator model has not yet been selected for the project. Based on analysis provided above, which utilized sound level data from an assumed equipment model, project generator noise exposure could potentially exceed the applicable Morgan Hill Municipal Code noise level standards at the nearest existing off-site land uses. Further, it is also possible that project generator noise levels could significantly increase ambient noise levels at those locations relative to the FICON criteria.

To comply with the applicable Morgan Hill Municipal Code hourly average (L_{eq}) noise level standard and FICON increase significance criteria at the property lines of the nearest existing off-site uses, the emergency standby generator model ultimately selected for installation within the proposed fenced enclosure should not exceed an overall sound level of 50 dB at a distance of 23 feet. Table 16 shows the calculated noise levels associated with a generator having an overall sound level of 50 dB at a distance of 23 feet.

Table 16
Emergency Generator Noise Levels – City Conditioned Equipment

Receiver	Predicted Noise Level, L_{eq} (dB)[1]	Calculated Increase in Ambient Noise Levels, L_{eq} (dB)	
		Daytime	Nighttime
Residential – West	51	1.0	4.4
Residential – North	29	<0.1	<0.1
Commercial – South	45	0.3	1.6
School – East	22	<0.1	<.1

[1] Predicted noise levels assume an overall generator sound level of 50 dB at 23 feet.
Source: Bollard Acoustical Consultants, Inc. (2021)

It is our understanding that the City of Morgan Hill will condition the project to ensure that the emergency standby generator model ultimately selected for the project will not exceed an overall sound level of 50 dB at a distance of 23 feet. As indicated in Table 16, noise exposure associated with the City-conditioned generator equipment would satisfy the applicable FICON increase significance criteria at the nearest existing off-site uses. Further, noise exposure from the City-conditioned generator would comply with the applicable Morgan Hill Municipal Code hourly average exterior noise level standards at those locations.

Based on the analysis presented above, and because the City will condition the project to include generator equipment as recommended above, this impact is identified as being ***less than significant***.

Impact 9: Cumulative (Combined) On-Site Noise Sources at Existing Off-Site Uses

The calculated cumulative (combined) noise level exposure from on-site activities at the nearest existing off-site land uses is presented in Table 17. It should be noted that due to the logarithmic nature of the decibel scale, the sum of two noise values which differ by 10 dB equates to an overall increase in noise levels of 0.4 dB. When the noise sources are equivalent, the sum would result in an overall increase in noise levels of 3 dB.

Table 17
Predicted Cumulative Project On-Site Noise Levels at Existing Off-Site Uses

Receiver	Predicted Exterior Noise Levels, L_{eq} (dB)						
	Playing Court	Playground	Parking	On-Site Vehicle Circ.	HVAC	Generator[1]	Cumulative
Residential – West	39	34	49	43	28	51	54
Residential – North	41	31	55	43	39	29	55
Commercial – South	53	53	44	43	41	45	57
School – East	37	39	32	34	29	22	43

[1] Generator noise levels associated with City-conditioned project equipment.
Source: Bollard Acoustical Consultants, Inc. (2021)

For noise generated by on-site activities, the Morgan Hill Municipal Code establishes exterior noise level standards of 60 and 65 dB L_{eq} for residential/public and commercial uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. As indicated in Table 17, cumulative (combined) project-generated on-site activity noise levels are predicted to comply with the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential, commercial, and school land uses. As footnoted in Table 17, the combined noise levels include consideration of the City-conditioned project generator equipment.

Noise measurement sites LT-1 through LT-3 on Figure 1 were selected to be representative of the ambient noise level environment within the project vicinity, including contributions from adjacent Monterey Road traffic, railroad operations to the east, and nearby commercial activities. The Table 7 data indicate that measured daytime hourly average noise levels in the project vicinity ranged from 54 to 62 (arithmetic mean of 57 dB L_{eq}). The Table 7 data also indicate that measured nighttime hourly average noise levels in the project vicinity ranged from 44 to 55 dB L_{eq} (arithmetic mean of 49 dB L_{eq}). As discussed previously, a 5 dB increase in noise levels due to project on-site activities would be required for a finding of a significant impact relative to the FICON increase significance criteria.

Given the arithmetic means of measured daytime and nighttime hourly average noise levels cited above, and based on the FICON criteria, a significant noise impact would be identified if predicted project-generated hourly average noise levels would exceed either 62 dB L_{eq} (during daytime hours) or 54 dB L_{eq} (during nighttime hours) at existing off-site land uses (i.e., 5 dB above ambient). Based on the data presented in Table 17, the increase in ambient daytime noise levels resulting from combined on-site noise sources is calculated to range from 0.2 to 3.2 dB L_{eq} at the nearest existing off-site uses. In addition, the combined project-related increase in ambient nighttime noise levels is calculated to range from less than 0.1 to 1.3 dB L_{eq} at the nearest existing off-site uses.

Because noise exposure from cumulative (combined) on-site activities is predicted to satisfy applicable Morgan Hill Municipal Code noise level standards at the nearest existing off-site land uses, and because noise level exposure from combined on-site activities is not expected to significantly increase ambient noise levels at those uses relative to the FICON criteria, this impact is identified as being ***less than significant.***

Noise Impacts Associated with Project Construction Activities

Impact 10: Project Construction Noise Levels at Existing Off-Site Uses

During project construction, heavy equipment would be used for grading excavation, paving, and building construction, which would increase ambient noise levels when in use. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Noise exposure at any single point outside the project work area would also vary depending upon the proximity of equipment activities to that point. The property lines of the nearest existing off-site land uses are located approximately 15 feet away from where construction activities would occur within the project area.

Table 18 includes the range of maximum noise levels for equipment commonly used in general construction projects at full-power operation at a distance of 50 feet. Not all of these construction activities would be required of this project. The Table 18 data also include predicted maximum equipment noise levels at the property lines of the nearest existing off-site uses, which assumes a standard spherical spreading loss of 6 dB per doubling of distance.

Table 18
Construction Equipment Reference and Projected Noise Levels Noise Levels

Equipment Description	Maximum Noise Level at 50 Feet (dB)	Predicted Maximum Noise Level at 15 Feet (dB)
Air compressor	80	90
Backhoe	80	90
Ballast equalizer	82	92
Ballast tamper	83	93
Compactor	82	92
Concrete mixer	85	95
Concrete pump	82	92
Concrete vibrator	76	86
Crane, mobile	83	93
Dozer	85	95
Generator	82	95
Grader	85	92
Impact wrench	85	95
Loader	80	95
Paver	85	90
Pneumatic tool	85	95
Pump	77	95
Saw	76	87
Scarifier	83	86
Scraper	85	93
Shovel	82	95
Spike driver	77	92
Tie cutter	84	87
Tie handler	80	94
Tie inserter	85	90
Truck	84	95

Source: Federal Transit Administration Noise and Vibration Impact Assessment Manual, Table 7-1 (2018)

Based on the equipment noise levels in Table 18, noise levels from project construction are calculated to range from 86 to 95 dB at the property lines of the nearest existing off-site uses. As mentioned previously, not all of these construction activities would be required of this project.

As noted in the Regulatory Setting Section of this report, Section 8.28.040(D) of the Morgan Hill Municipal Code exempts construction noise provided that such activities do not occur during set hours. Specifically, construction activities are prohibited other than between the hours of 7:00 a.m. and 8:00 p.m., Monday through Friday and between the hours of 9:00 a.m. to 6:00 p.m. on Saturday. Further, construction activities may not occur on Sundays or federal holidays. Provided project construction activities occur during these hours and days, construction activities would be exempt, and this impact would be considered less than significant. However, if construction

activities are proposed during the hours not exempted by Municipal Code Section 8.28.040(D), noise levels generated by construction activities could exceed the applicable Municipal Code exterior noise level standards at the nearest residential and commercial uses to the west and south, respectively.

To comply with the applicable Morgan Hill Municipal Code hourly average (L_{eq}) noise level standard and FICON increase significance criteria at the property lines of the nearest existing off-site uses, implementation of the following construction noise control measures should be implemented:

- Noise-generating construction activities should not occur within the hours identified in Municipal Code Section 8.28.040(D).
- The project should utilize temporary construction noise control measures including the use of temporary noise barriers, or other appropriate measures as mitigation for noise generated during construction of projects.
- All noise-producing project equipment and vehicles using internal-combustion engines should be equipped with manufacturer-recommended mufflers and be maintained in good working condition.
- All mobile or fixed noise-producing equipment used on the project site that are regulated for noise output by a federal, state, or local agency should comply with such regulations while in the course of project activity.
- Electrically powered equipment should be used instead of pneumatic or internal-combustion-powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas will be located as far as practicable from noise-sensitive receptors.
- Project area and site access road speed limits will be established and enforced during the construction period.
- Nearby residences will be notified of construction schedules so that arrangements can be made, if desired, to limit their exposure to short-term increases in ambient noise levels.

It is our understanding that the City of Morgan Hill will condition the project to ensure that the construction noise control measures identified above will be incorporated into the project construction operations. Based on this information, this impact is identified as being ***less than significant***.

Vibration Impacts Associated with Project Activities

Impact 11: Project Construction and On-Site Activity Vibration Levels at Sensitive Receptors

During project construction, heavy equipment would be used for grading, excavation, paving, and building construction, which would generate localized vibration in the immediate vicinity of the construction. The nearest existing off-site sensitive receptors have been identified as residential structures located approximately 25 feet from construction activities which would occur within the

project area. Table 19 includes the range of vibration levels for equipment commonly used in general construction projects at a distance of 25 feet.

Table 19
Vibration Source Levels for Construction Equipment at 25 Feet

Equipment	Maximum Vibration Level at 25 Feet (PPV)[1]
Hoe ram	0.089
Large bulldozer	0.089
Caisson drilling	0.089
Loaded trucks	0.076
Jackhammer	0.035
Small bulldozer	0.003

[1] PPV = Peak Particle Velocity
Source: 2018 FTA Transit Noise and Vibration Impact Assessment Manual and BAC calculations

As shown in Table 19, vibration levels generated from on-site construction activities at the nearest existing sensitive structures located approximately 25 feet away (residences) are predicted to be well below the strictest Caltrans thresholds for damage to residential structures of 0.30 in/sec PPV shown in Table 2. Further, construction activities are not expected to result in adverse human response relative to the vibration annoyance criteria as defined by Caltrans in Table 3. Therefore, on-site construction within the project area is not expected to result in excessive groundborne vibration levels at nearby existing sensitive uses.

Results from the BAC vibration survey on July 19th, 2021, indicate that that measured average vibration levels were well below the strictest Caltrans thresholds for damage to structures and thresholds for annoyance. Therefore, it is expected that the project would not result in the exposure of persons to excessive groundborne vibration levels at proposed uses of the project.

Finally, the project proposes the development of residential uses. It is the experience of BAC that residential uses do not typically have equipment that generates appreciable vibration. Further, it is our understanding that the project does not propose equipment that will produce appreciable vibration.

Because vibration levels due to and upon the project will satisfy the applicable Caltrans groundborne impact vibration criteria, this impact is identified as being ***less than significant***.

Noise Impacts Upon the Development

The California Supreme Court issued an opinion in *California Building Industry Association v. Bay Area Air Quality Management District (2015)* holding that CEQA is primarily concerned with the impacts of a project on the environment and generally does not require agencies to analyze the impact of existing conditions on a project's future users or residents. Nevertheless, the City of Morgan Hill has policies that address existing/future conditions affecting the proposed project, which are discussed in the following section.

On-Site Traffic & Railroad Noise Impacts

The project proposes the construction of residential uses within the project area. The following impact analyses address future traffic and railroad noise exposure at the exterior and interior areas of the proposed residential development.

Impact 12: Future Exterior Traffic Noise Levels at Project Site

According to the project traffic memorandum, the segment of Monterey Road adjacent to the project site currently experiences an average daily traffic (ADT) volume of approximately 15,000 vehicles. Assuming vehicle speeds of 35 MPH, medium- and heavy-truck mix of 2%/1%, and a traffic volume of 15,000, the FHWA Model predicts a roadway noise level of 61 dB DNL at a distance of 120 feet from the centerline of Monterey Road. The existing traffic noise level predicted by the FHWA Model is within 2 dB of the measured ambient day-night average noise level at the project site (site LT-3, 59 dB DNL), which maintained a 120 foot setback from the centerline of Monterey Road. The difference in predicted versus measured noise levels indicates close agreement, which suggests that the ambient noise environment at the project site adjacent to Monterey Road is defined primarily by traffic noise. As a result, this specific impact analysis focuses on future day-night average noise level (DNL) exposure associated with Monterey Road traffic at the proposed development.

The FHWA Model was used with future traffic data to predict future Monterey Road traffic noise levels at the project site. The future (Cumulative Plus Project conditions) daily traffic (ADT) volume for the roadway was calculated using data obtained from the traffic memorandum prepared by Hexagon Transportation Consultants, Inc. Specifically, the future Monterey Road average daily traffic (ADT) volume was conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions. The predicted future Monterey Road traffic noise levels at the common outdoor space and residential building facades proposed nearest to Monterey Road are summarized in Table 20. Detailed FHWA Model inputs and results are provided in Appendix I.

Table 20
Predicted Future Exterior Traffic Noise Levels at Project Site

Location[1]	Future Exterior DNL (dB)[2]
Common Outdoor Space – Garden/Recreation Area	55
Common Outdoor Space – Entry Plaza	64
Common Outdoor Space – 5th Floor Deck	65
Nearest 2nd & 3rd Floor Building Facades	68
Nearest 4th & 5th Floor Building Facades	70

[1] Common outdoor space shown on Figure 2.
[2] Positive offsets applied at upper-floor locations to account for reduced ground absorption at elevated locations. Negative offsets were applied where a reduced view of the roadway or shielding provided by proposed barriers would be present.
Source: Bollard Acoustical Consultants, Inc. (2021)

Table SSI-1 of the Morgan Hill General Plan (Table 3 of this report) includes the State of California Land Use Compatibility Guidelines for Community Noise Environments. For new multiple-family

residential land uses, such as those proposed by the project, the General Plan table indicates a normally acceptable exterior noise level of up to 65 dB DNL for common outdoor recreation areas. The table also identifies a conditionally allowable exterior noise level of up to 70 dB DNL at those locations, provided that a detailed analysis of noise reduction requirements is made, and the needed noise insulation features are included in building design.

As indicated in Table 20, future Monterey Road traffic noise level exposure is predicted to satisfy the Morgan Hill General Plan's normally acceptable noise level standard of 65 dB DNL at the nearest common outdoor spaces of the development. As a result, this impact is identified as being ***less than significant*.**

Impact 13: Future Interior Traffic & Railroad Noise Levels at Project Site

Policy SSI-8.1 of the Morgan Hill General Plan utilizes an interior noise level standard of 45 dB DNL for new residential housing units. Policy SSI-8.1 further states that noise levels in new residential development exposed to an exterior DNL of 60 dB or greater should be limited to a maximum instantaneous interior noise level (e.g., trucks on busy streets, train warning whistles) of 50 dB L_{max} in bedrooms and 55 dB L_{max} in all other habitable rooms.

As indicated in Table 20, future noise exposure from Monterey Road traffic is predicted to be 68 dB DNL at the 2nd & 3rd floor building facades of residences proposed nearest to the roadway. At the nearest 4th & 5th floor building facades, future Monterey Road traffic noise levels are predicted to approach 70 dB DNL. To satisfy the General Plan 45 dB DNL interior noise level standard, minimum noise reductions of 23 dB and 25 dB would be required of the 2nd & 3rd and 4th & 5th floor building facades (respectively) of residences constructed nearest to Monterey Road.

The nearest at-grade railroad crossing is located in excess of ½ mile to the south of the project area. As a result, noise levels associated with train passbys east of the project area would not include warning horn usage or at-grade crossing bells. Based on the experience of BAC with projects within the City of Morgan Hill located near the UPRR/Caltrain track, maximum noise levels associated with train passbys are approximately 100 dB L_{max} at a distance of 100 feet (excluding warning horn usage and at-grade crossing bells). Based on the reference noise level above, train passby noise levels are projected to be approximately 80 dB L_{max} at the apartment building facades proposed nearest to the track. To satisfy the General Plan 50 dB L_{max} interior noise level standard (applicable to bedrooms), a minimum noise reduction of 30 dB would be required of the residential building facades constructed nearest to the railroad track. To satisfy the General Plan 55 dB L_{max} interior noise level standard (applicable to all other habitable rooms), a minimum noise reduction of 25 dB would be required of the nearest residential building facades.

Standard building construction (stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), typically results in an exterior to interior noise reduction of approximately 25 dB with windows closed and approximately 15 dB with windows open. Therefore, window construction upgrades would be warranted for portions of the development.

To reduce future traffic and railroad noise level exposure to a state of compliance with the applicable Morgan Hill General Plan interior noise level limits, the windows of the building locations identified on Figures 4 and 5 should be upgraded to the minimum STC rating indicated.

Figure 4 shows the locations and associated STC ratings needed for bedroom windows. Figure 5 illustrates the locations and associated STC ratings required for all other habitable room windows. In addition, mechanical ventilation (air conditioning) should be provided to all residences of the development allow the occupants to close doors and windows as desired for additional acoustical isolation. Finally, disclosure statements should be provided to all prospective residents of this development notifying of elevated noise levels during railroad passages, particularly during nighttime operations and periods of warning horn usage.

It is our understanding that the City of Morgan Hill will condition the project to ensure that the window construction upgrades, mechanical ventilation and disclosure statement recommendations identified above are incorporated into the project design. Based on this information, this impact is identified as being ***less than significant***.

Legend

Recommended Window Construction Upgrades

- STC-35 (Bedrooms) | STC-32 (All Other Habitable Rooms)
- STC-32 (Bedrooms Only)

N

Scale (Feet)

0 25 50

Magnolias Apartments
Morgan Hill, California

Building Plans – 2nd & 3rd Floors

Figure 4

BOLLARD Acoustical Consultants

4th Floor

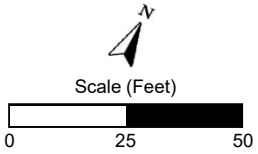
5th Floor

MONTEREY ROAD

Legend

Recommended Window Construction Upgrades

- STC-35 (Bedrooms) | STC-32 (All Other Habitable Rooms)
- STC-32 (Bedrooms Only)



Magnolias Apartments
Morgan Hill, California

Building Plans – 4th & 5th Floors

Figure 5

BOLLARD
Acoustical Consultants

Impact 14: Existing Commercial Noise Levels at the Project Site

Existing commercial uses (automotive and small engine repair businesses) are located to the south of the proposed residential development. The locations of the commercial uses are shown on Figure 1.

Noise measurement sites LT-1 and LT-2 were specifically selected to capture noise levels associated with adjacent commercial uses to the south at the project property line. According to information obtained online, the hours of operation for the adjacent commercial businesses are Monday through Friday from 8:00 a.m. to 5:00 p.m. According to data contained in Appendix E, measured hourly average noise levels at sites LT-1 and LT-2 did not exceed 66 dB L_{eq} during the business hours identified above. The highest measured commercial operations noise level of 66 dB L_{eq} at the property line of the proposed residential development would exceed the Morgan Hill Municipal Code 60 dB L_{eq} exterior noise level standard applicable to residential uses. However, after consideration of the noise attenuation that would be provided by the proposed continuous CMU wall along the project property line as discussed in this report and as indicated on Figure 2 (minimum of 6-feet in height), commercial noise level exposure is expected to be reduced to 60 dB L_{eq} or less at the proposed development, which would satisfy the applicable Municipal Code exterior noise level limit.

Based on the ambient noise level data obtained at the project site, noise exposure from existing commercial operations south of the project site is expected to satisfy applicable Morgan Hill Municipal Code noise level standard at the property line of the proposed residential development. As a result, this impact is identified as being ***less than significant.***

This concludes BAC's noise and vibration assessment of the Magnolias Apartments project in Morgan Hill, California. Please contact BAC at (916) 663-0500 or dariog@bacnoise.com if you have any comments or questions regarding this report.

Appendix A
Acoustical Terminology

Acoustics The science of sound.

Ambient Noise The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.

Attenuation The reduction of an acoustic signal.

A-Weighting A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.

Decibel or dB Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.

CNEL Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.

Frequency The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.

IIC Impact Insulation Class (IIC): A single-number representation of a floor/ceiling partition's impact generated noise insulation performance. The field-measured version of this number is the FIIC.

L_{dn} Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.

L_{eq} Equivalent or energy-averaged sound level.

L_{max} The highest root-mean-square (RMS) sound level measured over a given period of time.

Loudness A subjective term for the sensation of the magnitude of sound.

Masking The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.

Noise Unwanted sound.

Peak Noise The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.

RT_{60} The time it takes reverberant sound to decay by 60 dB once the source has been removed.

STC Sound Transmission Class (STC): A single-number representation of a partition's noise insulation performance. This number is based on laboratory-measured, 16-band (1/3-octave) transmission loss (TL) data of the subject partition. The field-measured version of this number is the FSTC.

Appendix B
Morgan Hill Municipal Code – Noise

Chapter 8.28 - NOISE

8.28.010 - Council findings and declarations.

The city council finds and declares as follows:

A. That the making, creation or maintenance of loud, unnecessary, unnatural or unusual noises which are prolonged, unusual and unnatural in their time, place and use affect and are a detriment to the public health, comfort, convenience, safety, welfare and prosperity of the residents of the city; and

B. That the necessity in the public interest for the provisions and prohibitions set forth in this chapter is declared as a matter of legislative determination and public policy, and it is further declared that the provisions of this chapter are in pursuance of, and for the purpose of, securing and promoting the public health, comfort, convenience, safety, welfare and prosperity and the peace and quiet of the city and its inhabitants.

(Ord. 328 N.S. § A (part), 1972)

8.28.020 - Unlawful behavior defined.

It is unlawful for any person to make or continue, or cause to be made or continued, any loud, disturbing, unnecessary or unusual noise or any noise which annoys, disturbs, injures, or endangers the comfort, health, repose, peace, or safety of another person within the city.

(Ord. 328 N.S. § A (part), 1972)

(Ord. No. 2276 N.S., § 29, 5-2-2018)

8.28.030 - Police and fire sirens exempted from chapter provisions.

Nothing in this chapter shall be construed to prevent the proper use of a siren or other alarm by a police, fire or authorized emergency vehicle as defined in the California Vehicle Code. Likewise, any stationary fire alarm operated by the fire department of the city is exempt from the provisions of this chapter.

(Ord. 328 N.S. § A (part), 1972)

8.28.040 - Enumeration of unlawful noises.

Unlawful noises include:

A. Animals and Birds. The keeping of any animal or bird which, by causing frequent or long-continued noise, disturbs the comfort or repose of any person in the vicinity;

B. Auto Body Repairs.

1. The repairing of any auto body, or part thereof, except within a completely enclosed building and the noises therefrom are reasonably confined to such building, and

2. The repairing of any auto body, or part thereof, between the hours of eight p.m. and seven a.m., which shall be deemed a violation of the provisions of this section;

C. Blowers, Fans, and Combustion Engines. The operation of any noise-creating blower, power fan or internal combustion engine, the operation of which causes noise due to the explosion of operating gases or fluids, unless the noise from such blower or fan is muffled and such engine is equipped with a muffler device to deaden such noise;

D. 1. Construction activities as limited below. "Construction activities" are defined as including but not limited to excavation, grading, paving, demolition, construction, alteration or repair of any building, site, street or highway, delivery or removal of construction material to a site, or movement of construction materials on a site. Construction activities are prohibited other than between the hours of seven a.m. and eight p.m., Monday through Friday and between the hours of nine a.m. to six p.m. on Saturday. Construction activities may not occur on Sundays or federal holidays. No third person, including but not limited to landowners, construction company owners, contractors, subcontractors, or employers, shall permit or allow any person working on construction activities which are under their ownership, control or direction to violate this provision. Construction activities may occur in the following cases without violation of this provision:

a. In the event of urgent necessity in the interests of the public health and safety, and then only with a permit from the chief building official, which permit may be granted for a period of not to exceed three days or less while the emergency continues and which permit may be renewed for periods of three days or less while the emergency continues.

b. If the chief building official determines that the public health and safety will not be impaired by the construction activities between the hours of eight p.m. and seven a.m., and that loss or inconvenience would result to any party in interest, the chief building official may grant permission for such work to be done between the hours of eight p.m. and seven a.m. upon an application being made at the time the permit for the work is issued or during the progress of the work.

c. The city council finds that construction by the resident of a single residence does not have the same magnitude or frequency of noise impacts as a larger construction project. Therefore, the resident of a single residence may perform construction activities on that home during the hours in this subsection, as well as on Sundays and federal holidays from nine a.m. to six p.m., provided that such activities are limited to the improvement or maintenance undertaken by the resident on a personal basis.

d. Public work projects are exempt from this section and the public works director shall determine the hours of construction for public works projects.

e. Until November 30, 1998, construction activities shall be permitted between the hours of ten a.m. to six p.m. on Sundays, subject to the following conditions. No power-driven vehicles, equipment or tools may be used during construction activities, except on the interior of a building or other structure which is enclosed by exterior siding (including windows and doors) and roofing, and which windows and doors are closed during construction activities. Construction activities must be situated at least one hundred fifty feet from the nearest occupied dwelling. No delivery or removal of construction material to a site, or movement of construction materials on a site, is permitted. No activity, including but not limited to the playing of radios, tape players, compact disc players or other devices, which creates a loud or unusual noise which offends, disturbs or harasses the peace and quiet of the persons of ordinary sensibilities beyond the confines of the property from which the sound emanates is allowed.

2. If it is determined necessary in order to ensure compliance with this section, the chief building official may require fences, gates or other barriers prohibiting access to a construction site by construction crews during hours in which construction is prohibited by this subsection. The project manager of each project shall be responsible for ensuring the fences, gates or barriers are locked and/or in place during hours in which no construction is

allowed. This subsection shall apply to construction sites other than public works projects or single dwelling units which are not a part of larger projects.

E. Defective or Loaded Vehicles. The use of any automobile, motorcycle or vehicle so out of repair, so loaded, or in such manner as to create loud and unnecessary grating, grinding, rattling or other noise;

F. Exhausts. The discharge into the open air of the exhaust of any steam engine, stationary internal combustion engine, motorboat or motor vehicle except through a muffler or other device which will effectively prevent loud or explosive noises therefrom;

G. Loading or Unloading Vehicles and Opening Boxes. The creation of loud and excessive noise in connection with loading or unloading any vehicle or the opening and destruction of bales, boxes, crates and containers;

H. Loudspeakers, Amplifiers and Similar Advertising Devices. The using or operating or permitting to be played, used or operated, of any radio receiving set, musical instrument, phonograph, loudspeaker, sound amplifier or other machine or device for the producing or reproducing of sound which is cast upon the public streets for the purpose of commercial advertising or attracting the attention of the public to any building or structure;

I. Noises Adjacent to Schools, Courts, Churches and Hospitals. The creation of any excessive noise on any street adjacent to any school, institution of learning, church or court while the same is in use or adjacent to any hospital, which noise unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital; provided, conspicuous signs are displayed in such streets indicating that the street is adjacent to a school, hospital or court;

J. Pile Drivers, Hammers and Similar Equipment. The operation, between the hours of eight p.m. and seven a.m. of any pile driver, steam shovel, pneumatic hammer, derrick, steam or electric hoist or other appliance, the use of which is attended by loud or unusual noise;

K. Radios, Phonographs, Musical Instruments and Similar Devices.

1. The using or operating, or permitting to be played, used or operated, of any radio receiving set, musical instrument, phonograph or other machine or device for the producing or reproducing of sound in such manner as to disturb the peace, quiet and comfort of the neighborhood inhabitants or at any time with louder volume than is necessary for convenient hearing for the persons who are in the room, vehicle or chamber in which such machine or device is operated and who are voluntary listeners thereto, and

2. The operation of any such set, instrument, phonograph, machine or device between the hours of eleven p.m. and seven a.m. in such manner as to be plainly audible at a distance of fifty feet from the building, structure or vehicle in which such device is located which shall be prima facie evidence of a violation of the provisions of this section;

L. Shouting by Hawkers and Peddlers. The shouting and crying of peddlers, hawkers and vendors which disturb the peace and quiet of the neighborhood;

M. Steam Whistles. The blowing of any locomotive steam whistle or steam whistle attached to any stationary boiler except to give notice of the time to begin or stop work, or as a warning of fire or danger, or upon the request of proper city authorities;

N. Vehicle Horns and Signaling Devices.

1. The sounding of any horn or signaling device on any automobile, motorcycle, streetcar or other vehicle on any street or public place of the city except as a danger warning,

2. The creation, by means of any such signaling device of any unreasonably loud or harsh sound,

3. The sounding of any such device for an unnecessary and unreasonable period of time,

4. The use of any signaling device except one operated by hand or electricity,

5. The use of any horn, whistle or other device operated by engine exhaust, and
6. The use of any such signaling device when traffic is delayed for any reason.

(Ord. 1405 N.S. § 1, 1998; Ord. 1196 N.S. § 4 Exh. A, 1994; Ord. 328 N.S. § A (part), 1972)

(Ord. No. 2276 N.S., § 29, 5-2-2018)

8.28.050 - Violation.

It is unlawful for any person to violate any of the provisions of this chapter.

(Ord. No. 2276 N.S., § 29, 5-2-2018)

Editor's note— Ord. No. 2276 N.S., § 29, adopted May 2, 2018, amended § 8.28.050 in its entirety to read as herein set out. Former § 8.28.050 pertained to violation—penalty and derived from Ord. 328 N.S., § A(part), adopted in 1972; Ord. 1192 N.S., § 13, adopted in 1994; and Ord. 1320 N.S., § 8, adopted in 1997.

Chapter 18.76 - PERFORMANCE STANDARDS

18.76.010 - Purpose. This chapter establishes performance standards for uses and activities to protect the community from nuisances, hazards, and objectionable conditions; promote compatibility of different land uses; and to protect environmental resources.

18.76.090 - Noise.

A. No land use or activity may produce a noise level in excess of the standards in Table 18.76-1.

Table 18.76-1: Maximum Noise Levels

Receiving Land Use	Maximum Noise Level at Lot Line of Receiving Use [1]
Industrial and Wholesale	70 dbA
Commercial	65 dbA
Residential or Public/Quasi Public	60 dbA

Notes:

[1] The planning commission may allow an additional 5 dbA noise level at the lot line if the maximum noise level shown in Table 18.76-1 cannot be achieved with reasonable and feasible mitigation.

B. Noise standards in Table 18.76-1do not apply to noise generated by vehicle traffic in the public right-of-way or from temporary construction, demolition, and vehicles that enter and leave the site of the noise-generating use (e.g., construction equipment, trains, trucks).

C. All uses and activities shall comply with Municipal Code Chapter 8.28 (Noise).

(Ord. No. 2277 N.S., § 5(Exh. A), 6-6-2018)

Appendix C-1
FHWA Highway Traffic Noise Prediction Model Data Inputs
Magnolias Apartments
File Name: 2021-123 01 Existing
Model Run Date: 8/11/2021

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Monterey Rd / Cochrane Rd	North	20,830	80	20	2	1	45	100
2		South	14,310	80	20	2	1	35	100
3		East	16,335	80	20	2	1	45	100
4		West	3,475	80	20	1	1	15	100
5	Monterey Rd / Old Monterey Rd	North	14,625	80	20	2	1	35	100
6		South	14,400	80	20	2	1	35	100
7		East							
8		West	4,185	80	20	2	1	35	100
9	Monterey Rd / Wright Ave	North	15,055	80	20	2	1	35	100
10		South	14,560	80	20	2	1	30	100
11		East	315	80	20	1	1	15	100
12		West	4,950	80	20	1	1	30	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix C-2
FHWA Highway Traffic Noise Prediction Model Data Inputs
Magnolias Apartments
File Name: 2021-123 02 Existing Plus Project
Model Run Date: 8/11/2021

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Monterey Rd / Cochrane Rd	North	20,840	80	20	2	1	45	100
2		South	14,450	80	20	2	1	35	100
3		East	16,465	80	20	2	1	45	100
4		West	3,475	80	20	1	1	15	100
5	Monterey Rd / Old Monterey Rd	North	14,790	80	20	2	1	35	100
6		South	14,570	80	20	2	1	35	100
7		East							
8		West	4,190	80	20	2	1	35	100
9	Monterey Rd / Wright Ave	North	15,240	80	20	2	1	35	100
10		South	14,650	80	20	2	1	30	100
11		East	405	80	20	1	1	15	100
12		West	4,955	80	20	1	1	30	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix C-3
FHWA Highway Traffic Noise Prediction Model Data Inputs
Magnolias Apartments
File Name: 2021-123 03 Cumulative
Model Run Date: 8/11/2021

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Monterey Rd / Cochrane Rd	North	26,140	80	20	2	1	45	100
2		South	17,045	80	20	2	1	35	100
3		East	20,095	80	20	2	1	45	100
4		West	3,480	80	20	1	1	15	100
5	Monterey Rd / Old Monterey Rd	North	17,635	80	20	2	1	35	100
6		South	17,395	80	20	2	1	35	100
7		East							
8		West	5,130	80	20	2	1	35	100
9	Monterey Rd / Wright Ave	North	18,160	80	20	2	1	35	100
10		South	17,345	80	20	2	1	30	100
11		East	315	80	20	1	1	15	100
12		West	5,380	80	20	1	1	30	100

Note: Blank cells represent roadways for which no traffic data was provided.

Appendix C-4
FHWA Highway Traffic Noise Prediction Model Data Inputs
Magnolias Apartments
File Name: 2021-123 04 Cumulative+Project
Model Run Date: 8/11/2021

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Monterey Rd / Cochrane Rd	North	26,105	80	20	2	1	45	100
2		South	17,185	80	20	2	1	35	100
3		East	20,180	80	20	2	1	45	100
4		West	3,480	80	20	1	1	15	100
5	Monterey Rd / Old Monterey Rd	North	17,800	80	20	2	1	35	100
6		South	17,565	80	20	2	1	35	100
7		East							
8		West	5,135	80	20	2	1	35	100
9	Monterey Rd / Wright Ave	North	18,345	80	20	2	1	35	100
10		South	17,435	80	20	2	1	30	100
11		East	405	80	20	1	1	15	100
12		West	5,385	80	20	1	1	30	100

Note: Blank cells represent roadways for which no traffic data was provided.

Legend

A: LT-1: Facing south towards commercial use
B: LT-2: Facing south towards commercial use
C: V-2: Facing southeast towards commercial use

Magnolias Apartments
Morgan Hill, California

Photographs of Survey Locations

Appendix D

BOLLARD
Acoustical Consultants

Appendix E-1
Ambient Noise Monitoring Results - Site LT-1
Magnolias Apartments - Morgan Hill, California
7/15/2021 - 7/16/2021

Hour	Leq	Lmax	L50	L90
1:00 PM	62	76	59	52
2:00 PM	61	75	59	51
3:00 PM	61	71	59	53
4:00 PM	62	74	60	56
5:00 PM	63	89	60	55
6:00 PM	59	74	57	53
7:00 PM	57	74	55	50
8:00 PM	53	75	50	47
9:00 PM	49	66	48	45
10:00 PM	46	63	45	43
11:00 PM	50	84	43	39
12:00 AM	45	69	41	40
1:00 AM	46	63	44	40
2:00 AM	48	63	47	42
3:00 AM	50	71	45	41
4:00 AM	49	76	46	42
5:00 AM	51	64	49	45
6:00 AM	63	77	60	53
7:00 AM	65	87	60	53
8:00 AM	66	94	62	57
9:00 AM	63	76	60	53
10:00 AM	60	76	58	52
11:00 AM	62	85	59	52
12:00 PM	60	81	57	52

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	66	49	62	63	45	55
Lmax (Maximum)	94	66	78	84	63	70
L50 (Median)	62	48	57	60	41	47
L90 (Background)	57	45	52	53	39	43

Computed DNL, dB	63
% Daytime Energy	89%
% Nighttime Energy	11%

GPS Coordinates	37°08'07.67" N
	121°39'38.53" W

BOLLARD
Acoustical Consultants

Appendix E-2
Ambient Noise Monitoring Results - Site LT-1
Magnolias Apartments - Morgan Hill, California
7/16/2021 - 7/17/2021

Hour	Leq	Lmax	L50	L90
1:00 PM	59	72	57	52
2:00 PM	60	85	55	51
3:00 PM	58	73	56	51
4:00 PM	57	74	53	50
5:00 PM	56	73	55	52
6:00 PM	57	73	56	51
7:00 PM	58	84	56	52
8:00 PM	56	74	55	52
9:00 PM	55	71	53	48
10:00 PM	51	67	48	45
11:00 PM	49	60	48	44
12:00 AM	47	69	45	41
1:00 AM	49	72	46	41
2:00 AM	47	57	45	41
3:00 AM	50	77	47	42
4:00 AM	49	64	46	41
5:00 AM	50	60	49	44
6:00 AM	57	82	52	47
7:00 AM	59	79	53	47
8:00 AM	61	80	54	48
9:00 AM	56	69	53	49
10:00 AM	61	76	58	53
11:00 AM	66	89	56	51
12:00 PM	58	84	54	50

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	66	55	60	57	47	51
Lmax (Maximum)	89	69	77	82	57	68
L50 (Median)	58	53	55	52	45	47
L90 (Background)	53	47	50	47	41	43

Computed DNL, dB	60
% Daytime Energy	92%
% Nighttime Energy	8%

GPS Coordinates	37°08'07.67" N
	121°39'38.53" W

BOLLARD
Acoustical Consultants

Appendix E-3
Ambient Noise Monitoring Results - Site LT-1
Magnolias Apartments - Morgan Hill, California
7/17/2021 - 7/18/2021

Hour	Leq	Lmax	L50	L90
1:00 PM	58	77	55	50
2:00 PM	59	80	55	50
3:00 PM	59	83	57	54
4:00 PM	57	72	55	52
5:00 PM	56	75	55	51
6:00 PM	57	73	55	51
7:00 PM	57	81	55	51
8:00 PM	63	88	57	53
9:00 PM	54	76	50	47
10:00 PM	46	62	45	43
11:00 PM	45	61	44	41
12:00 AM	43	59	42	39
1:00 AM	46	77	40	39
2:00 AM	42	62	41	40
3:00 AM	41	62	40	39
4:00 AM	46	73	40	38
5:00 AM	55	73	46	41
6:00 AM	58	69	54	48
7:00 AM	54	69	53	47
8:00 AM	54	67	51	47
9:00 AM	59	76	56	50
10:00 AM	60	81	56	52
11:00 AM	59	79	56	51
12:00 PM	63	78	59	53

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	63	54	59	58	41	51
Lmax (Maximum)	88	67	77	77	59	66
L50 (Median)	59	50	55	54	40	44
L90 (Background)	54	47	51	48	38	41

Computed DNL, dB	60
% Daytime Energy	91%
% Nighttime Energy	9%

GPS Coordinates	37°08'07.67" N
	121°39'38.53" W

BOLLARD
Acoustical Consultants

Appendix E-4
Ambient Noise Monitoring Results - Site LT-2
Magnolias Apartments - Morgan Hill, California
7/15/2021 - 7/16/2021

Hour	Leq	Lmax	L50	L90
2:00 PM	61	80	49	44
3:00 PM	55	78	50	46
4:00 PM	54	73	50	47
5:00 PM	52	69	51	48
6:00 PM	52	70	50	47
7:00 PM	49	62	48	42
8:00 PM	48	65	46	41
9:00 PM	46	66	43	39
10:00 PM	42	60	40	36
11:00 PM	40	58	36	32
12:00 AM	44	70	34	32
1:00 AM	35	53	33	30
2:00 AM	35	56	32	30
3:00 AM	46	71	33	31
4:00 AM	43	71	37	34
5:00 AM	44	58	41	36
6:00 AM	48	64	46	41
7:00 AM	52	78	46	42
8:00 AM	60	90	48	43
9:00 AM	61	81	49	44
10:00 AM	60	81	48	44
11:00 AM	60	90	47	43
12:00 PM	55	80	48	44
1:00 PM	60	82	49	45

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	46	57	48	35	44
Lmax (Maximum)	90	62	76	71	53	62
L50 (Median)	51	43	48	46	32	37
L90 (Background)	48	39	44	41	30	33

Computed DNL, dB	56
% Daytime Energy	97%
% Nighttime Energy	3%

GPS Coordinates	37°08'09.13" N
	121°39'35.92" W

BOLLARD
Acoustical Consultants

Appendix E-5
Ambient Noise Monitoring Results - Site LT-2
Magnolias Apartments - Morgan Hill, California
7/16/2021 - 7/17/2021

Hour	Leq	Lmax	L50	L90
2:00 PM	57	81	50	46
3:00 PM	53	73	49	45
4:00 PM	58	80	49	44
5:00 PM	50	70	48	44
6:00 PM	49	67	47	44
7:00 PM	55	86	49	45
8:00 PM	50	72	48	45
9:00 PM	48	65	46	44
10:00 PM	45	64	43	40
11:00 PM	43	58	41	37
12:00 AM	43	68	38	34
1:00 AM	41	69	35	33
2:00 AM	37	56	34	31
3:00 AM	36	49	34	31
4:00 AM	37	51	35	32
5:00 AM	40	52	38	34
6:00 AM	51	70	45	40
7:00 AM	57	78	48	44
8:00 AM	53	69	47	44
9:00 AM	53	68	50	47
10:00 AM	51	71	49	46
11:00 AM	56	77	51	49
12:00 PM	54	79	49	44
1:00 PM	50	63	49	45

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	58	48	54	51	36	44
Lmax (Maximum)	86	63	73	70	49	60
L50 (Median)	51	46	49	45	34	38
L90 (Background)	49	44	45	40	31	35

Computed DNL, dB	54
% Daytime Energy	94%
% Nighttime Energy	6%

GPS Coordinates	37°08'09.13" N
	121°39'35.92" W

BOLLARD
Acoustical Consultants

Appendix E-6
Ambient Noise Monitoring Results - Site LT-2
Magnolias Apartments - Morgan Hill, California
7/17/2021 - 7/18/2021

Hour	Leq	Lmax	L50	L90
2:00 PM	51	64	50	46
3:00 PM	55	79	52	48
4:00 PM	53	69	51	48
5:00 PM	56	76	50	48
6:00 PM	56	75	49	45
7:00 PM	58	78	49	44
8:00 PM	58	84	48	45
9:00 PM	49	68	46	43
10:00 PM	46	61	44	40
11:00 PM	43	61	40	38
12:00 AM	41	57	38	35
1:00 AM	39	58	35	33
2:00 AM	37	53	35	33
3:00 AM	37	61	33	31
4:00 AM	44	72	34	32
5:00 AM	55	70	49	35
6:00 AM	45	67	41	38
7:00 AM	46	61	45	40
8:00 AM	47	61	46	43
9:00 AM	55	82	47	45
10:00 AM	53	72	49	46
11:00 AM	53	79	49	46
12:00 PM	49	67	47	44
1:00 PM	49	66	48	45

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	58	46	54	55	37	47
Lmax (Maximum)	84	61	72	72	53	62
L50 (Median)	52	45	48	49	33	39
L90 (Background)	48	40	45	40	31	35

Computed DNL, dB	56
% Daytime Energy	89%
% Nighttime Energy	11%

GPS Coordinates	37°08'09.13" N
	121°39'35.92" W

BOLLARD
Acoustical Consultants

Appendix E-7
Ambient Noise Monitoring Results - Site LT-3
Magnolias Apartments - Morgan Hill, California
7/15/2021 - 7/16/2021

Hour	Leq	Lmax	L50	L90
2:00 PM	56	67	54	46
3:00 PM	56	71	54	46
4:00 PM	57	75	56	49
5:00 PM	59	78	57	49
6:00 PM	57	75	54	47
7:00 PM	55	72	53	44
8:00 PM	54	74	50	41
9:00 PM	53	75	47	40
10:00 PM	50	69	43	37
11:00 PM	48	67	38	34
12:00 AM	48	72	36	33
1:00 AM	41	61	33	31
2:00 AM	42	64	33	30
3:00 AM	56	84	34	31
4:00 AM	48	74	39	34
5:00 AM	52	68	46	38
6:00 AM	55	72	52	43
7:00 AM	55	72	52	45
8:00 AM	56	77	53	44
9:00 AM	55	73	53	46
10:00 AM	56	71	54	47
11:00 AM	56	80	53	46
12:00 PM	55	75	52	46
1:00 PM	55	69	53	46

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	59	53	56	56	41	51
Lmax (Maximum)	80	67	74	84	61	70
L50 (Median)	57	47	53	52	33	39
L90 (Background)	49	40	45	43	30	35

Computed DNL, dB	59
% Daytime Energy	83%
% Nighttime Energy	17%

GPS Coordinates	37°08'09.52" N
	121°39'35.16" W

BOLLARD
Acoustical Consultants

Appendix E-8
Ambient Noise Monitoring Results - Site LT-3
Magnolias Apartments - Morgan Hill, California
7/16/2021 - 7/17/2021

Hour	Leq	Lmax	L50	L90
2:00 PM	62	83	55	49
3:00 PM	56	71	55	48
4:00 PM	56	75	55	48
5:00 PM	55	73	54	46
6:00 PM	55	74	52	44
7:00 PM	55	77	52	46
8:00 PM	55	80	51	44
9:00 PM	53	72	49	44
10:00 PM	51	71	46	40
11:00 PM	49	64	42	37
12:00 AM	47	70	39	34
1:00 AM	49	81	35	32
2:00 AM	42	63	34	31
3:00 AM	40	61	33	31
4:00 AM	43	60	35	32
5:00 AM	46	61	38	35
6:00 AM	51	68	46	38
7:00 AM	52	64	49	42
8:00 AM	53	66	49	42
9:00 AM	54	66	52	45
10:00 AM	55	79	52	45
11:00 AM	56	72	54	46
12:00 PM	56	81	53	45
1:00 PM	55	71	53	43

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62	52	56	51	40	48
Lmax (Maximum)	83	64	74	81	60	66
L50 (Median)	55	49	52	46	33	39
L90 (Background)	49	42	45	40	31	34

Computed DNL, dB	57
% Daytime Energy	92%
% Nighttime Energy	8%

GPS Coordinates	37°08'09.52" N
	121°39'35.16" W

BOLLARD
Acoustical Consultants

Appendix E-9
Ambient Noise Monitoring Results - Site LT-3
Magnolias Apartments - Morgan Hill, California
7/17/2021 - 7/18/2021

Hour	Leq	Lmax	L50	L90
2:00 PM	54	71	52	43
3:00 PM	56	81	52	45
4:00 PM	55	73	53	47
5:00 PM	54	72	51	45
6:00 PM	54	74	51	45
7:00 PM	54	73	50	45
8:00 PM	57	80	50	44
9:00 PM	52	69	49	43
10:00 PM	51	68	47	40
11:00 PM	49	68	42	36
12:00 AM	47	67	39	35
1:00 AM	45	63	36	33
2:00 AM	42	61	35	33
3:00 AM	42	61	34	31
4:00 AM	51	80	34	32
5:00 AM	46	62	43	35
6:00 AM	48	65	43	38
7:00 AM	52	69	48	41
8:00 AM	53	68	52	48
9:00 AM	54	70	52	49
10:00 AM	57	75	54	49
11:00 AM	61	89	54	48
12:00 PM	54	75	52	43
1:00 PM	54	70	52	44

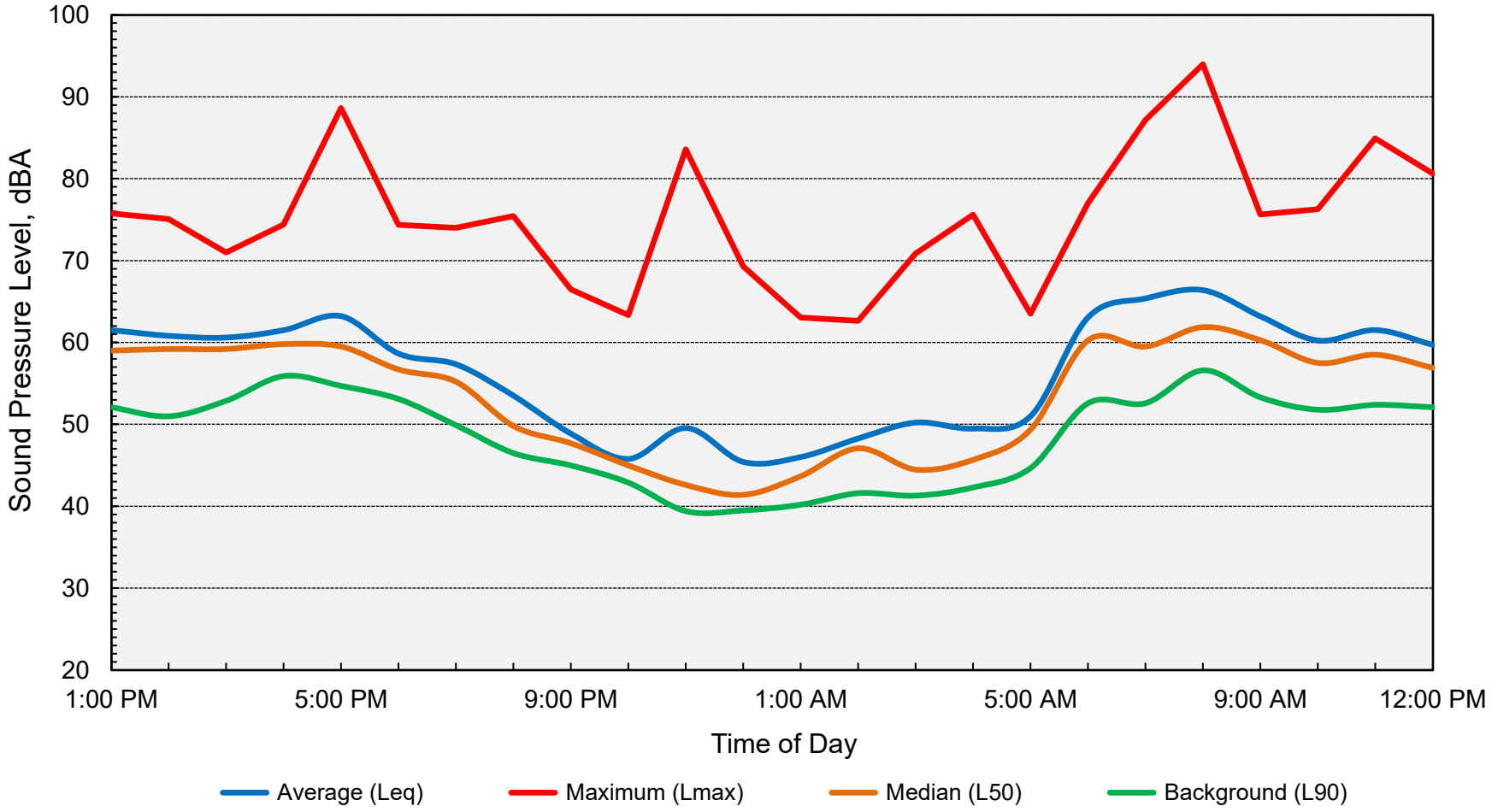
	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	52	55	51	42	48
Lmax (Maximum)	89	68	74	80	61	66
L50 (Median)	54	48	51	47	34	39
L90 (Background)	49	41	45	40	31	35

Computed DNL, dB	56
% Daytime Energy	90%
% Nighttime Energy	10%

GPS Coordinates	37°08'09.52" N
	121°39'35.16" W

BOLLARD
Acoustical Consultants

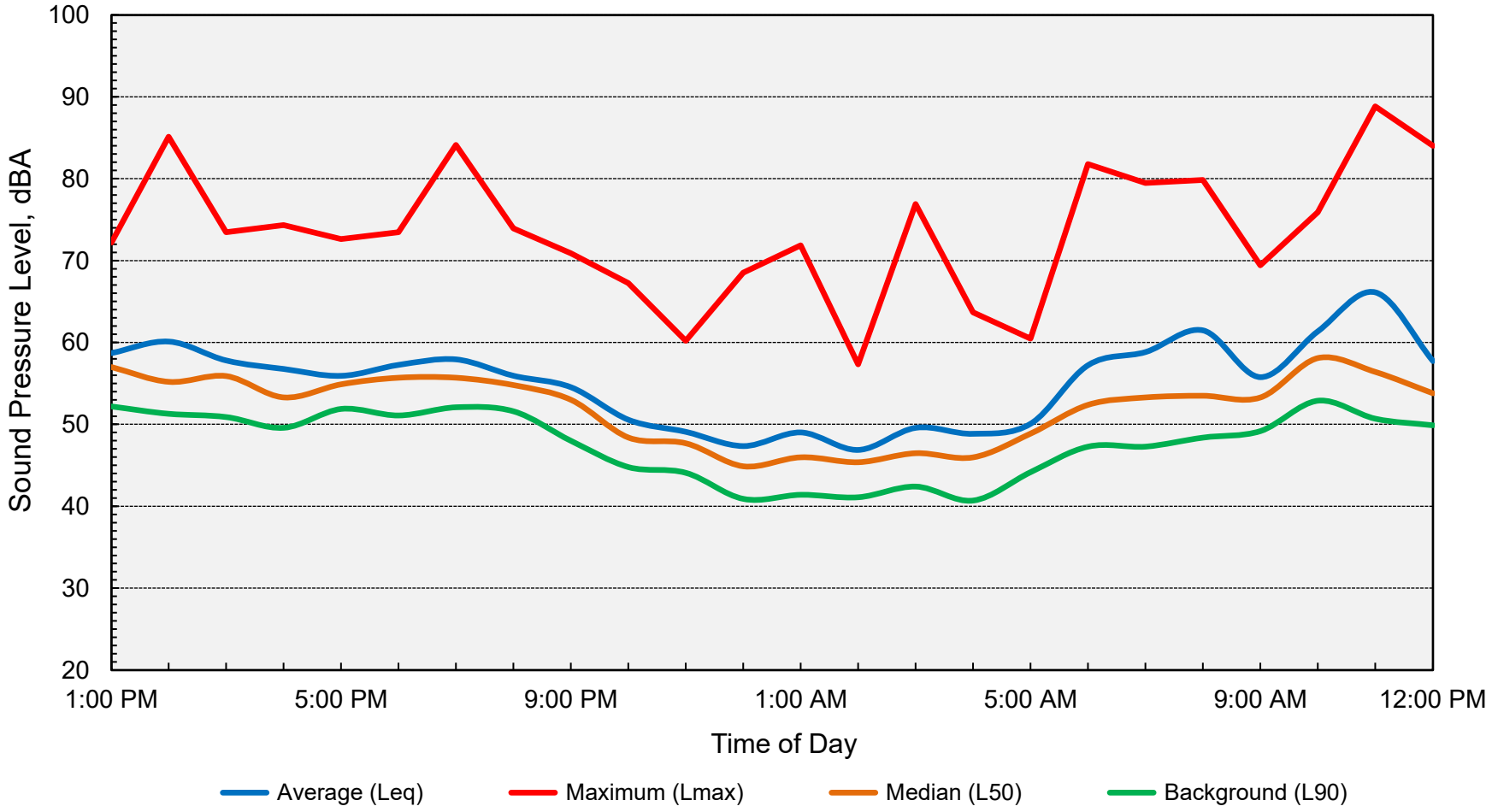
Appendix F-1
Ambient Noise Monitoring Results - Site LT-1
Magnolias Apartments - Morgan Hill, California
7/15/2021 - 7/16/2021



Computed DNL = 63 dB

BOLLARD
Acoustical Consultants

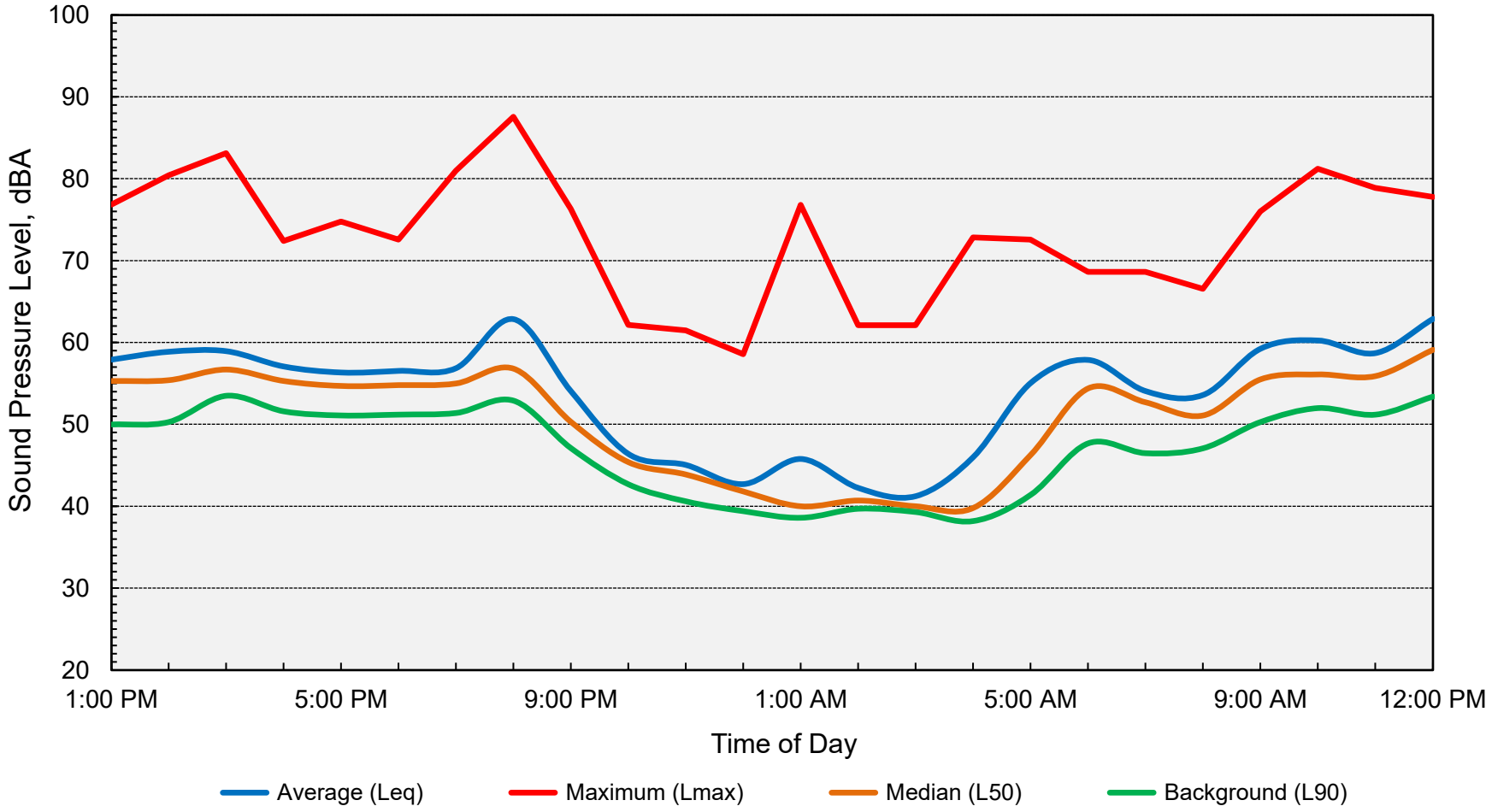
Appendix F-2
Ambient Noise Monitoring Results - Site LT-1
Magnolias Apartments - Morgan Hill, California
7/16/2021 - 7/17/2021



Computed DNL = 60 dB

BOLLARD
Acoustical Consultants

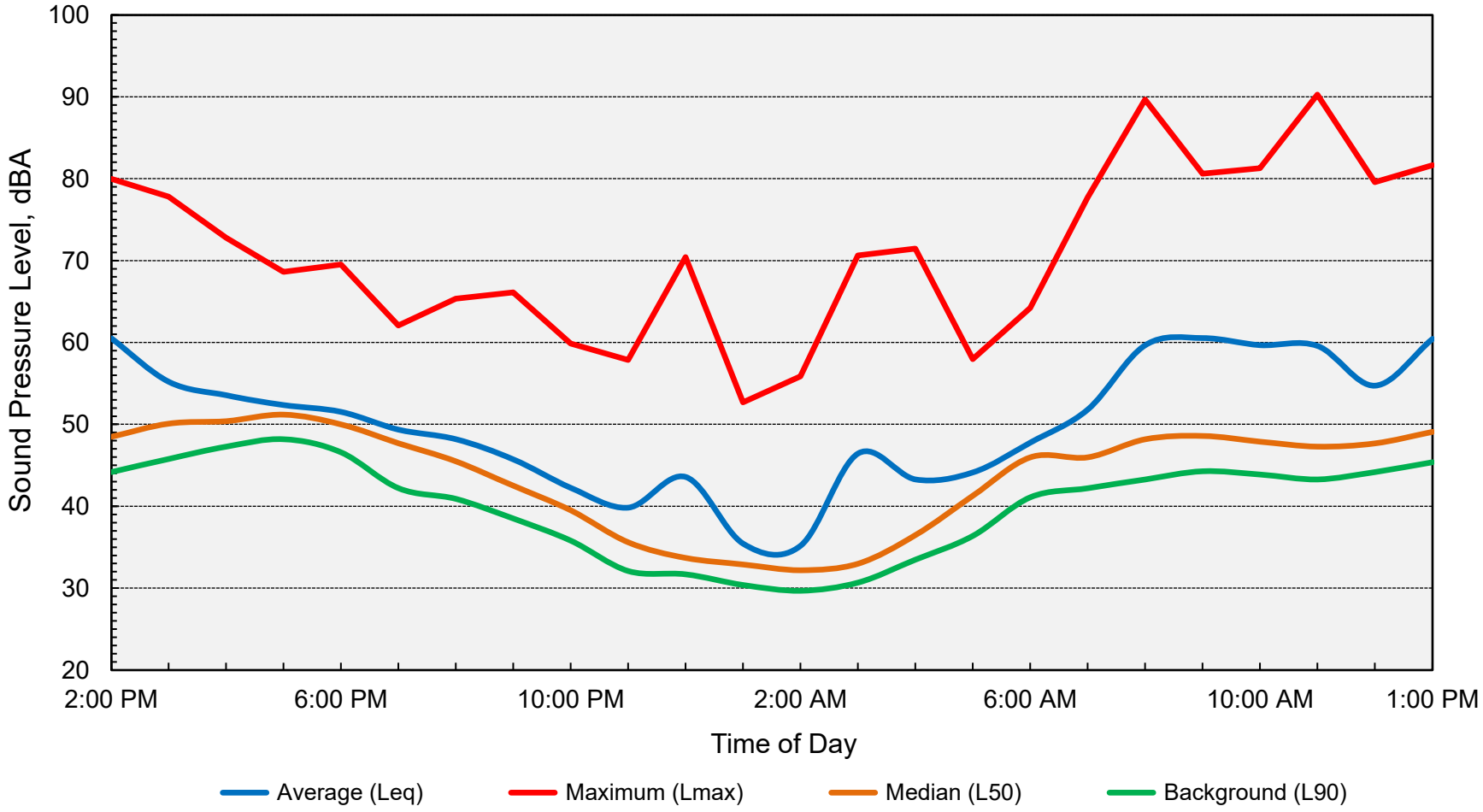
Appendix F-3
Ambient Noise Monitoring Results - Site LT-1
Magnolias Apartments - Morgan Hill, California
7/17/2021 - 7/18/2021



Computed DNL = 60 dB

BOLLARD
Acoustical Consultants

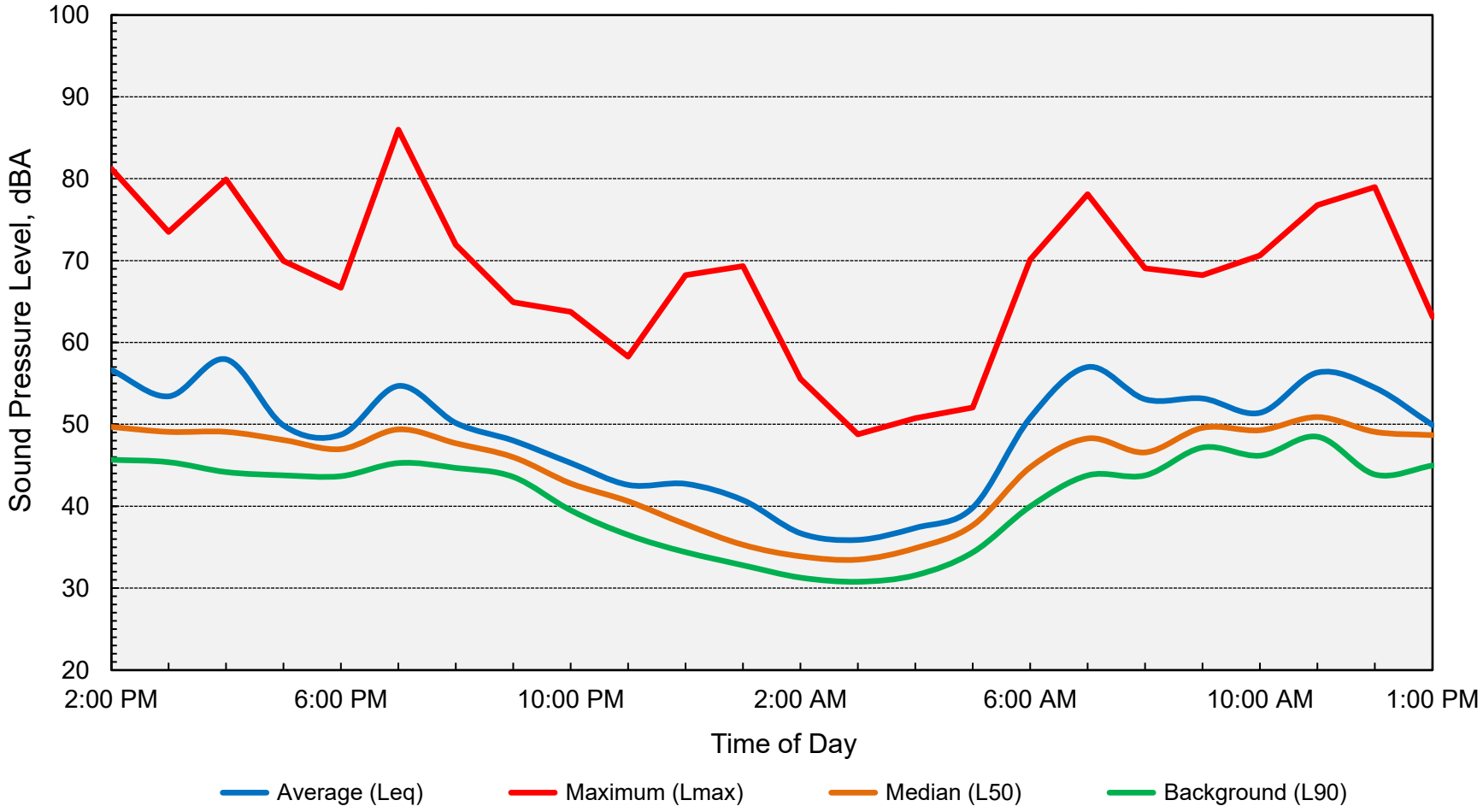
Appendix F-4
Ambient Noise Monitoring Results - Site LT-2
Magnolias Apartments - Morgan Hill, California
7/15/2021 - 7/16/2021



Computed DNL = 56 dB

BOLLARD
Acoustical Consultants

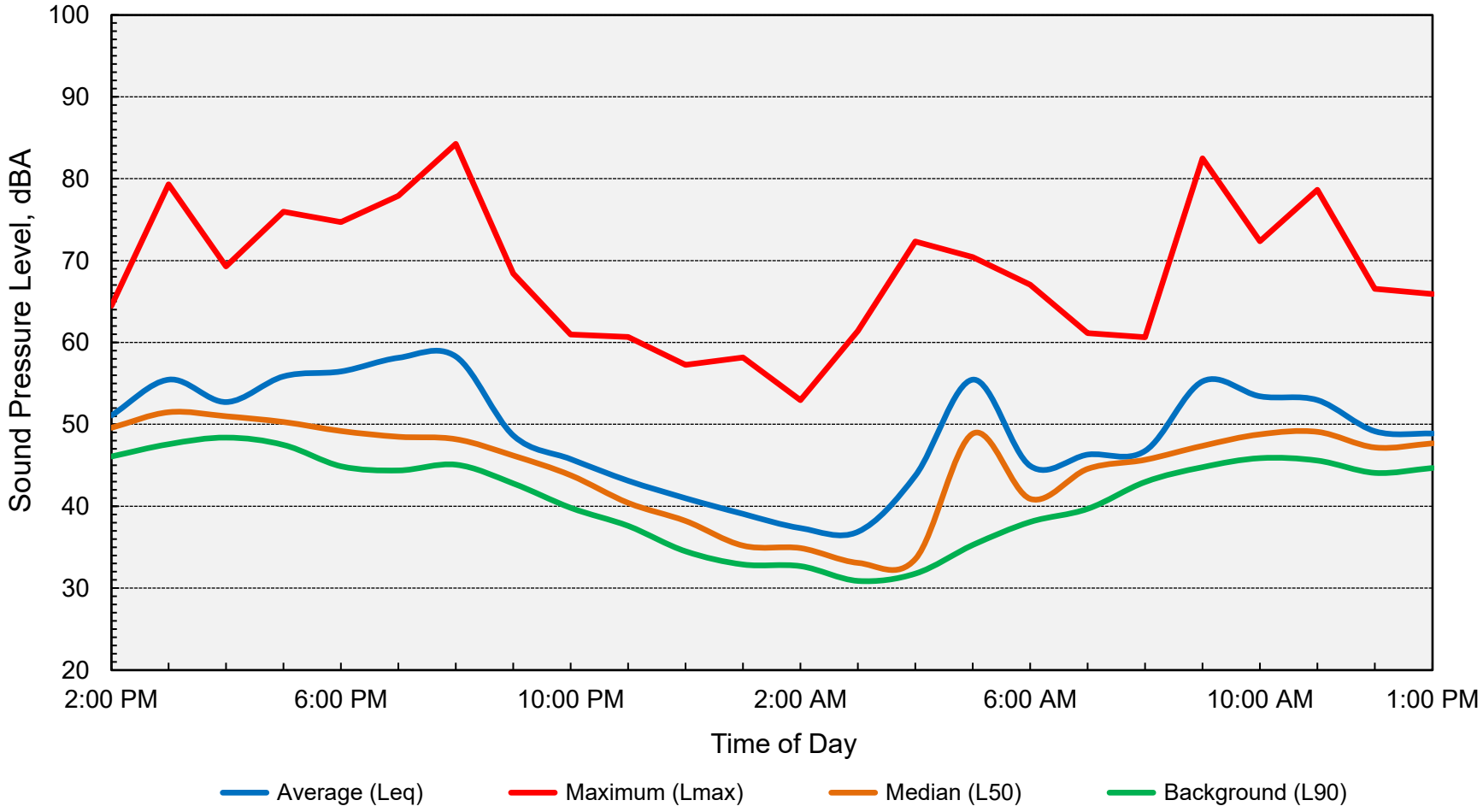
Appendix F-5
Ambient Noise Monitoring Results - Site LT-2
Magnolias Apartments - Morgan Hill, California
7/16/2021 - 7/17/2021



Computed DNL = 54 dB

BOLLARD
Acoustical Consultants

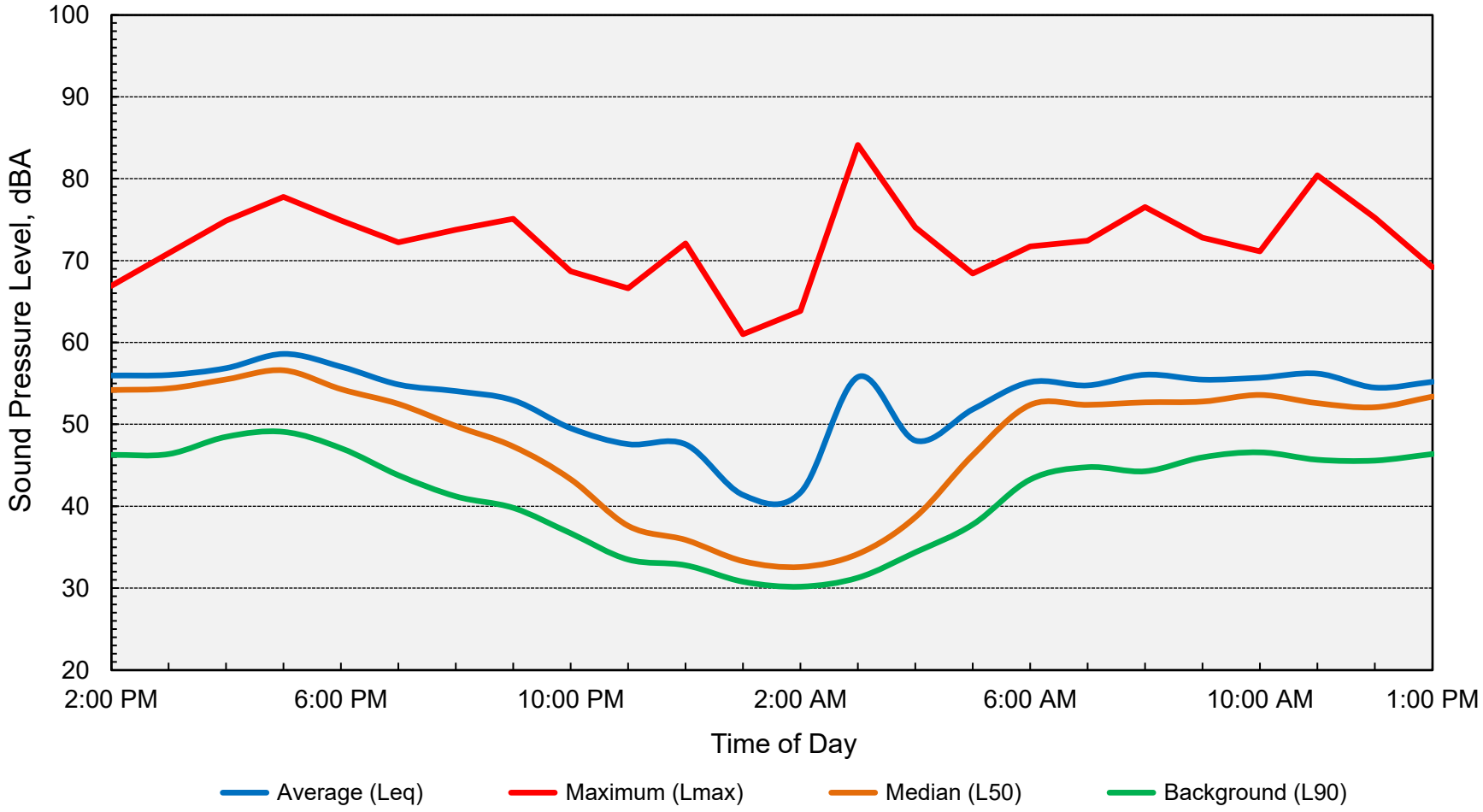
Appendix F-6
Ambient Noise Monitoring Results - Site LT-2
Magnolias Apartments - Morgan Hill, California
7/17/2021 - 7/18/2021



Computed DNL = 56 dB

BOLLARD
Acoustical Consultants

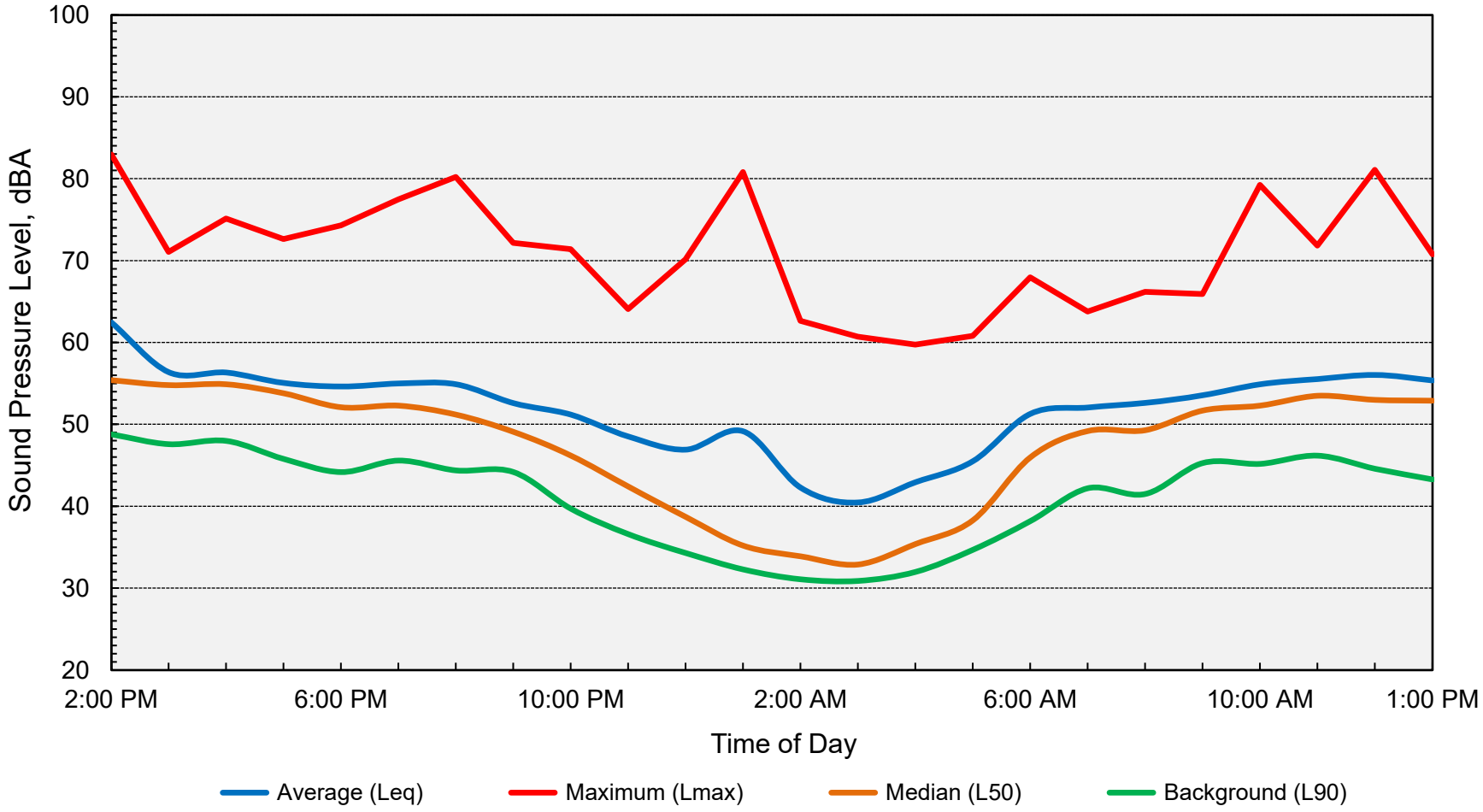
Appendix F-7
Ambient Noise Monitoring Results - Site LT-3
Magnolias Apartments - Morgan Hill, California
7/15/2021 - 7/16/2021



Computed DNL = 59 dB

BOLLARD
Acoustical Consultants

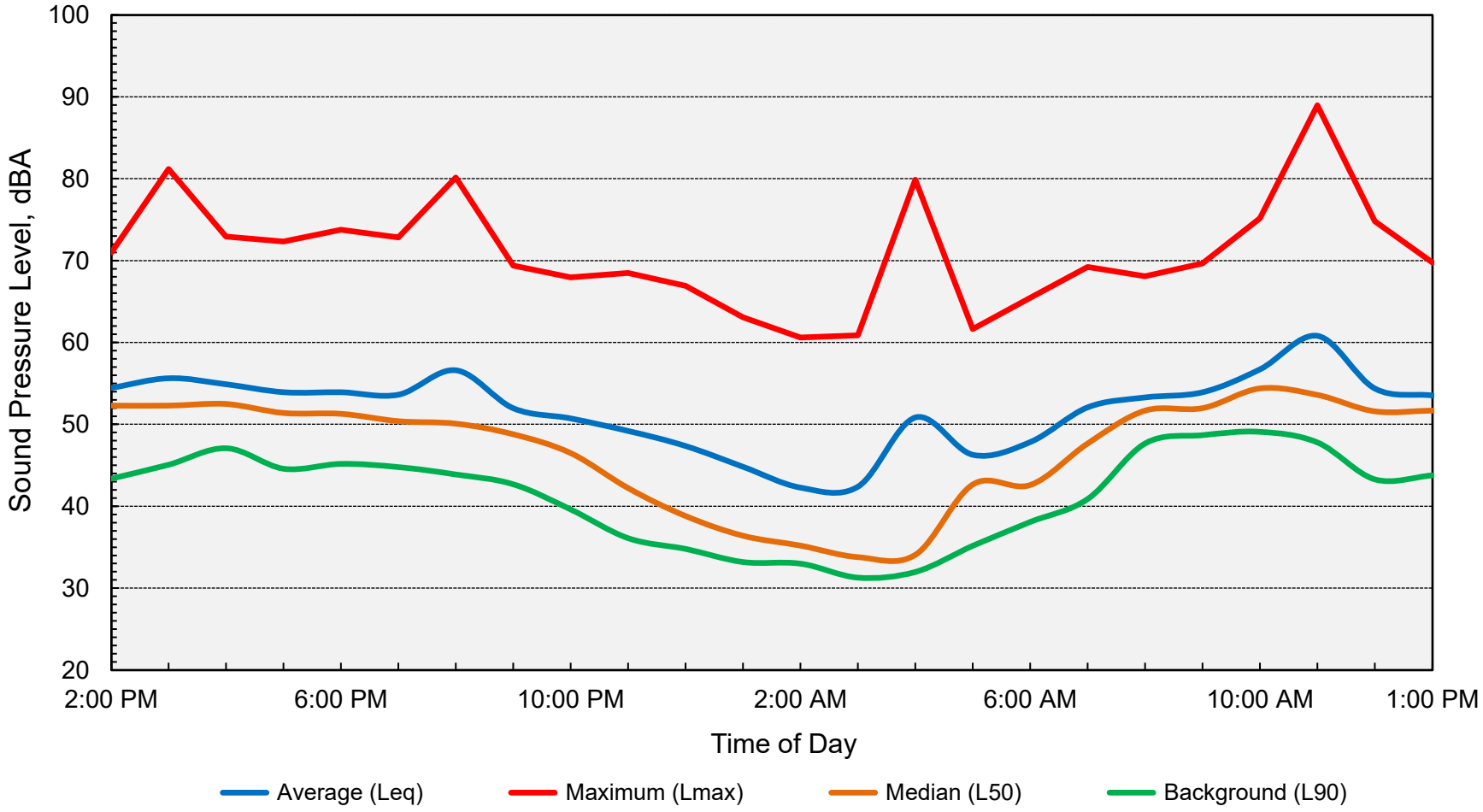
Appendix F-8
Ambient Noise Monitoring Results - Site LT-3
Magnolias Apartments - Morgan Hill, California
7/16/2021 - 7/17/2021



Computed DNL = 57 dB

BOLLARD
Acoustical Consultants

Appendix F-9
Ambient Noise Monitoring Results - Site LT-3
Magnolias Apartments - Morgan Hill, California
7/17/2021 - 7/18/2021



Computed DNL = 56 dB

BOLLARD
Acoustical Consultants

Appendix G-1

CH14NB
Single–Stage Heat Pump
with Puron® Refrigerant
1–1/2 To 5 Tons

Carrier
turn to the experts

Product Data

NOTE: Ratings contained in this document are subject to change at any time. Always refer to the AHRI directory (www.ahridirectory.org) for the most up-to-date ratings information.

INDUSTRY LEADING FEATURES / BENEFITS

Efficiency

- 14 SEER / 11.5 - 11.7 EER / 8.2 HSPF
- Microtube Technology ™ refrigeration system
- Indoor air quality accessories available

Sound

- Sound level as low as 69 dBA
- Sound levels as low as 68 dBA with accessory sound blanket

Comfort

- System supports CôR ™, Edge® or standard thermostat controls

Reliability

- Puron® refrigerant - environmentally sound, won't deplete the ozone layer and low lifetime service cost.
- Scroll compressor
- Internal pressure relief valve
- Internal thermal overload
- High pressure switch
- Loss of charge switch
- Filter drier
- Balanced refrigeration system for maximum reliability

Durability

WeatherArmor™ protection package:

- Solid, durable sheet metal construction
- Dense wire coil guard

Applications

- Long-line - up to 250 feet (76.20 m) total equivalent length, up to 200 feet (60.96 m) condenser above evaporator, or up to 80 ft. (24.38 m) evaporator above condenser (See Longline Guide for more information.)
- Low ambient (down to -20°F/-28.9°C) with accessory kit

Appendix G-2

ELECTRICAL DATA

UNIT SIZE	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MAX FUSE** or CKT BRK AMPS
		MAX	MIN	LRA	RLA	FLA		
18	208/230/1	253	197	48.0	9.0	0.50	11.8	20
24				62.9	10.9	0.60	14.2	25
30				72.5	13.5	1.40	18.3	30
36				75.0	15.1	1.10	20.0	30
42				105.5	15.5	1.40	24.0	40
48				108.0	19.0	1.40	25.2	40
60				144.2	24.4	1.52	32.0	50

* Permissible limits of the voltage range at which the unit will operate satisfactorily

** Time-Delay fuse.

FLA – Full Load Amps

LRA – Locked Rotor Amps

MCA – Minimum Circuit Amps

RLA – Rated Load Amps

NOTE: Control circuit is 24-V on all units and requires external power source. Copper wire must be used from service disconnect to unit.

All motors/compressors contain internal overload protection.

Complies with 2007 requirements of ASHRAE Standards 90.1

A-WEIGHTED SOUND POWER

UNIT SIZE	STANDARD RATING (dBA)	TYPICAL OCTAVE BAND SPECTRUM (dBA, without tone adjustment)						
		125	250	500	1000	2000	4000	8000
18	69	45	48	56	62	55	53	47
24	76	46	56	59	63	63	60	55
30	77	52	62	67	68	65	62	55
36	77	51	62	66	69	64	61	53
42	76	49	61	63	65	62	60	52
48	79	53	66	69	71	67	64	57
60	73	50	63	62	63	60	58	52

NOTE: Tested in accordance with AHRI Standard 270–08 (not listed in AHRI).

A-WEIGHTED SOUND POWER WITH SOUND HOOD

UNIT SIZE	STANDARD RATING	TYPICAL OCTAVE BAND SPECTRUM (dBA, without tone adjustment)						
		125	250	500	1000	2000	4000	8000
18	68	47	48	56	61	55	52	46
24	74	47	57	59	62	61	58	51
30	77	52	62	67	67	65	62	54
36	76	52	62	66	67	64	60	52
42	74	50	61	63	64	61	58	49
48	79	54	66	69	70	67	64	56
60	73	51	64	62	63	59	56	49

NOTE: Tested in accordance with AHRI Standard 270–08 (not listed in AHRI).

CHARGING SUBCOOLING (TXV-TYPE EXPANSION DEVICE)

UNIT SIZE–SERIES	REQUIRED SUBCOOLING °F (°C)
18	11 (6.1)
24	11 (6.1)
30	10 (5.6)
36	10 (5.6)
42	10 (5.6)
48	14 (7.8)
60	15 (8.3)

HP ONLY REPLACEMENT WITH PISTON INDOORS

When the CH14NB is used as a replacement component in a system with a piston fan coil, use the indoor piston size specified below:

UNIT SIZE	PISTON SIZE		
	FB4CNF	FFM	FPMA
18	0.052	0.050	0.050
24	0.057	0.057	0.056
30	0.067	0.070	0.067
36	0.070	0.072	0.069
42	0.078		
48	0.084		
60			

= N/A

Appendix H-1

Sound-attenuated and weather-protective enclosures

> For generator sets from 10 to 1000 kW

Our energy working for you.™

Cummins Power Generation

> Diesel generator set enclosures
10 to 1000 kW
Weather-protective
Level I, Level II, Level III

> Spark-ignited generator set enclosures
20 to 150 kW
Weather-protective
Level I, Level II

Sound-attenuated and weather-protective enclosures from Cummins Power Generation Inc. meet even the strictest sound requirements and provide optimum protection from inclement weather.

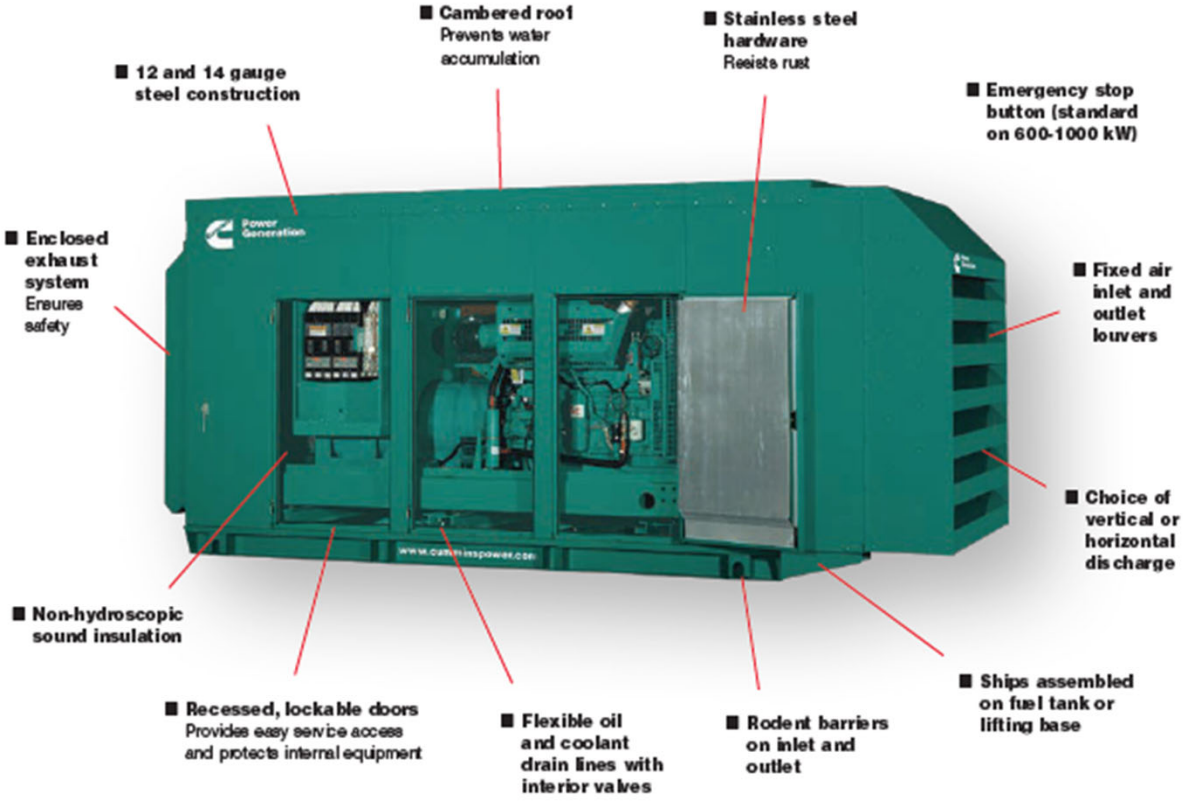
Cummins Power Generation diesel and spark-ignited generator sets are available with sound-attenuated and weather-protective enclosures. Pre-assembled, pre-integrated and delivered as part of the entire power system, these enclosures are designed to speed installation time and reduce costs.

Choose from three levels of sound-attenuation, depending on model size, to comply with even the strictest noise requirements. Enclosures are constructed of steel or aluminum, which is preferred in coastal regions or other environments where corrosion is a concern.

www.cumminspower.com

Appendix H-2

Features:



> Three levels of sound attenuation
  Level I: 70 to 89 d(B)A*
  Level II: 63 to 78 d(B)A*
  Level III: 68 to 70 d(B)A*
> Compact footprint, low profile design
> Easy access to all major generator and engine control components for servicing
> Fully-house, enclosed exhaust silencer ensures safety and protects against rust
> Enclosure, generator set, exhaust system and tank are pre-assembled, pre-integrated and shipped as one package, saving time and labor costs
> All-steel construction with stainless steel hardware offers durability
> Upgrade kits
> Enclosures mounted directly to a sub-base fuel tank or lifting base
> UL2200-listed
> Customer options available to meet your application needs

Enclosure options

> Aluminum enclosure is wind-rated to 150 mph (per ASCE 7-05 exposure D, category 1 importance factor)
> Kits available to up-fit existing generator sets or to upgrade existing enclosures with additional sound attenuation
> Exterior oil and coolant drains with interior valves for ease of service
> Overhead 2-point lifting brackets (some models)

* Full load at 7 meters, steel enclosures

www.cumminspower.com

Appendix H-3

Choose from weather protective enclosure or three levels of sound attenuation:

Sound levels (dB(A))*				
kW	Model	Weather-protective	Level I	Level II
Diesel				
10	DSKAA	78	68	65
15	DSKAB	81	69	66
20	DSKBA	80	70	67
25	DSKFA	82	72	69
35	DGBB	82	71	63
35	DGGD	81	72	66
40	DGBC	82	72	63
40	DGHD	79	71	64
50	DGCA	83	72	66
50	DGHE	79	70	65
60	DGCB	84	73	67
60	DSFAD	87	79	71
80	DGCG	84	76	67
80	DSFAE	87	82	72
100	DGDB	86	77	70
100	DSGAA*	87	-	73
100	DSHAF	95	88	78
125	DGDK	86	80	71
125	DSGAB*	87	-	74
125	DSHAE	95	88	78
150	DGFA	89	77	72
150	DSGAC*	88	-	75
150	DSHAA	95	88	78
175	DGFB	90	78	72
175	DSHAB	95	88	78
200	DGFC	91	80	74
200	DSHAC	95	88	78
230	DGFS	91	81	75
230	DSHAD	96	89	78
250	DQDAA	90	86	71
275	DQDAB	89	86	71
275	DQHAA	86	85	74
300	DFCB	86	84	71
300	DQDAC	89	86	71
300	DQHAB	89	88	76
350	DFCC	87	85	72
350	DFEG	85	83	72
400	DFCE	89	85	73
400	DFEG	89	85	73
450	DFEJ	87	84	73
500	DFEK	88	85	76
600	DFGB	85	78	74
600	DQCA	87	79	74
750	DFGE	87	80	75
750	DFHA	91	81	77
750	DQCB	87	79	74
750	DQFAA	89	79	75
800	DFHB	91	81	77
800	DQCC	87	79	74
800	DQFAB	89	79	75
900	DFHC	93	83	78
900	DQFAC	88	80	76
1000	DFHD	90	80	76
1000	DQFAD	90	80	76

Sound levels (dB(A))*				
kW	Model	Weather-protective	Level I	Level II
Spark-ignited				
20	GGMA	77	N/A	66
25	GGMB	78	N/A	66
30	GGMC	79	N/A	67
35	GGFD	80	73	65
42/47	GGFE	83	73	66
60	GGHE	86	77	68
70/75	GGHF	87	77	69
85	GGHG	85	79	75
100	GGHH	86	80	76
125	GGLA	85	79	75
150	GGLB	85	79	75

***Also available Level III**

100 kW	DSGAA	68 dB(A)
125 kW	DSGAB	69 dB(A)
150 kW	DSGAC	70 dB(A)

Diesel generator sets from 100 to 150 kW (models **DSGAA, DSGAB, DSGAC**) are available in **Level III** sound attenuation.

Shown: 100 kW Tier 3 diesel generator set (model DSGAA).

* Full load at 7 meters, sled enclosures

Appendix H-4

Diesel package dimensions (in.)

Tank capacity (gal.)	Weather-protective			Level I			Level II, III		
	Length	Width	Height	Length	Width	Height	Length	Width	Height
35-90 kW									
70	83	40	63	83	40	81	102	40	81
140	83	40	71	83	40	89	102	40	89
100-230 kW									
109	105	40	67	108	40	85	142	40	87
173	105	40	72	108	40	90	142	40	92
309	105	44	87	N/A	N/A	N/A	145	43	97
336	105	40	86	108	40	104	142	40	106
230-500 kW									
Lifting base	188	82	100	188	82	100	222	82	100
300	188	82	104	188	82	104	222	82	104
400	188	82	106	188	82	106	222	82	106
500	188	82	108	188	82	108	222	82	108
600	188	82	111	188	82	111	222	82	111
660	188	82	113	188	82	113	222	82	113
720	188	82	114	188	82	114	222	82	114
850	188	82	118	188	82	118	222	82	118
1470	200	82	128	200	82	128	200	82	128
1700	234	82	128	234	82	128	234	82	128
600-1000 kW									
200	260	98	133	303	98	133	315	98	133
660	260	98	133	303	98	133	315	98	133
1000	260	98	137	303	98	137	315	98	137
1500	260	98	142	303	98	142	315	98	142
2000	280	98	142	320	98	142	320	98	142
2400	332	98	142	330	98	142	332	98	142

Spark-ignited package dimensions (in.)

Model number	Weather-protective			Level I			Level II		
	Length	Width	Height	Length	Width	Height	Length	Width	Height
20 kW									
GGMA	65	30	46	N/A	N/A	N/A	85	30	47
25 kW									
GGMB	65	30	46	N/A	N/A	N/A	85	30	47
30 kW									
GGMC	65	30	46	N/A	N/A	N/A	85	30	47
35 kW									
GGFD	83	40	54	83	40	72	83	40	72
45 kW									
GGFE	83	40	54	83	40	72	83	40	72
60 kW									
GGHE	83	40	54	83	40	72	83	40	72
70 kW									
GGHF	83	40	54	83	40	72	83	40	72
85 kW									
GGHG	105	40	70	105	60	70	142	60	70
100 kW									
GGHH	105	40	70	105	60	70	142	60	70
125 kW									
GGLA	105	40	70	105	60	70	142	60	70
150 kW									
GGLB	105	40	70	105	60	70	142	60	70

Cummins Power Generation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
Phone: 763 574 5000
Fax: 763 574 5298

Latin America
3350 Southwest 148th Ave., Suite 205
Miramar, FL 33027
USA
Phone 1 954 431 5511
Fax 1 954 433 5797

Package listed to UL2200

Our energy working for you.™
www.cumminspower.com

Power Generation

Appendix I
FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number: 2021-123
Project Name: Magnolias Apartments
Roadway Name: Monterey Road

Traffic Data:

Year: Future
Average Daily Traffic Volume: 18,345
Percent Daytime Traffic: 80
Percent Nighttime Traffic: 20
Percent Medium Trucks (2 axle): 2
Percent Heavy Trucks (3+ axle): 1
Assumed Vehicle Speed (mph): 35
Intervening Ground Type (hard/soft): **Soft**

Traffic Noise Levels:

				DNL (dB)			
Location	Description	Distance	Offset (dB)	Autos	Medium Trucks	Heavy Trucks	Total
1	Common outdoor space - garden/recreation area	240	-3	53	46	48	55
2	Common outdoor space - entry plaza	95		62	55	57	64
3	Common outdoor space - 5th floor deck	70	-1	63	56	58	65
4	Nearest 2nd & 3rd floor building facades	70	2	66	59	61	68
5	Nearest 4th & 5th floor building facades	70	4	68	61	63	70

Traffic Noise Contours (No Calibration Offset):

DNL Contour (dB)	Distance from Centerline (ft)
75	17
70	37
65	80
60	172

Notes:
1. Future (Cumulative Plus Project conditions) ADT volume for Monterey Road was calculated by using traffic volume data provided in the project traffic memorandum prepared by Hexagon Transportation Consultants, Inc. Future traffic volume was conservatively estimated by applying a factor of 5 to sum of AM and PM peak hour conditions.
2. Positive offsets applied at upper-floor locations to account for reduced ground absorption at elevated locations. Negative offsets applied where a reduced view of the roadway or shielding provided by a proposed barrier/wall would be present.