Environmental Noise & Vibration Assessment

Manzanita Park Subdivision

Morgan Hill, California

BAC Job # 2021-065

Prepared For:

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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 Manzanita Park Subdivision (project) is located east of Monterey Road and north of Burnett Avenue in Morgan Hill, California. The project proposes the development of a multi-family residential subdivision on two parcels and will consist of approximately 67 units (12 three-story buildings). Existing land uses in the project vicinity include commercial to the south, residential to the west, and land currently undeveloped to the north and east. In addition, an existing Union Pacific Railroad (UPRR) track is located west of the project area across Monterey Road. 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.

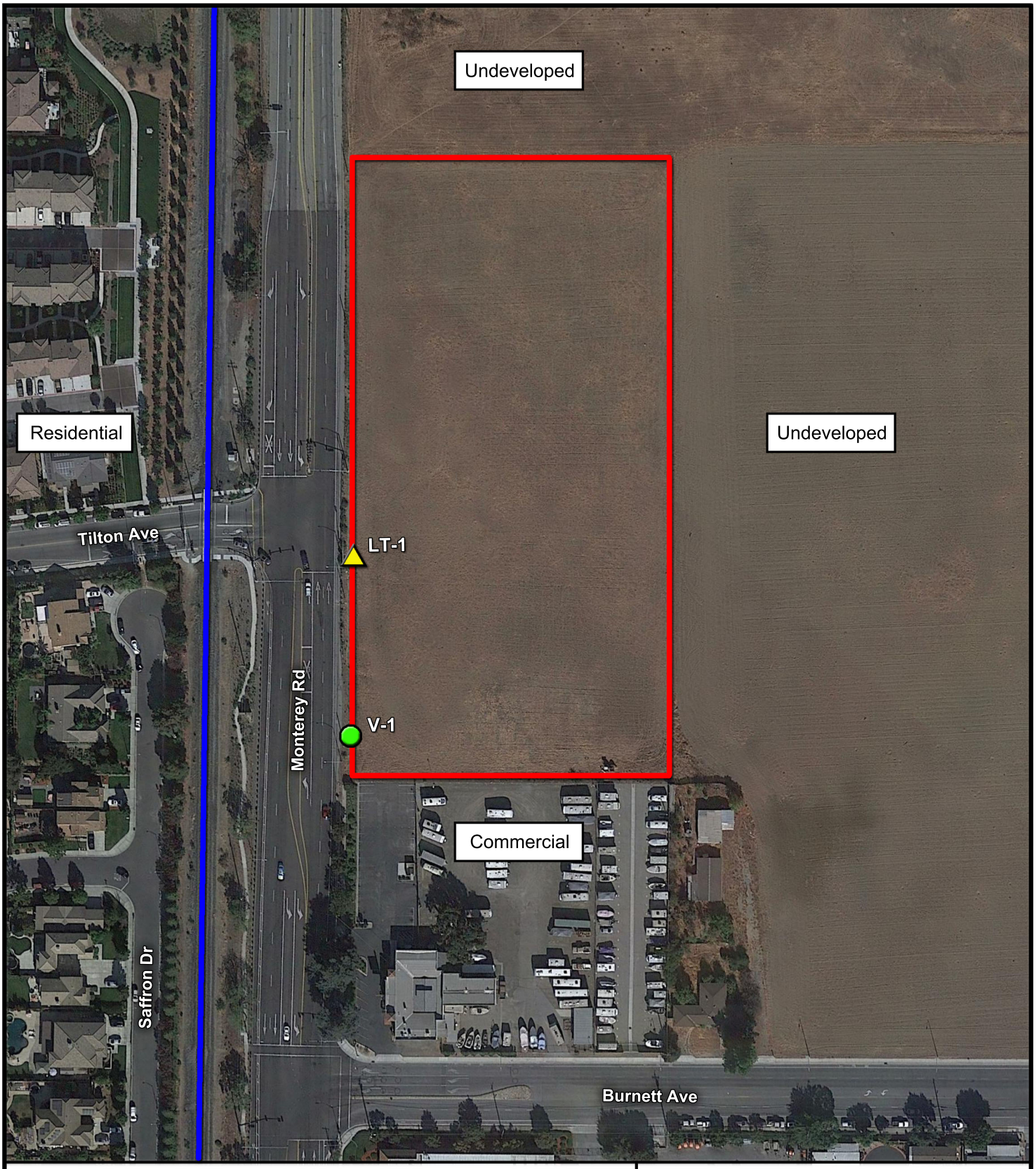
Vibration

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 Border (Approximate)
- Union Pacific Railroad Tracks
- Short-Term Vibration Measurement Location
- Long-Term Noise Measurement Location

N

Scale (feet)

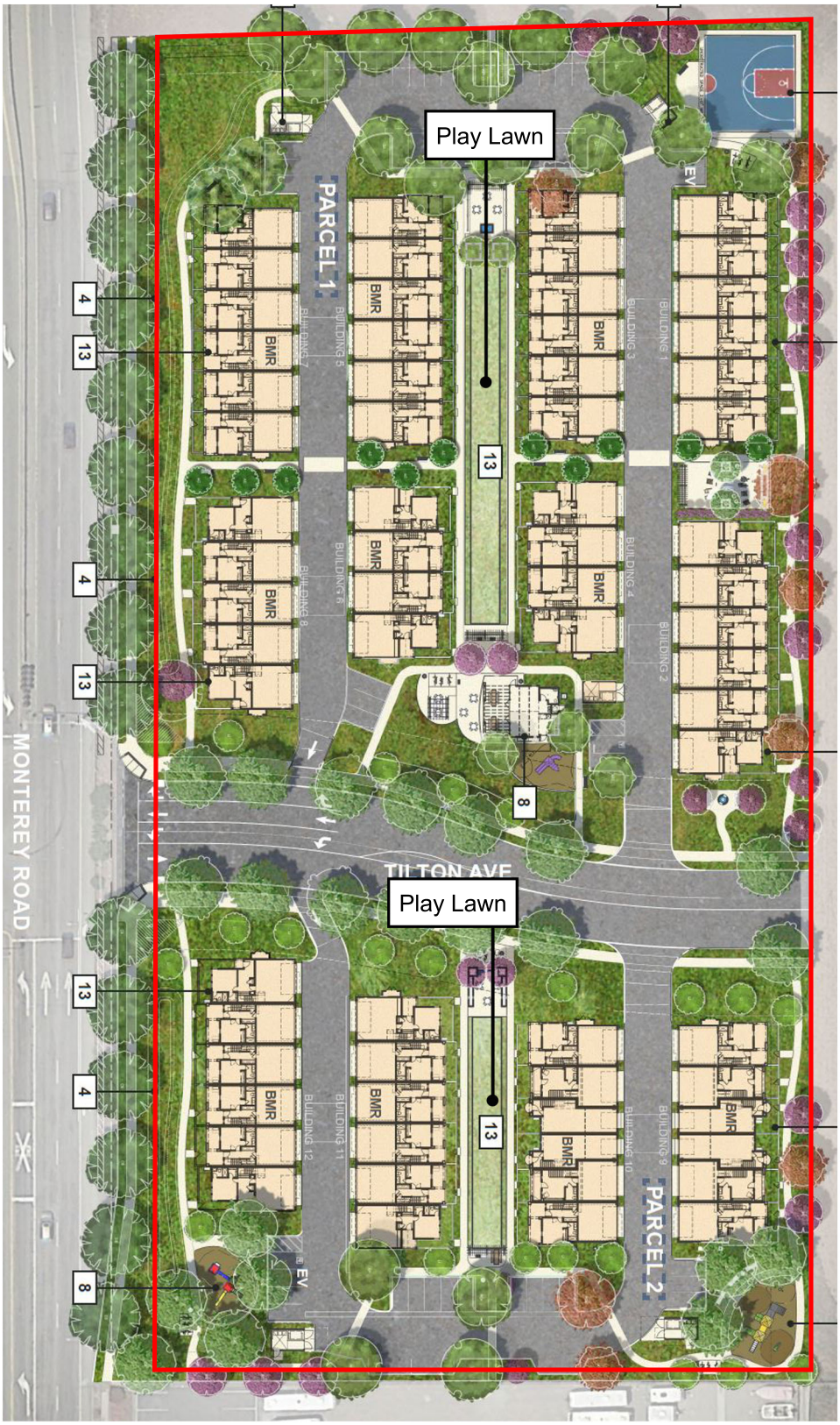
0 75 150

Manzanita Park Subdivision
Morgan Hill, California

Project Area

Figure 1

BOLLARD Acoustical



Legend

Project Border

N

Scale (feet)

0 40 80

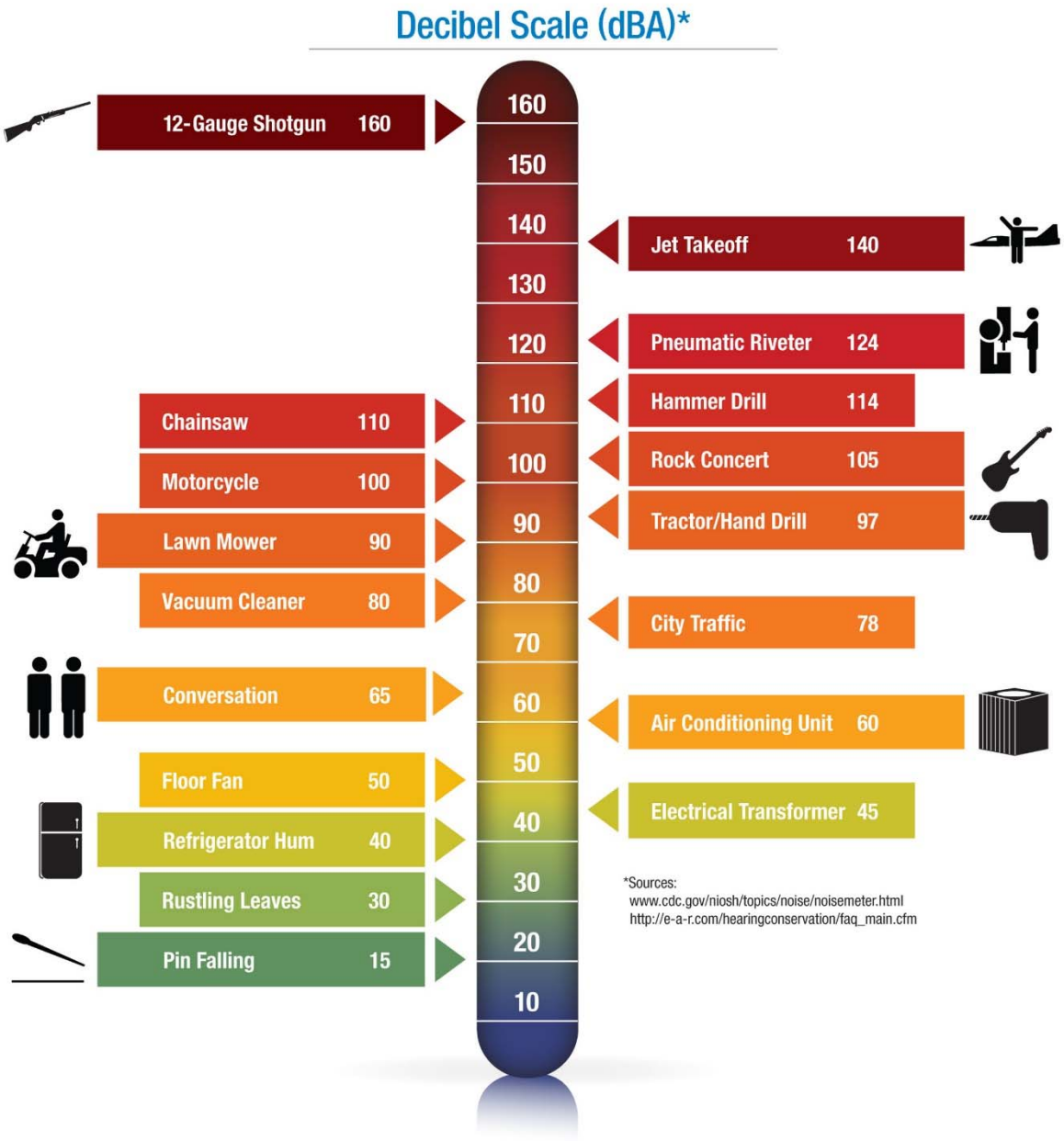
Manzanita Park Subdivision
Morgan Hill, California

Site Plan

Figure 2

BOLLARD Acoustical

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 from project-generated 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.

Federal Transit Administration (FTA)

The City of Morgan Hill does not currently have adopted standards for groundborne vibration. As a result, vibration impact assessment criteria established by the U.S. Department of Transportation's Federal Transit Administration (FTA) criteria was applied to the project. The FTA vibration impact criteria is based on maximum overall levels for a single event, such as vehicle or train passbys. This vibration impact criteria, identified in Table 6-3 of the FTA's Transit Noise and Vibration Impact Assessment Manual (September 2018), has been reproduced in Table 2.

Table 2
Groundborne Vibration Impact Criteria for Annoyance Determinations

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 µinch/sec, RMS)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1 – Buildings where vibration would interfere with interior operations	65[4]	65[4]	65[4]
Category 2 – Residences and buildings where people normally sleep	72	75	80
Category 3 – Institutional land uses with primarily daytime use	75	78	83

[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day.
[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.
[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. For equipment that is more sensitive, a Detailed Vibration Analysis must be performed.
Source: Federal Transit Administration. Transit Noise and Vibration Impact Assessment Manual (2018), Table 6-3

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 3), 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.

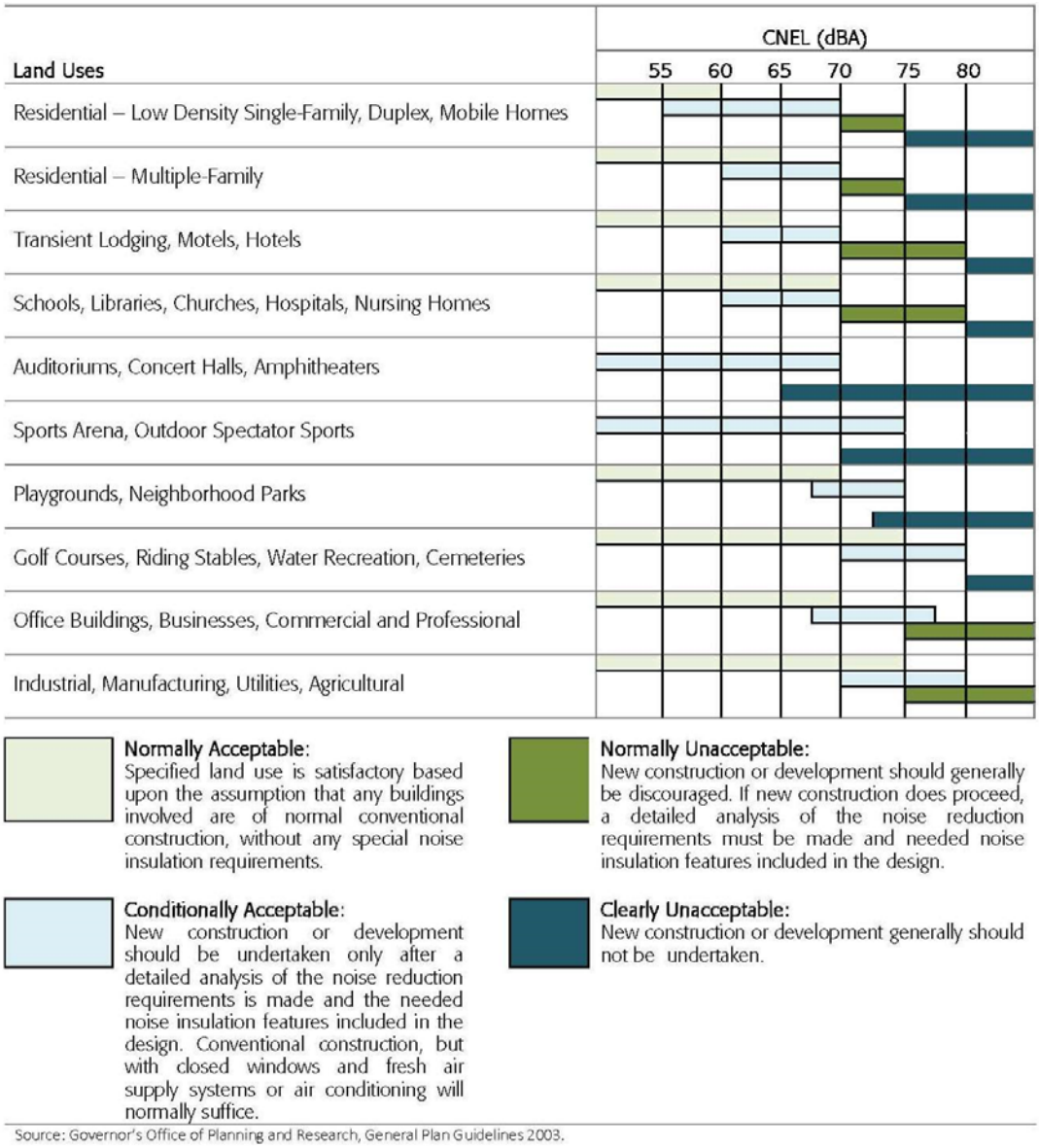
SSI-9.3 **Sound Wall Design.** The maximum height of sound walls shall be eight feet. Residential projects adjacent to the freeway shall be designed to minimize sound wall height through location of a frontage road, use of two sound walls or other applicable measures. Sound wall design and location shall 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 3
State of California Land Use Compatibility Guidelines for Community Noise Environments



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 proposed playing court and playground areas. The city's quantitative exterior noise standards are provided below in Table 4. According to city staff, the Table 4 standards are interpreted as being hourly average (L_{eq}) noise level standards.

Table 4
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: City of 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 uses. Specifically, single-family residential land uses are located to the west of the project area. Existing commercial uses are located to the 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 (2020) conditions were obtained from a project traffic memorandum prepared by Keith Higgins, Traffic Engineer. 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 5.

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 5
Existing (2020) 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 Road / Tilton Avenue	North	69	85	183	395
2		South	68	74	158	341
3		East	--	--	--	--
4		West	59	18	38	82

Blank cell = no traffic data was provided

Source: FHWA-RD-77-108 with inputs from Higgins Traffic Engineer. Appendix C contains FHWA Model inputs.

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, intermittent railroad operations on the adjacent UPRR track, and to a lesser extent by activities at nearby commercial uses. To generally quantify existing ambient noise environment within the project area, BAC conducted long-term (48-hour) ambient noise level measurements from April 14th to 15th, 2021. The noise survey location is shown on Figure 1, identified as site LT-1. Photographs of the noise survey location are provided in Appendix D.

A Larson Davis Laboratories (LDL) Model 831 precision integrating sound level meter equipped with a real-time frequency analyzer was used to complete the long-term noise level measurements. The meter was calibrated immediately before and after 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 6. The detailed results of the ambient noise survey are contained in Appendix E in tabular format and graphically in Appendix F.

Table 6
Summary of Long-Term Noise Survey Measurement Results – April 14-15, 2021[1]

Site Description[2]	Date	DNL	Average Measured Hourly Noise Levels (dBA)[3]			
			Daytime[4]		Nighttime[5]	
			L_{eq}	L_{max}	L_{eq}	L_{max}
LT-1: West end of the project area	4/14/21	72	68 (64-73)	90 (80-102)	65 (54-69)	88 (77-99)
	4/15/21	72	69 (66-74)	94 (83-101)	65 (55-69)	88 (78-99)

[1] Detailed summaries of the noise monitoring results are provided in Appendices E and F.
[2] Long-term noise survey location is shown on Figure 1.
[3] Data presented in terms of: Average (Low-High)
[4] Daytime hours: 7:00 a.m. to 10:00 p.m.
[5] Nighttime hours: 10:00 p.m. to 7:00 a.m.

Source: Bollard Acoustical Consultants, Inc. (2021)

The Table 6 data indicate that measured day-night average and average hourly noise levels were consistent throughout the monitoring period. Long-term measurement site LT-1 was selected to be representative of the existing Monterey Road traffic and UPRR railroad noise level environment at the project site.

Existing Ambient Vibration Environment

During a site visit on April 13, 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 (1-hour) vibration measurements at the location identified on Figure 1 (site V-1). 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. The results are presented graphically in Appendix G. In the analysis of the vibration measurement data, it was revealed that measured maximum vibration levels did not exceed 60 VdB RMS during the 1-hour monitoring period.

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 and commercial land uses are located to the west and south of the project area, respectively. For noise generated by on-site activities, the Municipal Code establishes exterior noise level limits of 60 and 65 dB L_{eq} for residential and commercial land uses (Table 4). 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 on-site noise sources of the project have been identified as the playing court (basketball), playground (tot lot) areas. Because it is reasonably assumed that activities within those outdoor areas would take place during daytime hours only (7:00 a.m. to 10:00 p.m.), the daytime ambient noise level data presented in Table 6 would serve as the baseline ambient noise level environment in the project vicinity. The General Plan, however, 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 was 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 6, the measured day-night average noise level within the project vicinity was 72 dB DNL during the 48-hour monitoring period. Thus, a 1.5 dB increase in noise levels due to project on-site activities is required for a finding of a significant impact.

For this project, measured ambient hourly average noise levels in the project vicinity during daytime hours ranged from 64 to 74 (overall arithmetic average of 68 dB L_{eq}). Measured daytime hourly maximum noise levels ranged from 80 to 102 dB L_{max} with an overall arithmetic average of 91 dB L_{max}. Given the arithmetic averages identified above, and based on the FICON criteria, a significant noise impact would be identified if predicted hourly average or maximum noise levels due to the project would exceed 70 dB L_{eq} or 93 dB L_{max}, respectively (i.e., 1.5 dB above ambient).

- **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 FTA Groundborne Vibration Impact 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.

Analysis Methodology

Noise impacts are identified if the proposed project would result in a substantial increase in off-site traffic noise levels, or if noise generated by on-site activities would either exceed the applicable City of Morgan Hill noise standards or result in a substantial increase in ambient noise levels. Vibration impacts are identified in vibration exposure at existing or proposed sensitive receptors would exceed the FTA criteria presented in Table 2.

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 the project traffic impact analysis prepared by to predict project traffic noise level increases relative to existing (2020) 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 project traffic memorandums prepared by Keith Higgins Traffic Engineer and Hexagon Transportation Consultants, Inc. provided by the project applicant. 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 7. The following section includes an assessment of predicted traffic noise levels relative to the FICON increase significance noise criteria identified in Table 1. The Table 7 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 7
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 Road / Tilton Avenue	North	69.0	69.0	0.0	No
2		South	68.0	68.0	0.0	No
3		East	N/A	45.7	45.7	Yes
4		West	58.7	58.8	0.1	No

*N/A = Roadway segment that would not exist without project

Source: FHWA-RD-77-108 with inputs from Higgins and Hexagon. Appendix C contains the FHWA Model inputs.

As indicated in Table 7, the proposed project's contribution to traffic noise level increases is predicted to exceed applicable General Plan Policy SSI-8.5 increase significance criteria along one roadway segment evaluated in the existing conditions analysis (segment 3). However, segment 3 is a future access point to the proposed development off Monterey Avenue (Tilton Avenue) and is located within the project area. Further, existing noise-sensitive uses were not identified along this roadway segment within the project area.

Based on the analysis presented above, 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 (General Plan 2035 Buildout with Madrone Parkway Extension) Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for Cumulative (General Plan 2035 Buildout No Project *with* Madrone Parkway Extension) and Cumulative Plus Project conditions in the project area roadway network were obtained from the project traffic memorandums prepared by Keith Higgins Traffic Engineer and Hexagon Transportation Consultants, Inc. provided by the project applicant. 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 8. The following section includes an assessment of predicted traffic noise levels relative to the FICON increase significance noise criteria identified in Table 1. 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
Cumulative (with Madrone Extension) Versus Cumulative Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			C	C+P	Increase	
1	Monterey Road / Tilton Avenue	North	70.9	70.9	0.0	No
2		South	69.9	69.6	-0.3	No
3		East	N/A	53.5	53.5	Yes
4		West	54.6	54.7	0.1	No

*N/A = Roadway segment that would not exist without project

Source: FHWA-RD-77-108 with inputs from Higgins and Hexagon. Appendix C contains the FHWA Model inputs.

The Table 8 data indicate that the proposed project's contribution to traffic noise level increases is predicted to exceed applicable General Plan Policy SSI-8.5 increase significance criteria along one roadway segment evaluated in the existing conditions analysis (segment 3). However, segment 3 is a future access point to the proposed development off Monterey Avenue (Tilton Avenue) and is located within the project area. Further, existing noise-sensitive uses were not identified along this roadway segment within the project area.

Based on the analysis presented above, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (Cumulative [General Plan 2035 Buildout No Project *with* Madrone Parkway Extension] versus Cumulative Plus Project conditions) are identified as being ***less than significant***.

Impact 3: Increases in Cumulative (General Plan 2035 Buildout without Madrone Parkway Extension) Traffic Noise Levels due to the Project

Traffic data in the form of AM and PM peak hour movements for Cumulative (General Plan 2035 Buildout No Project *without* Madrone Parkway Extension) and Cumulative Plus Project conditions in the project area roadway network were obtained from the project traffic memorandums

prepared by Keith Higgins Traffic Engineer and Hexagon Transportation Consultants, Inc. provided by the project applicant. 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 FICON increase significance noise criteria identified in Table 1. 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 (without Madrone Extension) Versus Cumulative Plus Project Conditions

Segment	Intersection	Direction	Traffic Noise Level at 100 feet, DNL (dB)			Substantial Increase?
			C	C+P	Increase	
1	Monterey Road / Tilton Avenue	North	70.9	70.9	0.0	No
2		South	69.9	69.7	-0.2	No
3		East	N/A	53.5	53.5	Yes
4		West	54.6	59.1	4.5	No

*N/A = Roadway segment that would not exist without project

Source: FHWA-RD-77-108 with inputs from Higgins and Hexagon. Appendix C contains the FHWA Model inputs.

As shown in Table 9, the proposed project's contribution to traffic noise level increases is predicted to exceed applicable General Plan Policy SSI-8.5 increase significance criteria along one roadway segment evaluated in the existing conditions analysis (segment 3). However, segment 3 is a future access point to the proposed development off Monterey Avenue (Tilton Avenue) and is located within the project area. Further, existing noise-sensitive uses were not identified along this roadway segment within the project area.

Based on the analysis presented above, off-site traffic noise impacts related to increases in traffic resulting from the implementation of the project (Cumulative [General Plan 2035 Buildout No Project *without* Madrone Parkway Extension] 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 activities within the project area have been identified as the outdoor playing court (basketball) and playgrounds (tot lots). The locations of those outdoor activity areas are shown on Figure 2. An assessment of each project-related noise source at the nearest existing off-site land uses to west (residential) and south (commercial) follows.

Impact 4: Playing Court Noise at Nearest Existing Off-Site Land Uses

The project proposes an outdoor playing court (basketball) located at the northeast end of the project area. The primary noise source associated with outdoor playing court use is participant shouting. BAC file data indicate that average and maximum noise levels of similar sized outdoor

playing courts are approximately 55 dB L_{eq} and 75 dB L_{max} at a distance of 50 feet from the focal point of the court area.

Based on the above-mentioned reference noise levels, and assuming standard spherical spreading loss (-6 dB per doubling of distance), playing court noise exposure at the nearest existing off-site residential and commercial uses was calculated and the results of those calculations are presented in Table 10.

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

Receiver[1]	Distance from Playing Court (ft)[2]	Predicted Exterior Noise Levels (dB)	
		L_{eq}	L_{max}
Residential – West	550	34	54
Commercial – South	650	33	53

[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.
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 and commercial land uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. The Table 10 data indicate that project playing court noise levels are predicted to satisfy the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential and commercial land uses.

As discussed previously, a noise impact relative to ambient conditions is identified if noise levels from on-site activities would exceed the hourly average and hourly maximum noise levels of 70 dB L_{eq} and 93 dB L_{max} by 1.5 dB or more. The increase in ambient noise levels resulting from project playing court activities is calculated to be less than 0.01 dB L_{eq}/L_{max}.

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 land uses, this impact is identified as being ***less than significant.***

Impact 5: Playground Noise at Nearest Existing Off-Site Land Uses

According to the project site plan, the project proposes three (3) playground areas (tot-lots) within the project area. The locations of the proposed playground areas are shown 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 and maximum noise levels of similar sized outdoor play areas range from approximately 50 to 55 dB L_{eq} and 75 dB L_{max} at a distance of 50 feet from the focal point of the playground area. Based on reference noise levels of 55 dB L_{eq} and 75 dB L_{max} at 50 feet, and assuming standard spherical spreading

loss (-6 dB per doubling of distance), playground noise exposure at the nearest existing off-site residential and commercial uses was calculated and the results of those calculations are presented in Table 11.

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

Receiver[1]	Distance from Nearest Playground (ft)[2]	Predicted Exterior Noise Levels (dB)	
		L_{eq}	L_{max}
Residential – West	300	39	59
Commercial – South	30	59	79

[1] Existing land use locations are identified on Figure 1.
[2] Distances scaled from center of nearest playground to receiver property lines using provided site plans.
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 and commercial land uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. As indicated in Table 11, project playground noise levels are predicted to satisfy the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential and commercial land uses.

As discussed previously, a noise impact relative to ambient conditions is identified if noise levels from on-site activities would exceed the hourly average and hourly maximum noise levels of 70 dB L_{eq} and 93 dB L_{max} by 1.5 dB or more. The increase in ambient noise levels resulting from project playground activities is calculated to range from 0.0 to 0.4 dB L_{eq} and 0.0 to 0.2 dB L_{max}.

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 land uses, this impact is identified as being ***less than significant.***

Impact 6: Cumulative (Combined) Noise Levels from On-Site Sources at Nearest Existing Off-Site Land Uses

The calculated cumulative (combined) noise level exposure from on-site noise sources at the nearest existing off-site land uses to the west and south is presented in Table 12. 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 12
Predicted Cumulative Project Noise Levels at Nearest Existing Off-Site Land Uses

Receiver	Predicted Exterior Noise Levels (dB)[1]					
	Playing Court		Playground		Cumulative	
	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
Residential – West	34	54	39	59	41	61
Commercial – South	33	53	59	79	59	79

[1] Calculated cumulative noise levels based on predicted noise levels presented in Impacts 4 & 5.
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 and commercial land uses, respectively. The Municipal Code noise level limits are to be assessed at the property lines of receiving uses. The Table 12 data indicate that cumulative (combined) noise level exposure from primary on-site noise sources is calculated to satisfy the applicable Morgan Hill Municipal Code exterior noise level standards at the nearest existing residential and commercial land uses.

As discussed previously, a noise impact relative to ambient conditions is identified if noise levels from on-site activities would exceed the hourly average and hourly maximum noise levels of 70 dB L_{eq} and 93 dB L_{max} by 1.5 dB or more. The increase in ambient noise levels resulting from combined on-site noise sources is calculated to range from 0.0 to 0.4 dB L_{eq} and 0.0 to 0.2 dB L_{max}.

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

Noise Impacts Associated with Project Construction Activities

Impact 7: Project Construction Noise Levels at Nearest Existing Off-Site Land 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 from the nearest existing off-site land uses are located approximately 275 feet (residential to west) and 25 feet (commercial to south) away from where construction activities would occur within the project area.

Table 13 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 13 data also include predicted maximum equipment noise levels at the property lines of the nearest residential and commercial uses

located west and south of the project (respectively), which assumes a standard spherical spreading loss of 6 dB per doubling of distance.

Table 13
Construction Equipment Reference and Projected Noise Levels Noise Levels

Equipment Description	Maximum Noise Level at 50 Feet (dB)	Predicted Maximum Noise Level (dB)	
		25 Feet	275 Feet
Air compressor	80	86	65
Backhoe	80	86	65
Ballast equalizer	82	88	67
Ballast tamper	83	89	68
Compactor	82	88	67
Concrete mixer	85	91	70
Concrete pump	82	88	67
Concrete vibrator	76	82	61
Crane, mobile	83	89	68
Dozer	85	91	70
Generator	82	91	70
Grader	85	88	67
Impact wrench	85	91	70
Loader	80	91	70
Paver	85	86	65
Pneumatic tool	85	91	70
Pump	77	91	70
Saw	76	83	62
Scarifier	83	82	61
Scraper	85	89	68
Shovel	82	91	70
Spike driver	77	88	67
Tie cutter	84	83	62
Tie handler	80	90	69
Tie inserter	85	86	65
Truck	84	91	70

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

Based on the equipment noise levels in Table 13, noise levels from project construction are predicted to range from 61 to 70 dB L_{max} at the nearest residential use (west), and from 82 to 91 dB L_{max} at the nearest commercial use (south). 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 would likely exceed the applicable Municipal Code exterior noise level standards at the nearest residential and commercial uses to the west and south, respectively. As a result, noise impacts associated with construction activities are identified as being ***potentially significant***.

Mitigation Impact 7: Construction Noise Control Measures

MM 7: To the maximum extent practical, the following measures should be incorporated into the project construction operations:

- Noise-generating construction activities shall not occur within the hours identified in Municipal Code Section 8.28.040(D).
- The project shall 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 shall be equipped with manufacturers-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 shall comply with such regulations while in the course of project activity.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion-powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise-sensitive receptors.
- Project area and site access road speed limits shall be established and enforced during the construction period.
- Nearby residences shall 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.

Significance of Impact 7 after Mitigation: ***Less than Significant***

Vibration Impacts Associated with Project Activities

Impact 8: Project Construction and On-Site Activities 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 350 feet from construction activities which would occur within the project area.

Table 14 includes the range of vibration levels for equipment commonly used in general construction projects at a distance of 25 feet. The Table 14 data also include predicted equipment vibration levels at the nearest existing off-site residences located approximately 350 feet away.

Table 14
Vibration Source and Projected Levels for Construction Equipment

Equipment	Approximate RMS L_v[1]	
	Reference Level at 25 Feet[2]	Predicted Level at 350 Feet
Vibratory roller	94	59
Large bulldozer	87	58
Loaded trucks	86	55
Jackhammer	79	54
Small bulldozer	58	<50

[1] RMS velocity in decibels (VdB) re 1 micro-inch/second
[2] Reference vibration level obtained from the Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual (2018).

Because vibration levels generated by the type of construction equipment which will be required for this project dissipates very rapidly with distance, vibration levels at the nearest residences are expected to be well below 70 VdB RMS over the course of project construction activities. Construction-generated vibration levels of less than the 70 VdB RMS at nearby existing sensitive receptors would satisfy the strictest Federal Transportation Authority (FTA) groundborne vibration impact criteria of 72 VdB for residences shown in Table 2 (regardless of number of vibration events from a source). Therefore, project construction would not result in the exposure of persons to excessive groundborne vibration levels.

The primary sources of vibration within the immediate vicinity of the project site have been identified as traffic and railroad. Vibration levels associated with these sources dissipate very rapidly with distance. Further, results from the BAC vibration survey on April 13, 2021, indicate that measured vibration levels within the project area did not exceed 60 VdB RMS, which is well below the strictest FTA groundborne vibration impact criteria for residences in Table 2. Based on the information above and given the distances from the railroad track and adjacent roadway, exposure of persons to excessive groundborne vibration levels at the project site is not expected.

Finally, the project proposes the development of a 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 FTA 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 uses.

Impact 9: Future Exterior Traffic & Railroad Noise Levels at Project Site

The FHWA Model was used with future traffic data to predict future Monterey Road traffic noise levels at the project site. The future (Cumulative [General Plan 2035 Buildout No Project *with* Madrone Parkway Extension] conditions) daily traffic (ADT) volume for the roadway was calculated using data provided in the project traffic memorandums prepared by Keith Higgins Traffic Engineer and Hexagon Transportation Consultants, Inc. A complete listing of FHWA Model inputs and results are provided in Appendix H.

To predict future railroad noise exposure at the proposed residential development, BAC utilized long-term noise level measurement data obtained from a 2017 noise survey conducted by BAC for the Harvest Park II Residential Development located south of the project area adjacent to the same UPRR track. According to BAC file data, day-night average railroad noise level exposure along the same UPRR track was computed to be 71 dB DNL at a distance of approximately 260 feet from the center of the track. Future railroad activity would be limited to the number of operations which could reasonably occur on the single set of tracks over a 24 hour period. For purposes of this analysis, it was assumed that a future increase in rail activity could occur along the tracks parallel to the project site.

The predicted future traffic and railroad noise level data cited above were projected to the nearest proposed building facades of residences and common outdoor recreation areas of the development. The results of that analysis are summarized in Table 15. For the purposes of this analysis, the primary common outdoor recreation areas of the development were identified as the centrally located play lawn areas. The project also proposes outdoor areas including a basketball court and tot lots (active recreation uses), but such noise sources are typically considered to be noise-generating rather than noise-sensitive. The locations of the primary common outdoor recreation areas are shown on Figure 2.

Table 15
Predicted Future Combined Exterior Traffic & Railroad Noise Levels at Project Site

Location[1]	Offset (dB)	Future Exterior DNL (dB)[3,4]
Common Outdoor Recreation Areas – Play Lawns (2)	-7	63
Nearest First-Floor Building Facades		76
Nearest Upper-Floor Building Facades	+3	79

[1] Primary common outdoor recreation area locations are shown on Figure 2.
[2] A +3 dB offset was applied at upper-floor locations to account for reduced ground absorption at elevated locations. Negative offsets were applied where proposed intervening buildings would provide screening.
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. Finally, General Plan Policy SSI-8.1 states that the maximum outdoor noise level for new residences near railroad tracks shall be 70 dB DNL, recognizing that train noise is characterized by relatively few loud events.

As indicated in Table 15, future combined traffic and railroad noise level exposure is predicted to satisfy the Morgan Hill General Plan's normally acceptable and conditionally acceptable exterior noise level limits of 65 and 70 dB DNL at the primary common outdoor recreation areas of the development (play lawns). As a result, this impact is identified as being ***less than significant*****.**

Impact 10: 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 15, future combined noise exposure from Monterey Road traffic and UPRR railroad operations is predicted to be 76 dB DNL at the first-floor building facades of residences proposed nearest to those noise sources. Due to reduced ground absorption at elevated positions, noise levels at the upper-floor facades of those residences are predicted to approach approximately 79 dB DNL. To satisfy the General Plan 45 dB DNL interior noise level standard, minimum noise reductions of 31 dB and 34 dB would be required of the first- and upper-floor building facades (respectively) of residences constructed nearest to Monterey Road and the UPRR track.

Using audio recordings collected at site LT-1 during the monitoring period, it was possible to identify maximum noise levels associated with discrete train passbys at the project site. In the

analysis of 25 train passbys during the 48-hour monitoring effort, it was determined that maximum noise levels associated with train passbys ranged from 81 to 99 dB L_{max} (calculated average of 92 dB L_{max}) at approximately 160 feet from the center of the track. The measured railroad passbys included noise associated with train cars, warning horn usage, and at-grade crossing bells. Based on a calculated average of 92 dB L_{max} at 160 feet, train passby noise levels are projected to be approximately 90 dB L_{max} at the building facades proposed nearest to the track located approximately 200 feet away. To satisfy the General Plan 50 dB L_{max} interior noise level standard (applicable to bedrooms), a minimum noise reduction of 40 dB would be required of the first- and upper-floor building facades of residences constructed nearest to the UPRR 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 35 dB would be required of the nearest first- and upper-floor 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 and door construction upgrades would be warranted for portions of the development. As a result, this impact is identified as being **potentially significant**.

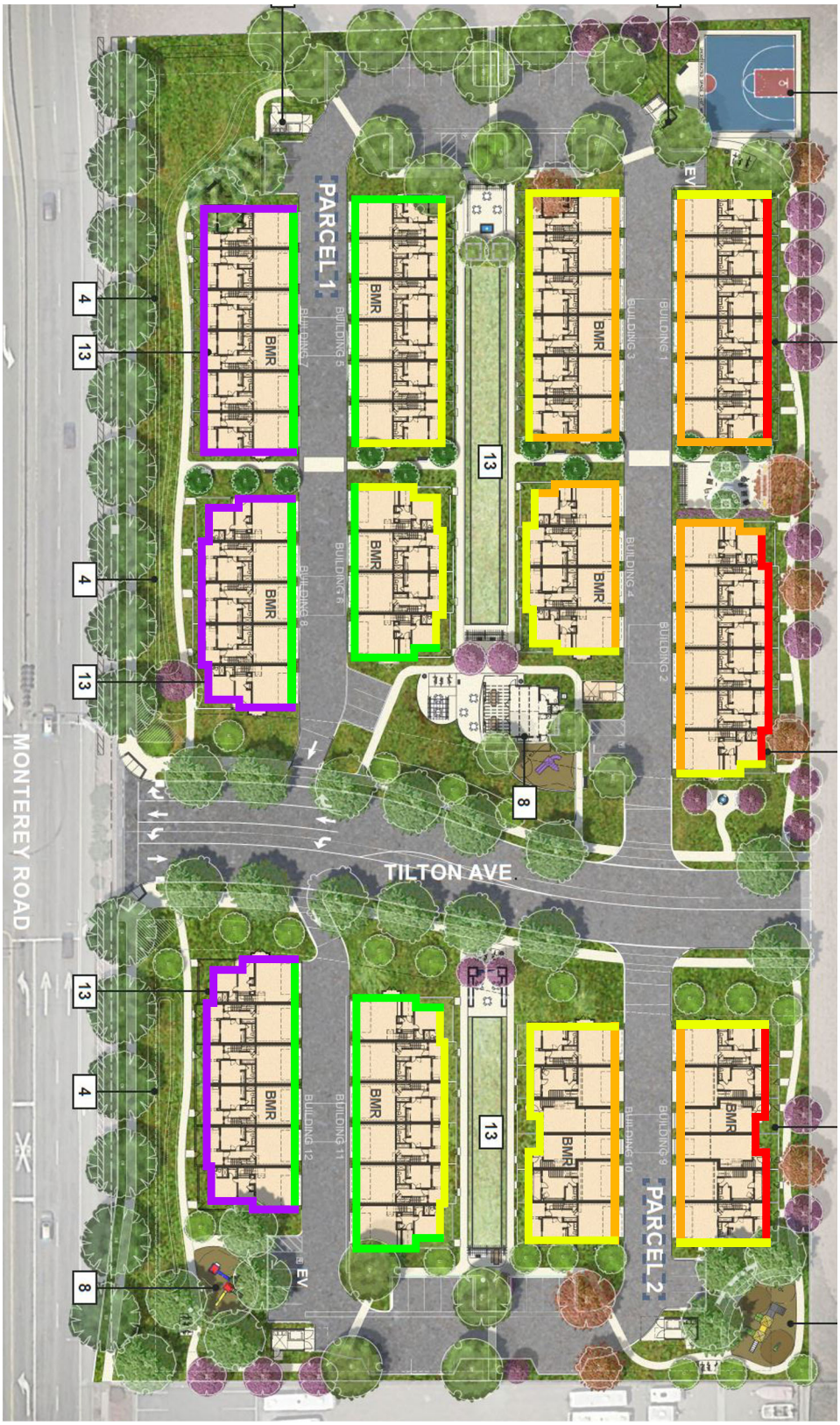
Mitigation Impact 10:

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, implementation of the following noise mitigation measures would be required:

MM-10A: To comply with the General Plan's interior noise level criteria *including* a factor of safety, it is recommended that the windows and doors of the building locations identified on Figures 4 and 5 be upgraded to the minimum STC rating indicated. Figure 4 shows the locations and associated STC ratings needed for bedroom windows/doors. Figure 5 illustrates the locations and associated STC ratings required for all other habitable room windows/doors. Finally, 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.

MM-10B: 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.

Significance of Impact 10 after Mitigation: ***Less than Significant***



Legend Recommended Window & Door Construction (All Floors)

- STC-32
- STC-33
- STC-35
- STC-37
- STC-45

N

Scale (feet)

0 40 80

Manzanita Park Subdivision

Morgan Hill, California

Mitigation Measure 10A
50 dB Lmax in Bedrooms

Figure 4

BOLLARD Acoustical

Legend Recommended Window & Door Construction (All Floors)

- STC-27
- STC-32
- STC-40

N

Scale (feet)

0 40 80

Manzanita Park Subdivision

Morgan Hill, California

Mitigation Measure 10A
55 dB Lmax in All Other Habitable Rooms

Figure 5

BOLLARD Acoustical

This concludes BAC's noise and vibration assessment of the Manzanita Park Subdivision 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
Manzanita Park Subdivision
File Name: 2021-065 01 Existing
Model Run Date: 5/27/2021

Segment	Intersection	Direction	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Monterey Rd / Tilton Ave	North	21,280	80	20	2	1	55	100
2		South	21,740	80	20	2	1	50	100
3		East							
4		West	6,100	80	20	2	1	35	100

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

Legend

- A Intersection of Tilton Avenue & Monterey Road
- B Property Boundary Facing Site V-1
- C Site LT-1: 37° 9'18.65"N, 121°40'33.63"W
- D Site V-1: 37° 9'17.10"N, 121°40'32.12"W

○ Location of noise monitoring equipment

Manzanita Park Subdivision
Morgan Hill, California

Photographs of Survey Locations

Appendix D

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Appendix E-1
Ambient Noise Monitoring Results - Site LT-1
Manzanita Park Subdivision - Morgan Hill, California
Wednesday, April 14, 2021

Hour	Leq	Lmax	L50	L90
12:00 AM	54	77	40	36
1:00 AM	67	97	39	34
2:00 AM	69	99	41	38
3:00 AM	57	80	44	40
4:00 AM	60	85	51	44
5:00 AM	67	90	59	51
6:00 AM	68	86	63	56
7:00 AM	69	91	63	56
8:00 AM	65	86	58	50
9:00 AM	66	88	57	50
10:00 AM	64	84	58	50
11:00 AM	65	87	58	49
12:00 PM	64	83	57	48
1:00 PM	65	80	58	50
2:00 PM	67	91	62	53
3:00 PM	67	85	64	57
4:00 PM	67	89	64	58
5:00 PM	69	94	63	57
6:00 PM	73	102	63	56
7:00 PM	70	98	60	54
8:00 PM	68	98	58	50
9:00 PM	70	99	53	44
10:00 PM	64	93	50	42
11:00 PM	59	88	43	39

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	73	64	68	69	54	65
Lmax (Maximum)	102	80	90	99	77	88
L50 (Median)	64	53	60	63	39	48
L90 (Background)	58	44	52	56	34	42

Computed DNL, dB	72
% Daytime Energy	77%
% Nighttime Energy	23%

GPS Coordinates	37° 9'18.65" N
	121°40'33.63" W

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Appendix E-2
Ambient Noise Monitoring Results - Site LT-1
Manzanita Park Subdivision - Morgan Hill, California
Thursday, April 15, 2021

Hour	Leq	Lmax	L50	L90
12:00 AM	56	83	40	36
1:00 AM	66	98	40	37
2:00 AM	55	78	42	38
3:00 AM	69	99	46	41
4:00 AM	61	84	53	45
5:00 AM	67	89	59	53
6:00 AM	68	89	60	53
7:00 AM	67	89	61	55
8:00 AM	70	94	62	55
9:00 AM	70	93	62	53
10:00 AM	69	95	63	53
11:00 AM	69	96	59	51
12:00 PM	66	92	59	50
1:00 PM	66	83	61	52
2:00 PM	68	92	61	53
3:00 PM	69	94	65	59
4:00 PM	68	89	64	58
5:00 PM	68	94	64	57
6:00 PM	74	101	63	57
7:00 PM	70	98	61	54
8:00 PM	71	101	58	52
9:00 PM	68	98	55	47
10:00 PM	62	82	52	42
11:00 PM	61	88	44	38

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	74	66	69	69	55	65
Lmax (Maximum)	101	83	94	99	78	88
L50 (Median)	65	55	61	60	40	49
L90 (Background)	59	47	54	53	36	43

Computed DNL, dB	72
% Daytime Energy	82%
% Nighttime Energy	18%

GPS Coordinates	37° 9'18.65" N
	121°40'33.63" W

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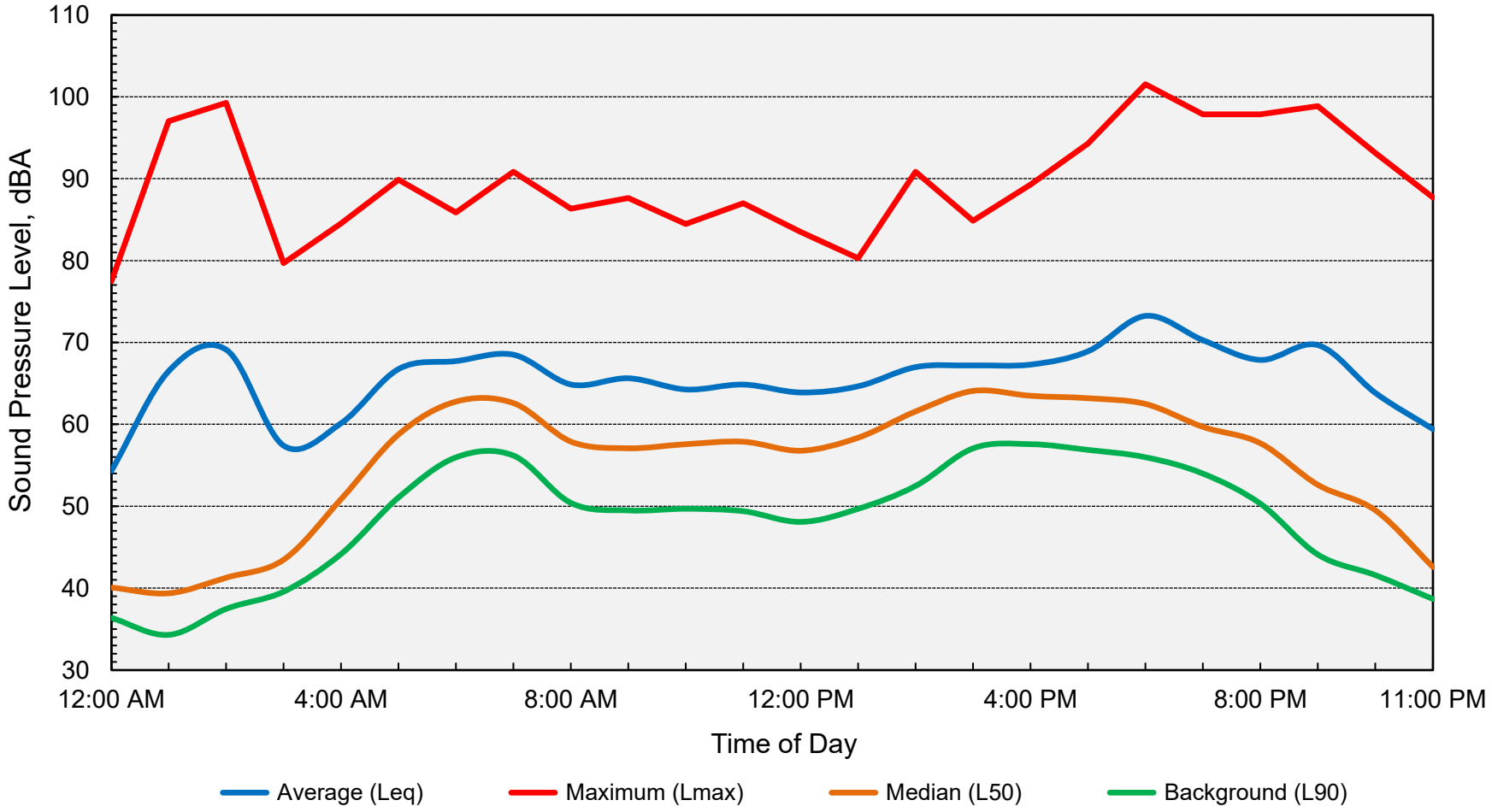
Appendix F-1
Ambient Noise Monitoring Results - Site LT-1
Manzanita Park Subdivision - Morgan Hill, California
Wednesday, April 14, 2021



Computed DNL = 72 dB

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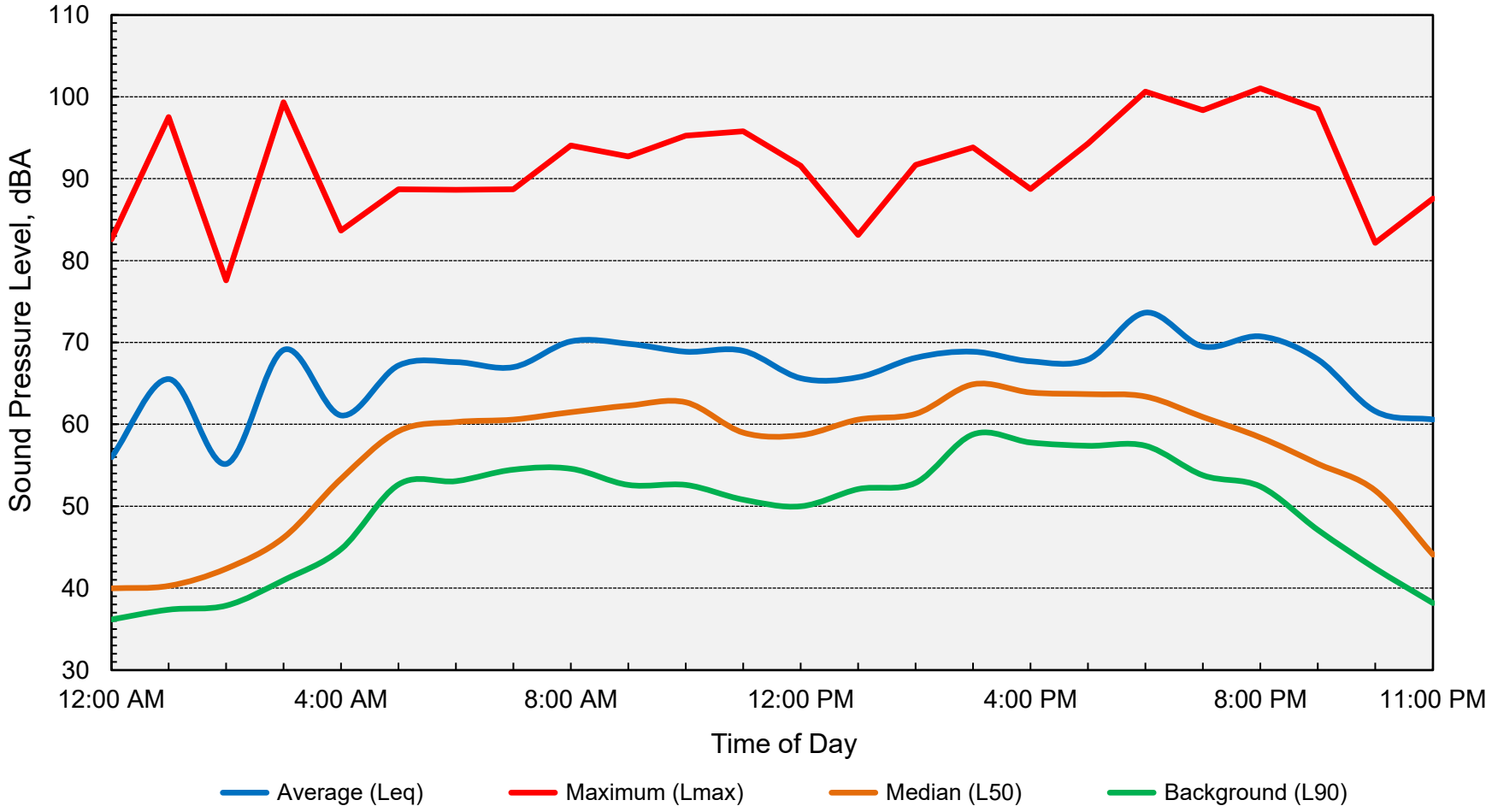
Appendix F-2
Ambient Noise Monitoring Results - Site LT-1
Manzanita Park Subdivision - Morgan Hill, California
Thursday, April 15, 2021



Computed DNL = 72 dB

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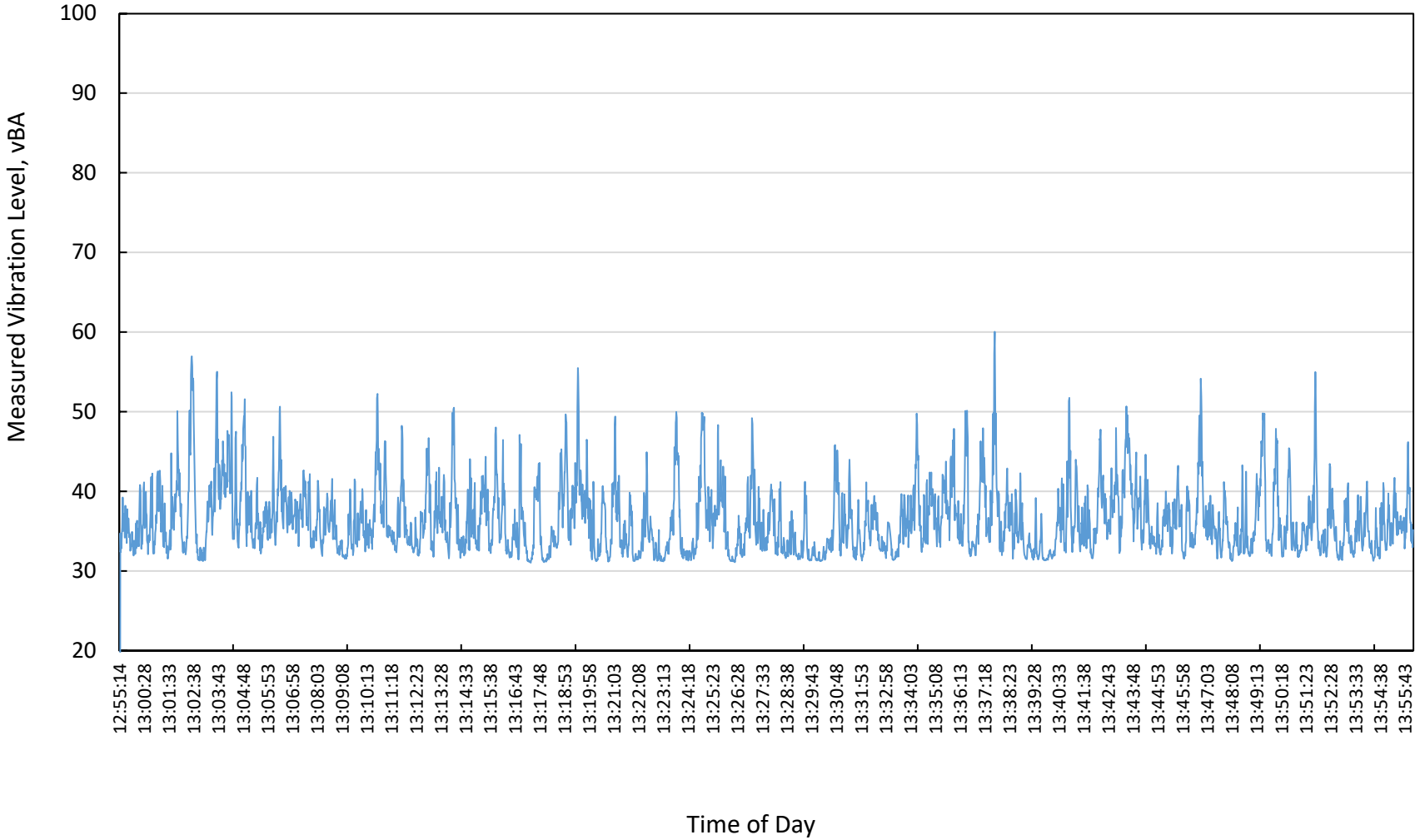
Appendix G
Vibration Measurement Results - Site V-1
Manzanita Park Subdivision
April 13, 2021



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