APPENDIX D
ENVIRONMENTAL NOISE ANALYSIS

MORGAN HILL DOWNTOWN SPECIFIC PLAN ENVIRONMENTAL NOISE ASSESSMENT MORGAN HILL, CALIFORNIA

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INTRODUCTION

The Morgan Hill Downtown Specific Plan project contains a number of strategies to increase development densities in the downtown. The project would allow additional sensitive land uses in areas where noise and vibration levels could exceed acceptable standards. The project would also allow more construction in the downtown area, which could result in temporary noise increases. The Specific Plan would also facilitate an increase in traffic along area roadways, which could permanently increase existing traffic noise levels.

This report includes a brief description of the fundamentals of environmental noise and vibration, a summary of regulatory criteria applicable to the project, and the results of noise and vibration monitoring surveys made in the downtown area. Future noise and vibration levels are calculated and summarized. The report then evaluates impacts resulting from the project in terms of noise and land use compatibility, vibration compatibility, permanent noise level increases resulting from the operation of the project, and temporary noise level increases resulting from project construction. Mitigation is presented to reduce the potential for significant noise and vibration impacts resulting from the project.

FUNDAMENTALS OF ENVIRONMENTAL NOISE

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB) with 0 dB corresponding roughly to the threshold of hearing. Decibels and other technical terms are defined in Table 1.

Most of the sounds which we hear in the environment do not consist of a single frequency, but rather a broad band of frequencies, with each frequency differing in sound level. The intensities of each frequency add together to generate a sound. The method commonly used to quantify environmental sounds consists of evaluating all of the frequencies of a sound in accordance with a weighting that reflects the facts that human hearing is less sensitive at low frequencies and extreme high frequencies than in the frequency mid-range. This is called "A" weighting, and the decibel level so measured is called the A-weighted sound level (dBA). In practice, the level of a sound source is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting curve. Typical A-weighted levels measured in the environment and in industry are shown in Table 2 for different types of noise.

Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources which create a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors, L_{01}, L_{10}, L_{50}, and L_{90}, are commonly used. They are the A-weighted noise levels equaled or exceeded during 1%, 10%, 50%, and 90% of a stated time period. A single number descriptor called the L_{eq} is also widely used. The L_{eq} is the average A-weighted noise level during a stated period of time.

In determining the daily level of environmental noise, it is important to account for the difference in response of people to daytime and nighttime noises. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes very noticeable. Further, most people sleep at night and are very sensitive to noise intrusion. To account for human sensitivity to nighttime noise levels, a descriptor, L_{dn} (day/night average sound level), was developed. The L_{dn} divides the 24-hour day into the daytime of 7:00 AM to 10:00 PM and the nighttime of 10:00 PM to 7:00 AM. The nighttime noise level is weighted 10 dB higher than the daytime noise level. The Community Noise Equivalent Level (CNEL) is another 24-hour average which includes both an evening and nighttime weighting.

FUNDAMENTALS OF GROUNDBORNE VIBRATION

Railroad and light-rail operations are potential sources of substantial ground vibration depending on distance, the type and the speed of trains, and the type of railroad track. People's response to ground vibration has been correlated best with the velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1×10^{-6} in./sec. RMS, which equals 0 VdB, and 1 in./sec. equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

Typical background vibration levels in residential areas are usually 50 VdB or lower, well below the threshold of perception for most humans. Perceptible vibration levels inside residences are attributed to the operation of heating and air conditioning systems, door slams and foot traffic. Construction activities, train operations, and street traffic are some of the most common external sources of vibration that can be perceptible inside residences. Table 3 illustrates some common sources of vibration and the association to human perception or the potential for structural damage.

Table 1 Definitions of Acoustical Terms Used in this Report

Term	Definitions
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, Leq	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Table 2 Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
	120 dBA	
Jet fly-over at 300 meters		Rock concert
	110 dBA	
Pile driver at 20 meters	100 dBA	
		Night club with live music
	90 dBA	
Large truck pass by at 15 meters		
	80 dBA	Noisy restaurant
		Garbage disposal at 1 meter
Gas lawn mower at 30 meters	70 dBA	Vacuum cleaner at 3 meters
Commercial/Urban area daytime		Normal speech at 1 meter
Suburban expressway at 90 meters	60 dBA	
Suburban daytime		Active office environment
	50 dBA	
Urban area nighttime		Quiet office environment
	40 dBA	
Suburban nighttime		
Quiet rural areas	30 dBA	Library
		Quiet bedroom at night
Wilderness area	20 dBA	
Most quiet remote areas	10 dBA	Quiet recording studio
Threshold of human hearing	0 dBA	Threshold of human hearing

Table 3 – Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level, VdB (re 1μinch/sec, RMS)	Typical Events (50 –foot setback)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment
		Heavy tracked vehicles (Bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	
		Commuter rail, upper range
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, occasional events		Commuter rail, typical Bus or truck over bump or on rough roads
Residential annoyance, frequent events	70	Rapid transit, typical
Approximate human threshold of perception to vibration		Buses, trucks and heavy street traffic
	60	
		Background vibration in residential settings in the absence of activity
Lower limit for equipment ultra-sensitive to vibration	50	

Source: Illingworth & Rodkin, Inc. and U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

REGULATORY BACKGROUND - NOISE

Regulatory criteria applicable in this environmental noise assessment have been established by the State of California and the City of Morgan Hill. The State's CEQA guidelines are used to assess the potential significance of environmental noise impacts pursuant to local policies set forth in the City of Morgan Hill Public Health and Safety Element of the General Plan. Other applicable regulatory criteria include the State of California's 2007 Building Code.

State CEQA Guidelines. The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of environmental noise impacts attributable to a proposed project. Applicable CEQA checklist questions ask whether the project would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies?

- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

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

CEQA does not define what noise level increase would be considered substantial. Typically, project-generated noise level increases of 3 dBA L_{dn} or greater would be considered significant where exterior noise levels would exceed the normally acceptable noise level standard (60 dBA L_{dn}). Where noise levels would remain at or below the normally acceptable noise level standard with the project, noise level increases of 5 dBA L_{dn} or greater would be considered significant.

2007 California Building Code. Multi-family housing in the State of California is subject to the environmental noise limits set forth in the 2007 California Building Code (Chapter 12, Appendix Section 1207.11.2). The noise limit is a maximum interior noise level of 45 dBA L_{dn}. Where exterior noise levels exceed 60 dBA L_{dn}, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the noise limit.

Public Health and Safety Element of the City of Morgan Hill General Plan. The Public Health and Safety Element of the General Plan sets forth noise and land use compatibility standards to guide development, and noise goals and policies to protect citizens from the harmful and annoying effects of excessive noise. Residential land uses are considered "normally acceptable" in noise environments up to 60 dBA L_{dn}. Policies established in the Noise Element of the General Plan that are applicable to the proposed project include:

7a. New development projects shall be designated and constructed to meet acceptable exterior noise level standards, as follows:

- The maximum exterior noise level of 60 dBA L_{dn} shall be applied in residential areas where outdoor noise 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 an L_{dn} of 60 dBA or lower cannot be achieved after the application of reasonable and feasible mitigation, an L_{dn} of 65 dBA may be permitted.
- Indoor noise levels should not exceed an L_{dn} of 45 dBA in new residential housing units.
- Noise levels in a new residential development exposed to an exterior L_{dn} 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 L_{dn}, recognizing that train noise is characterized by relatively few loud events.

7b. The impact of a proposed development project on existing land uses should be evaluated in terms of the potential for community response based on significant increase in existing noise levels, regardless of compatibility guidelines.

7e. Noise level increases resulting from traffic associated with new projects shall be considered significant if: a) the noise level increase is 5 dBA L_{dn} or greater, with future noise levels of less than 60 dBA L_{dn}, or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater.

REGULATORY CRITERIA - VIBRATION

The City of Morgan Hill has not identified quantifiable vibration limits that can be used to evaluate the compatibility of land uses with vibration levels experienced at a project site. Although there are no local standards that control the allowable vibration in a new residential development, the U.S. Department of Transportation has developed vibration impact assessment criteria for evaluating vibration impacts associated with transit projects.[1] The Federal Transit Administration (FTA) has proposed vibration impact criteria, based on maximum overall levels for a single event. The impact criteria for groundborne vibration are shown in Table 4. Note that there are criteria for frequent events (more than 70 events of the same source per day), occasional events (30 to 70 vibration events of the same source per day), and infrequent events (less than 30 vibration events of the same source per day).

[1]U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

Table 4 – Groundborne Vibration Impact Criteria

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 VdB[4]	65 VdB[4]	65 VdB[4]
Category 2 Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3 Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research should always require detailed evaluation to define the acceptable vibration levels. Ensuring low vibration levels in a building requires special design of HVAC systems and stiffened floors.

Source: U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

EXISTING NOISE AND VIBRATION ENVIRONMENT

Downtown Morgan Hill is subject to noise from railroad trains along the Union Pacific Railroad (UPRR) and from vehicles along area roadways. The primary north-south routes are Monterey Road and Butterfield Boulevard. Main Avenue and Dunne Avenue are the primary west-east routes.

Table 5 summarizes approximate noise level contours along the primary transportation routes through the downtown. These data are based on recent noise measurements made by Illingworth & Rodkin, Inc. for this project and others within the Specific Plan Area and vicinity[2]. All data were normalized to a reference distance of 100 feet from the center of the roadway or railroad tracks.

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2 Horizons Senior Housing Environmental Noise Assessment, Illingworth & Rodkin, Inc., February 13, 2008, and Huntington Square Residential Project Environmental Noise Assessment, Illingworth & Rodkin, Inc., April 11, 2007.

Railroad operations along the UPRR generate the highest noise levels. Railroad trains are required to sound their warning whistles within one-quarter mile of at-grade railroad crossings in the downtown area, and given the many crossings in the downtown area, these high maximum instantaneous noise levels, ranging from about 90 to 110 dBA L_{max}, occur on a frequently basis during passby events. The day-night average noise level is highly influenced by these high maximum noise events, particularly those that occur during the hours between 10:00 p.m. and 7:00 a.m. Day-night average noise levels are approximately 84 dBA L_{dn} at the railroad right-of-way and the 70 dBA L_{dn} noise contour lies approximately 320 feet from the tracks assuming no intervening shielding.

In areas not adjacent to the tracks, railroad train warning whistle noise levels are similar to typical maximum noise levels from local roadway traffic. In these areas, local traffic becomes the predominant noise source. Monterey Road and Butterfield Boulevard generate day-night average noise levels of 68 dBA L_{dn} at a distance of 100 feet from the roadway centerline. The 60 dBA L_{dn} noise contour is located approximately 340 feet from the center of these roadways. The 60 dBA L_{dn} noise contour for Main Avenue is about 160 feet from the roadway centerline. West of Monterey Road, the 60 dBA L_{dn} noise contour is located about 140 feet from the roadway center. The 60 dBA L_{dn} noise contour for Dunne Avenue east of Monterey Road is located about 180 feet from the roadway center. Traffic noise levels along lesser traveled roadways in and around the Specific Plan Area are less than 60 dBA L_{dn}.

Table 5 – Existing Noise Contours

Noise Source	Ldn at 100 feet (dBA)	Distance to Noise Contour (feet)		
		70 Ldn (dBA)	65 Ldn (dBA)	60 Ldn (dBA)
UPRR	80	320	560	1000
Monterey Road	68	70	160	340
Butterfield Boulevard	68	70	160	340
Main Avenue	63	--	70	160
Dunne Avenue west of Monterey Road	62	--	60	140
Dunne Avenue east of Monterey Road	64	--	90	180

Vibration levels at properties adjoining the UPRR are dependent on the type, speed, and weight of the particular train passing the property, as well as the type and condition of train's wheels. Track conditions, soil type, and foundation type also affect the propagation of vibration from the tracks to the receiver. Data collected by Illingworth & Rodkin, Inc. since 2007 indicate that vibration levels in the downtown area typically range from 66 to 70 VdB at a distance of 100 feet from the center of the tracks.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Appendix G of the CEQA Guidelines states that a project would normally be considered to result in a significant impact if noise levels conflict with adopted environmental standards or plans, if persons would be exposed to excessive groundborne vibration, or if noise levels generated by the project would substantially increase existing noise levels on a permanent or temporary basis. A significant noise impact would occur at proposed sensitive land uses where exterior noise levels resulting from railroad trains would exceed 70 dBA L_{dn}, where exterior noise levels from traffic would exceed 60 dBA L_{dn}. A significant impact would also result where interior day-night average noise levels would exceed 45 dBA L_{dn} or where interior maximum noise levels would exceed 50 dBA L_{max} in bedrooms or 55 dBA L_{max} in other habitable rooms. A substantial permanent noise increase would occur if the noise level increase resulting from the project is 5 dBA L_{dn} or greater in noise environments where noise levels would remain less than 60 dBA L_{dn}, or 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater. A substantial temporary noise level increase would occur where noise from construction activities exceeds 60 dBA L_{eq} and the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive uses in the project vicinity. A substantial permanent cumulative noise increase would occur if the project contributed a minimum noise increase of 1 dBA L_{dn} where cumulative noise levels are anticipated to increase by 3 dBA L_{dn} or more.

NOISE IMPACTS AND MITIGATION MEASURES

Impact 1: **Noise and Land Use Compatibility.** Residential land uses facilitated by the project would be exposed to exterior noise levels exceeding 60 dBA L_{dn} from traffic noise and 70 dBA L_{dn} from railroad noise. Future noise levels would exceed the City's noise and land use compatibility standards and the threshold for acceptable exterior noise levels for multi-family housing per the 2007 California Building Code. **This is a significant impact.**

Railroad Train Noise

A High-Speed Train project is envisioned along the UPRR right-of-way through downtown Morgan Hill. According to the Draft Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS[3], "...the proposed HST would be a steel-wheel, steel-rail electrically powered train operating in an exclusive right-of-way. Because there would be no roadway at-grade crossings, the annoying sounds of the train horn and warning bells would be eliminated. The use of electrical power cars would eliminate the engine rumble associated with diesel-powered locomotives. The above factors allow HST to generate lower noise levels than conventional trains at comparable speeds below 100 mph (161 kph)."

A review of the information presented in this study indicates that noise levels from such trains would be comparable to the sounds of conventional trains assuming that these trains would be

3 Draft Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS, Volume 1: Report, California High Speed Rail Authority and Federal Railroad Administration, July 2007.

traveling below 100 mph throughout the City of Morgan Hill. The HST project would install grade separations in some areas thereby eliminating the sound of HST train warning whistles during passbys. The UPRR would not be grade separated and future noise levels from freight and passenger trains would continue to result primarily from the sounding of their train warning whistles.

Rail traffic along the conventional railroad line is also anticipated to increase with the planned Caltrain South County Commuter Rail Project[4] and other growth in rail service. The Caltrain expansion project would install 16.5 miles of double-track on the UPRR between the Coyote Valley area in South San Jose and Gilroy by 2012. The project would increase the number of headways through downtown Morgan Hill in any given hour, but would not necessarily result in substantially higher noise levels. A worst-case estimate would assume that noise levels at a distance of 100 feet would increase by about 1 dBA L_{dn}, to 81 dBA L_{dn}. Maximum noise levels would be expected to be similar to existing conditions. Figure 1 shows the 70 dBA L_{dn} railroad train noise contour.

Traffic Noise

In the absence of railroad trains, the future noise environment in the downtown area will continue to result from traffic along the primary north-south and west-east routes. The major change being proposed by the Specific Plan is the narrowing of Monterey Road from Dunne Avenue to Main Avenue to two. No other circulation changes from the existing condition would occur, and noise levels along lesser-traveled streets will continue to be less than 60 dBA L_{dn} at 100 feet from the center of the roadway.

Table 6 summarizes approximate noise level contours along the primary transportation routes through the downtown. These data are based on adjustments made to the existing traffic data assuming increased traffic in 2030. Figure 2 shows the 60 dBA L_{dn} traffic noise contours.

Traffic noise levels along Monterey Road are calculated to increase by about 2 dBA L_{dn} between Central Avenue and Main Avenue and by about 1 dBA L_{dn} between Main Avenue and Dunne Avenue. Day-night average noise levels along Monterey Road are calculated to reach 70 dBA L_{dn} between Central Avenue and Main Avenue and 69 dBA L_{dn} between Main Avenue and Dunne Avenue at 100 feet from the roadway centerline.

Traffic noise levels along Butterfield Boulevard are anticipated to increase by 2 dBA L_{dn} to 70 dBA L_{dn} at a distance of 100 feet from the roadway centerline between Central Avenue and Dunne Avenue.

Main Avenue would be subject to traffic noise increases of about 2 dBA L_{dn} west of Monterey Road and 3 dBA L_{dn} between Monterey Road and Butterfield Boulevard. Traffic noise levels would reach 65 to 66 dBA L_{dn} at a distance of 100 feet from the centerline. Future traffic noise levels at a distance of 100 feet from the center of Dunne Avenue are calculated to increase to 64 dBA L_{dn} west of Monterey Road and 65 dBA L_{dn} between Monterey Road and Butterfield Boulevard.

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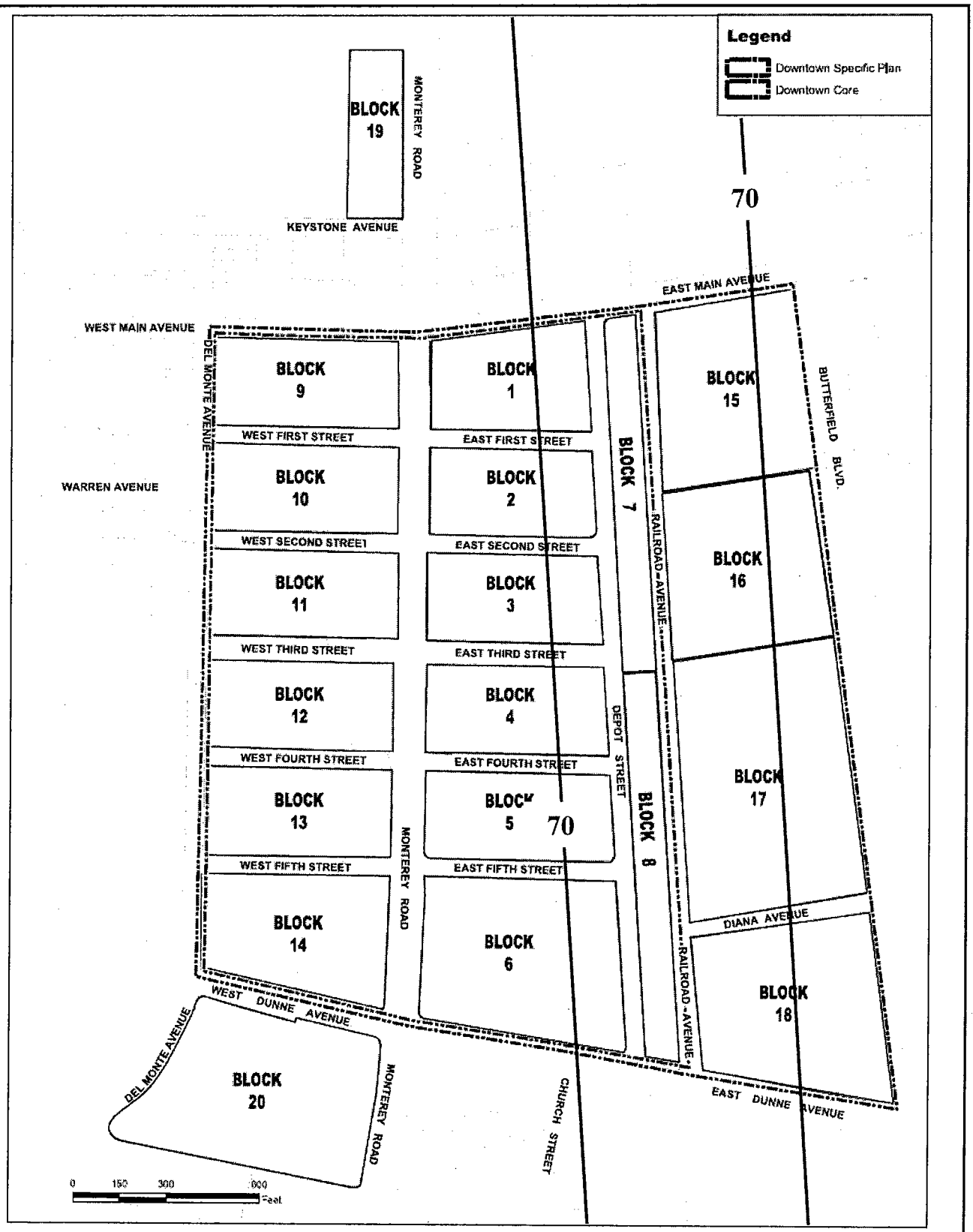
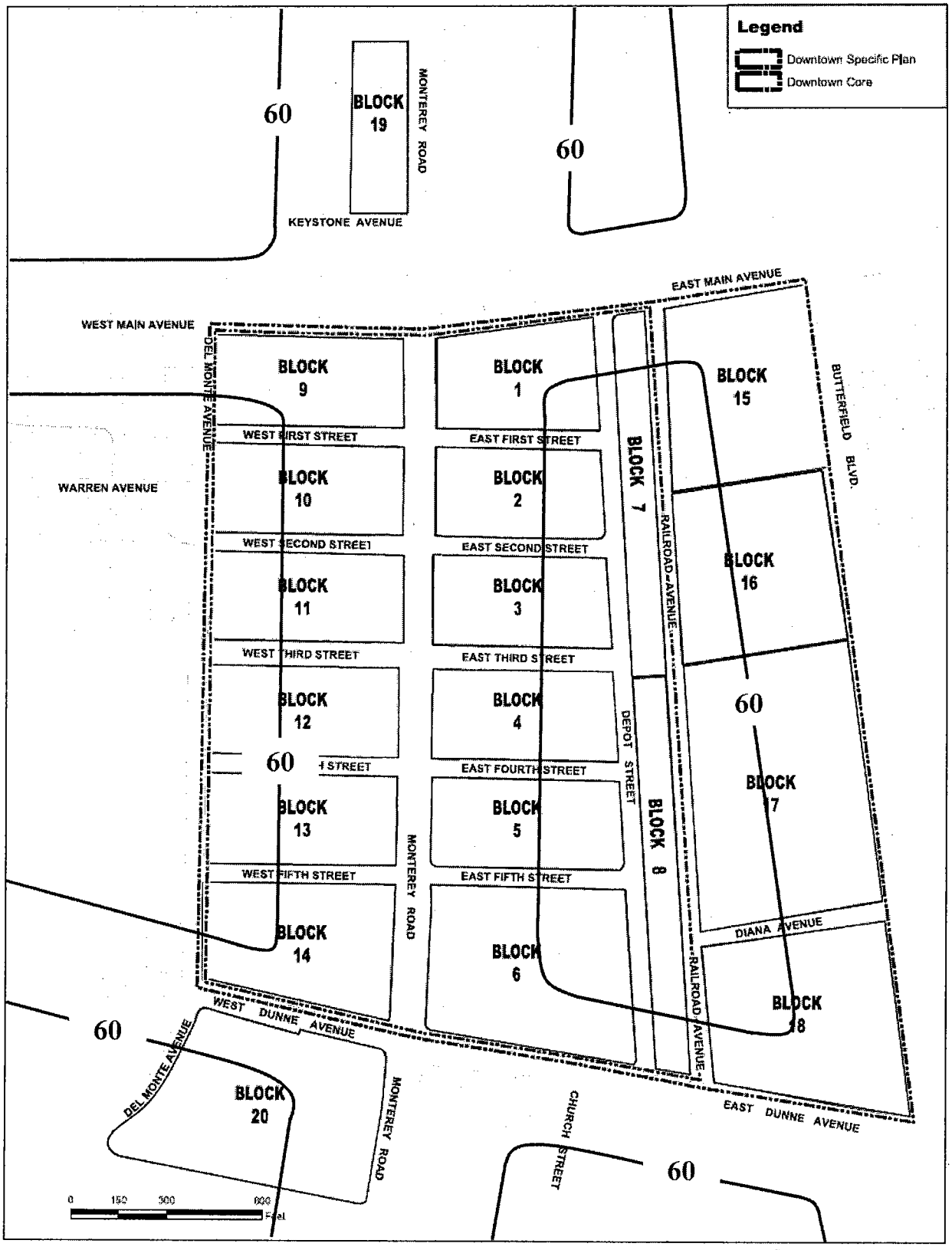
4 http://www.vta.org/2000_measure_a/pdf/projects/commuter_rail_program_caltrain_south_county.pdf



Source: City of Morgan Hill

Figure 1
Future 70 dBA Ldn Railroad Train Noise Contour



Source: City of Morgan Hill

Figure 2
Future 60 dBA Ldn Traffic Noise Contours

Table 6 – Future Noise Contours

Noise Source	Ldn at 100 feet (dBA)	Distance to Noise Contour (feet)		
		70 Ldn (dBA)	65 Ldn (dBA)	60 Ldn (dBA)
UPRR	81	350	630	1120
Monterey Road (Central Avenue to Main Avenue)	70	100	220	460
Monterey Road (Main Ave to Dunne Avenue)	69	90	180	400
Butterfield Boulevard (Central Ave to Dunne Avenue)	70	100	220	460
Main Avenue (West of Monterey Road)	65	50	100	220
Main Avenue (Monterey Road to Butterfield Boulevard)	66	50	120	250
Dunne Avenue (West of Monterey Road)	64	--	90	180
Dunne Avenue (Monterey Road to Butterfield Boulevard)	65	50	100	220

Mitigation Measures:

- Incorporate sufficient setbacks or shield noise-sensitive outdoor spaces with buildings or noise barriers where possible. The design of projects facilitated by the Specific Plan should strive to limit traffic noise to 60 dBA L_{dn} or less and railroad train noise to 70 dBA L_{dn} or less in outdoor use areas where there would be frequent human use and quiet would be of benefit.

- Project-specific acoustical analyses are mandated by the State for multi-family uses where noise levels exceed 60 dBA L_{dn}. The analyses should meet the following noise reduction requirements. Interior noise levels shall be reduced to 45 dBA L_{dn} or lower to meet State and local standards. Building sound insulation requirements would need to include the provision of forced-air mechanical ventilation for all units, so that windows could be kept closed at the occupant's discretion to control noise. Special building construction techniques (e.g., sound-rated windows and building facade treatments) may be required for new residential uses adjacent to the UPRR, Monterey Road, or Butterfield Boulevard. Maximum instantaneous noise levels (L_{max}) should be reduced as much as feasible recognizing that the interior L_{max} noise standards may not be met at properties adjoining the railroad with the best available methods. Building sound insulation requirements would need to include the provision of forced-air mechanical ventilation for all new units, so that windows could be kept closed at the occupant's discretion to control

noise. Special building construction techniques (e.g., sound-rated windows and building facade treatments) would be required. These treatments include, but are not limited to, sound rated windows and doors, sound rated wall construction, acoustical caulking, insulation, acoustical vents, etc. Large windows and doors should be oriented away from the railroad where possible. The specific determination of what treatments are necessary will be conducted on a unit-by-unit basis. Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the City along with the building plans and approved prior to issuance of a building permit.

- The City should also explore designation of the at-grade rail crossings as "quiet zones". Quiet zones could be established so that trains would not be required to sound their warning whistles but would require greater safety controls at the crossings. Wayside horn systems could be installed at the at-grade crossings to confine horn noise only in the immediate vicinity of the crossings.

Significance After Mitigation:

Implementation of these measures would reduce noise impacts to outdoor use areas to a less than significant level for many of the proposed downtown residential units, however, even with incorporation of these mitigation measures to the extent feasible, the outdoor spaces for some residential units will continue to be impacted and, therefore, this impact is significant and unavoidable.

Implementation of interior noise control measures would be sufficient to maintain day-night average noise levels within proposed residential units at or below acceptable levels. For some downtown residential properties incorporation of project-specific noise reduction treatments will reduce the L_{max} noise impact to a less than significant level; however, for many units on properties adjoining the railroad the interior L_{max} noise standards may not be met even with incorporation of feasible and best available methods and, therefore, this impact would be significant and unavoidable.

Impact 2: **Groundborne Vibration.** Portions of parcels adjoining the UPRR would be subject to vibration from railroad trains that would exceed the FTA guidelines for vibration compatibility. **This is a significant impact.**

Rail traffic along the conventional railroad line is anticipated to increase to 30 trains or more per day with the planned Caltrain expansion project and other growth in rail service, but would not exceed 70 trains per day. Train activity would be considered "occasional" with respect to the FTA vibration impact criteria. Data gathered along the UPRR indicate that vibration levels are 70 VdB or less at a distance of 100 feet from the center of the near track. Residential units proposed within 50 feet of the near track may be subject to vibration levels above 75 VdB. Units proposed within 25 feet of the near track would be subject to vibration levels exceeding 80 VdB. This is a significant impact.

The Draft Bay Area to Central Valley High-Speed Train Program EIR/EIS states that, "...vibration of the ground caused by the pass-by of the HST is similar to that caused by

conventional steel wheel/steel rail trains. However, vibration levels associated with the HST are relatively lower than conventional passenger and freight trains due to advanced track technology, smooth track and wheel surfaces, and high maintenance standards required for high-speed operation." Based on these data, vibration levels resulting from the HST are anticipated to be at or below ambient vibration levels from conventional railroad trains.

Mitigation Measures:

- Residential structures shall be located at least 50 feet from the near railroad track unless project specific vibration analyses indicate that vibration levels at the building site and/or the design of the project result in vibration levels of 75 VdB or less.

Significance After Mitigation:

Sufficient setbacks and/or other design features that result in vibration levels of 75 VdB or less would reduce the significant impact to less than significant levels.

Impact 3: **Off-Site Project-Generated Traffic Noise.** The proposed project will not measurably increase traffic noise levels along roadways in the project vicinity. **This is a less than significant impact.**

A review of the intersection turning movement data contained in the project's traffic study indicates that additional project traffic will not measurably increase noise levels in and around the Specific Plan area. Traffic noise levels along the major routes are anticipated to increase by 1 to 2 dBA L_{dn} overall as a result of project development anticipated by 2030. The project's contribution to these overall noise increases would be less than one decibel. This is a less than significant impact.

Mitigation Measures: None Required

Impact 4: **Construction Noise.** Noise levels generated by construction activities facilitated by the Specific Plan would temporarily elevate ambient noise levels at sensitive land uses in the vicinity. **This is a significant impact.**

Construction activities can generate high noise levels, especially during the construction of project infrastructure when heavy equipment is used. The highest maximum instantaneous noise levels generated by project construction would typically range from about 90 to 95 dBA L_{max} at a distance of 50 feet from the noise source. Typical hourly average construction generated noise levels are about 81 dBA to 88 dBA measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). Portable rock crushers may be used to recycle demolition materials. These portable crushers typically generate noise levels of up to 85 dBA L_{eq} at a distance of 50 feet. Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction noise impacts primarily occur when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time. Where noise from construction activities exceeds 60 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive uses in the project vicinity for a period of one year or more, the impact would be considered significant.

Typically, significant noise impacts do not result when standard construction noise control measures are enforced at the project site and when the duration of the noise generating construction period is limited to one construction season (typically one year) or less. Noise generated by demolition, grading, infrastructure improvements and the construction of building shells would not be expected to occur for periods greater than one year for most small infill projects proposed within the plan area. However, larger mixed-use projects are also proposed and construction durations for these projects could exceed one construction season (one year). It is conceivable that a particular receiver or group of receivers would be subject to construction noise levels in excess of 60 dBA L_{eq} and the ambient by 5 dBA L_{eq} for durations exceeding one construction season. The construction of the project would result in a significant temporary noise level increase at neighboring noise-sensitive properties.

The following standard controls are assumed to be included in the project:

Construction activities shall be limited to the hours between 7:00 a.m. and 8:00 p.m., Monday through Friday, and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays. No construction activities should occur on Sundays or federal holidays (Consistent with Section 8.28.040 of the Morgan Hill Municipal Code).

- Equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Locate stationary noise generating equipment (e.g. rock crushers, compressors) as far as possible from adjacent residential receivers.
- Acoustically shield stationary equipment located near residential receivers with temporary noise barriers or recycled demolition materials.
- Utilize "quiet" air compressors and other stationery noise sources where technology exists.
- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem.

Significance After Mitigation:

Although the above measures would reduce noise generated by the construction of the project, the impact would remain significant and unavoidable as a result of the extended period of time that adjacent receivers would be exposed to construction noise.