Section 4.6: Noise

A Noise Impact Analysis (NIA), dated December 2009, was prepared by Giroux and Associates to characterize the noise environment in the project area and to determine the potential noise impacts on future residential development under the Specific Plan Amendment. The findings of the analysis are summarized below, and the complete Noise Impact Analysis is provided in Appendix G of this SEIR.

4.6.1 Environmental Setting

Sound is a form of mechanical energy that travels as pressure waves in a compressible medium, such as air. Sound is defined by the rate of oscillation of sound waves; the distance between successive troughs or crests of the waves; the speed of propagation; and the pressure level or energy content of a sound wave. In particular, the sound pressure level is the most common descriptor used to characterize the loudness of sound. Noise is generally defined as unwanted sound or sound at relatively high levels. Representative noise sources and sound levels are shown in Figure 4.6-1, *Acoustical Scale.*

The unit of sound pressure level is expressed as a ratio to the lowest sound level detectable by a person with good hearing and is called a decibel (dB). Because sound can vary in intensity by over one million times within the range of human hearing, decibels are based on a logarithmic progression, used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called "A-weighting", written as dBA.

Time variations in noise exposure are normally expressed in terms of a steady-state energy level equal to the energy content of the time period (called Equivalent Continuous Noise Level or Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, State law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise measurement to derive the Community Noise Equivalent Level (CNEL). CNEL also differs from Leq in that it applies a time-weighted factor designed to emphasize noise events that occur during the evening and nighttime hours (when quiet time and sleep disturbance are of particular concern). Noise occurring during the daytime period (7:00 AM to 7:00 PM) receives no penalty. Noise produced during the evening time period (7:00 PM to 10:00 PM) is penalized by 5 dBA, while nighttime noise (10:00 PM to 7:00 AM) is penalized by 10 dBA.

Most community development noise standards use the CNEL scale. Because the CNEL averages noise over a 24-hour period, the noise impact from a single event noise source, such as an aircraft overflight or a moving train, are balanced by times with no noise activity. For example, noise produced during an aircraft overflight will increase from relatively quiet background levels before the overflight to a maximum level when the aircraft passes overhead, then returning down to background levels as the aircraft leaves the vicinity. Although noise during a single event noise episode may be high, duration is typically short and the average CNEL is still low depending on the frequency, duration and time of day of high noise episodes.

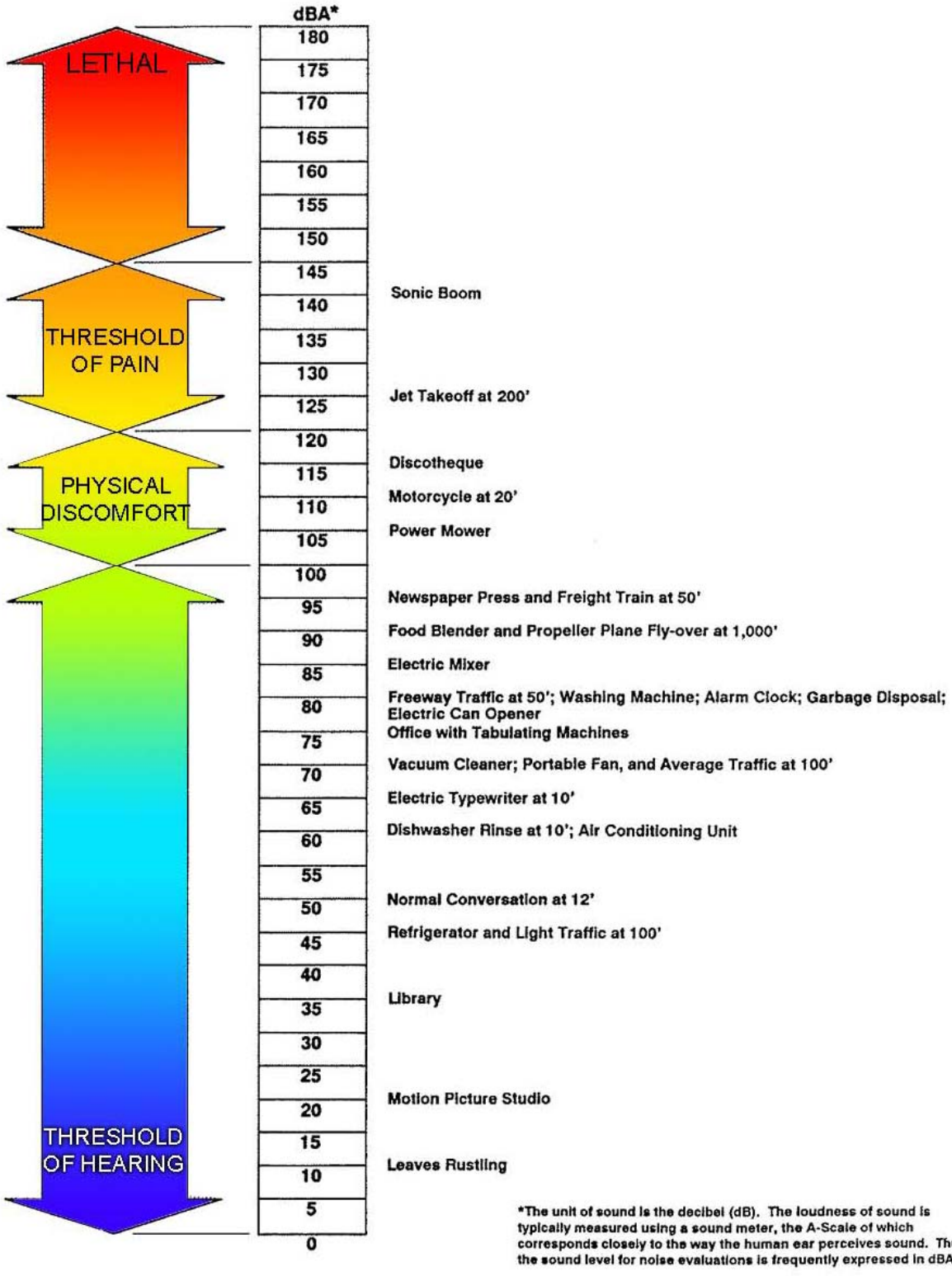

Figure 4.6-1
Acoustical Scale

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CNEL-based standards are also used to make land use decisions based on the suitability of a project site for its intended use because the CNEL applies to noise sources not amenable to local control such as on-road traffic, aircraft, trains, etc.

Noise Criteria

Because cities cannot regulate the noise created by mobile sources, they control the types of land use or levels of mitigation required by the receiving property. TOP does not specifically regulate the noise transmission from mobile sources to a land use, but rather identifies the acceptable levels of noise at a land use type from noise sources that are exempted from local control (e.g., on-road and freeway traffic, Ontario Airport, and railroads).

The City of Ontario has adopted noise/land use compatibility guidelines in its General Plan, which identifies acceptable community noise levels based on the CNEL scale. The guidelines rank noise/land use compatibility in terms of varying degrees of acceptability of noise levels for various land use types. The City's noise compatibility matrix is shown in Table 4.6-1, *Land Use Compatibility Guidelines for Noise*.

TABLE 4.6-1
LAND USE COMPATIBILITY GUIDELINES FOR NOISE

Land Use Category		Community Noise Exposure CNEL, dB			
		Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential/ Lodging	Single Family/Duplex	50-60	60-65	65-70	Above 70
	Multi-Family	50-60	60-65	65-75	Above 75
	Mobile Homes	50-60	60-65	--	Above 65
	Hotels/Motels	50-65	65-70	70-80	Above 80
Public/ Institutional	Schools/Hospitals	50-60	60-65	65-70	Above 70
	Churches/Libraries	50-60	60-65	65-70	Above 70
	Auditoriums/Concert Halls	50-55	55-60	60-70	Above 70
Commercial	Offices	50-65	65-75	75-80	Above 80
	Retail	50-70	70-75	75-80	Above 80
Industrial	Manufacturing	50-70	70-75	75-85	-
	Warehousing	50-70	70-80	Above 80	-
Recreational / Open Space	Parks/ Playgrounds	50-65	65-70	70-75	Above 75
	Golf Courses, Riding Stables	50-65	65-70	70-75	Above 75
	Outdoor Spectator Sports	50-60	60-65	65-75	Above 75
	Outdoor Music Shells/Amphitheaters	--	50-60	60-65	Above 65
	Livestock/Wildlife Preserves	50-70	--	70-75	Above 75
	Crop Agriculture	Above 50	--	--	--

Clearly Acceptable: No special noise insulation required, assuming buildings of normal conventional construction.
Normally Acceptable: Acoustical reports will be required for major new residential construction. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
Normally Unacceptable: New construction should be discouraged. Noise/avigation easements required for all new construction. If new construction does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included.
Clearly Unacceptable: No new construction should be permitted.

Source: TOP

Multi-family residential uses are considered "clearly acceptable" in areas with ambient noise environments of 60 dBA CNEL or less. The "normally acceptable" exterior noise level is 65 dBA CNEL and noise levels up to 75 dB CNEL are considered "normally unacceptable" for multi-family residential uses. Land uses that are proposed in "normally unacceptable" zones must demonstrate that adequate noise insulation features are incorporated into project design so as not to interfere with meeting the interior noise standards, through a detailed analysis of the noise reduction and insulation requirements. Commercial, retail or office uses are considered normally acceptable at ambient levels that are +10 dB higher than those for multi-family residential uses.

Chapter 29 of Title 5 of the Ontario Municipal Code regulates noise levels in the City. Exterior noise standards are provided in Table 4.6-2, *Exterior Noise Standards*.

TABLE 4.6-2
EXTERIOR NOISE STANDARDS

		Allowable Exterior Noise Levels	
Noise Zone	**Type of Land Use**	**7 a.m. to 10 p.m.**	**10 p.m. to 7 a.m.**
I	Single-Family Residential	65 dBA	45 dBA
II	Multi-Family Residential, Mobile Home Parks	65 dBA	50 dBA
III	Commercial Property	65 dBA	60 dBA
IV	Residential Portion of Mixed Use	70 dBA	70 dBA
V	Manufacturing and Industrial, Other Uses	70 dBA	70 dBA
Source: Ontario Municipal Code			

Because the project area is proposed for a mix of land uses, unacceptable noise levels at the residential portion of the site emanating from the adjacent commercial portion of the site could arise. According to the City's Noise Ordinance, "where 2 or more dissimilar land uses occur on a single property, the more restrictive noise standard shall apply" (Section 9-1.3305 of the Ontario Municipal Code). In recognition of the lesser noise sensitivity for residential uses located within a mixed use development, the noise ordinance standard for such uses is substantially relaxed. Noise levels of up to 70 dB average and 90 dB maximum are allowed within a mixed use development. However, where residences share a property line with commercial development, the more stringent exterior noise standard for commercial use (65 to 60 dB) applies.

The Ontario Municipal Code also regulates interior levels, with noise standard provided in Table 4.6-3, *Interior Noise Standards*.

TABLE 4.6-3
INTERIOR NOISE STANDARDS

		Allowable Interior Noise Levels	
Noise Zone	**Type of Land Use**	**7 a.m. to 10 p.m.**	**10 p.m. to 7 a.m.**
I	Single-Family Residential	45 dBA	40 dBA
II	Multi-Family Residential, Mobile Home Parks	45 dBA	40 dBA
IV	Residential Portion of Mixed Use	45 dBA	40 dBA
Source: Ontario Municipal Code			

Construction activities are exempt from noise regulations if they occur between the hours of 7:00 AM and 6:00 PM on weekdays and between 9:00 AM and 6:00 PM on Saturdays or Sundays.

Article 33, Environmental Performance Standards, in Title 9 of the City's Development Code states that no vibration should be detectable beyond the property line of the site, from which the vibration is emanating. Within Industrial Districts, vibration shall not exceed standards provided in Table 4.6-4, *Maximum Vibration in Industrial Districts.*

TABLE 4.6-4
MAXIMUM VIBRATION IN INDUSTRIAL DISTRICTS

Frequency (Cycles Per Second)	Vibration Displacement (inches)	
	Steady State	Impact
Under 10	.0055	.0010
10-19	.0044	.0008
20-29	.0033	.0006
30-39	.0002	.0004
40+	.0001	.0002
Source: Ontario Development Code		

Existing Noise Levels

The noise environment in the project area is defined by vehicular noise on the I-10 Freeway, train noise from the UPRR tracks, and aircraft noise from the Ontario International Airport. The project site is largely undeveloped and noise sources are limited to vehicle trips to and from the US Post Office.

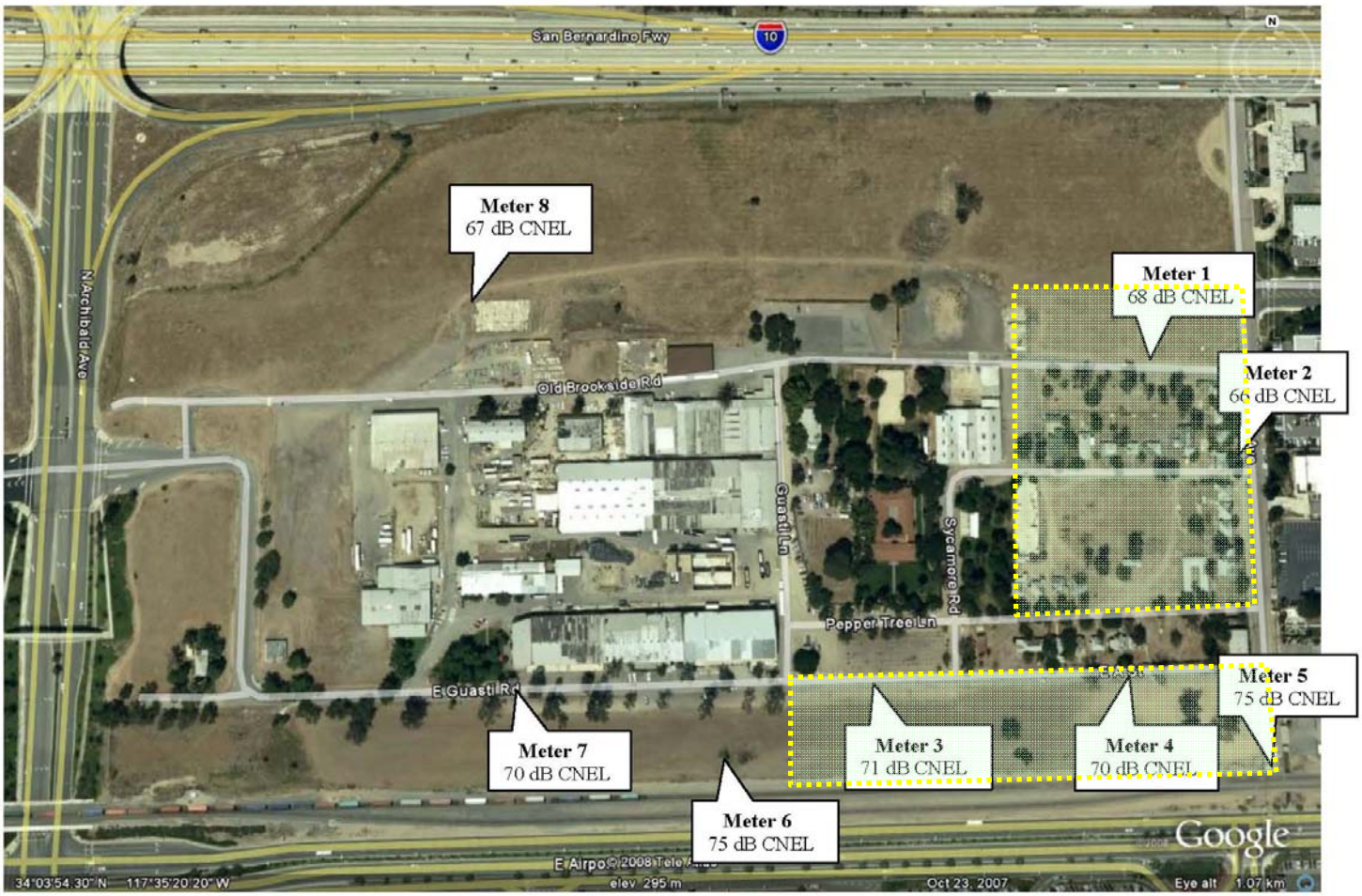
Noise measurements at 8 locations were made in order to document existing noise levels in the area. Figure 4.6-2, *Noise Meter Locations*, shows the CNEL readings at various locations on and near the site. Three meters recorded noise levels along the northern site perimeter, near the I-10 Freeway. Recorded measurements show CNELs ranging from 66 to 68 dB CNEL. Freeway traffic noise, as well as noise from other nearby sources, remained fairly constant throughout the 24-hour monitoring period.

Three meters recorded noise levels south of Old Guasti Road. The readings at these meters indicate CNELs in the 70 to 71 dB CNEL range. Two meters near the UPRR tracks recorded noise levels of approximately 75 dB CNEL. This noise level represents the worst case noise exposure for the Guasti Plaza development.

Line source noise sources, such as moving trains, attenuate at a spreading loss of 3 dB per doubling of the distance between the source and the receiver. Two noise meters were located approximately 75 feet from the railroad track centerline, while 3 meters were approximately 250 feet from the railroad track centerline. While at least 5-dB CNEL of noise attenuation due to distance from the railway is expected at Old Guasti Road, the readings do not reflect this. Other noise sources, such as airplane overflight and residual noise from freeway traffic, may be influencing the noise readings.

Noise form Railroad Operations

Currently, the Union Pacific Railroad Company (UPRR) operates 42 freight trains on average and one passenger train a day at a maximum speed of 70 mph along the railroad tracks that pass immediately south of the project site. The passenger train is the Amtrak Sunset Limited route that runs twice each day for 3 days a week. These trains generate occasional noise at the site. Metrolink trains operate on a track south of the Ontario International Airport along Mission Boulevard and do not present noise impacts to the site.



Proposed Residential Overlay Zone

Source: Noise Impact Analysis, 2009

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Figure 4.6-2
Noise Meter Locations

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Measured noise levels at a distance of 75 feet from the railroad track centerline is 75 dB CNEL. Farther from the tracks, along Old Guasti Road, noise levels are around 70 to 71 dB CNEL.

Airport Noise
Noise from aircraft operations at the Ontario International Airport is another noise source for the Guasti Plaza site. The Airport Impact Area prepared for Ontario International Airport by the Los Angeles World Airports shows that the project site is outside the 70-dB noise contour but the southern section of the site is within the 65-dB noise contour (see Figure 4.6-3, *Existing Airport Noise Contours*). Projected 2030 noise contours for the airport show that aircraft noise levels would increase, with the 70-dB noise contour along the UPRR tracks and Airport Drive and the 65-dB noise contour located just north of New Guasti Road.

Section 9-1.2980, Airport Safety Zones, of the City's Development Code states:

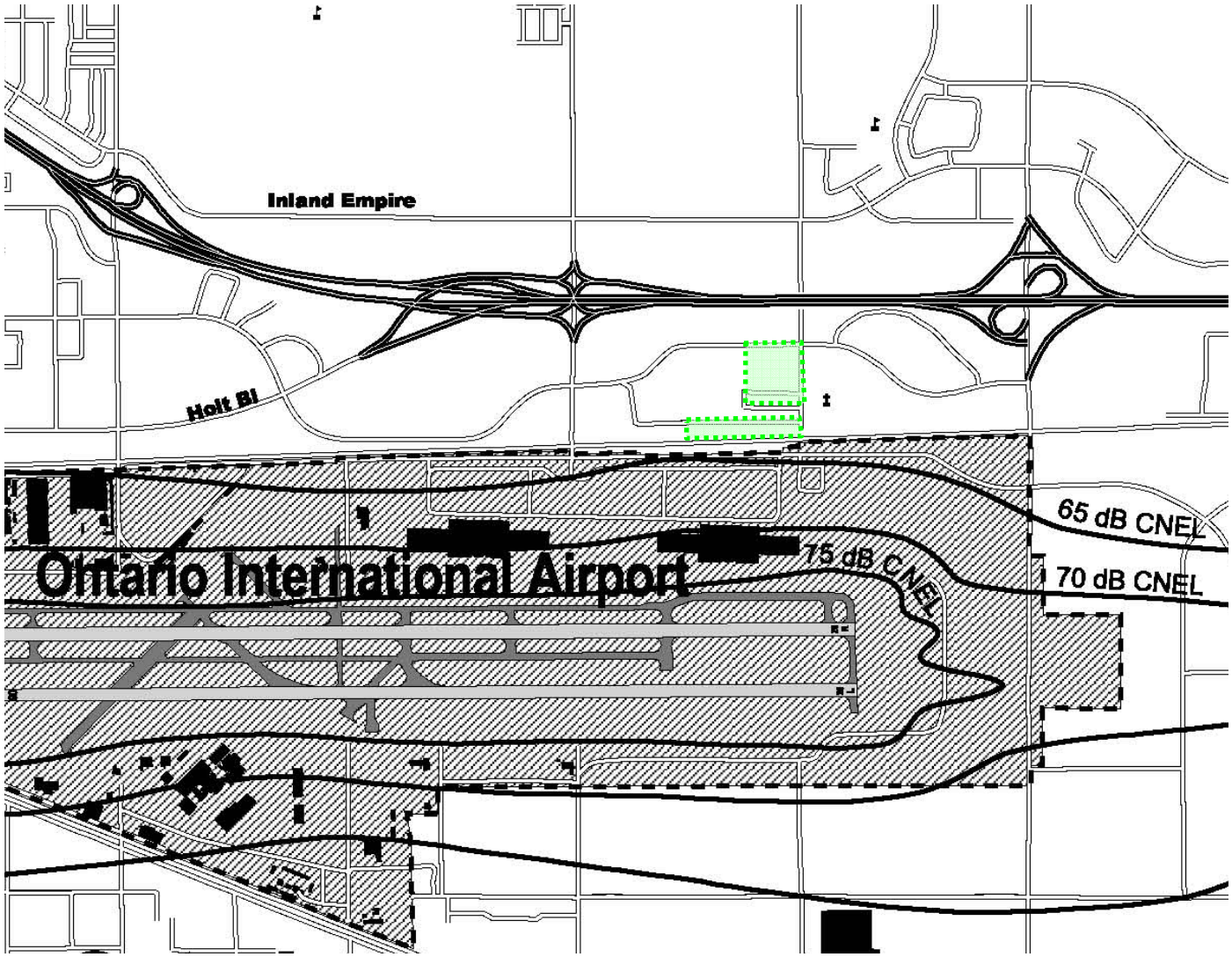
> *(h) Any building located within the Airport Approach Safety Zone which is intended for human occupancy, shall be acoustically designed by a qualified acoustic engineer to mitigate internal noise below 55 Community Noise Equivalent Level (CNEL). This requirement shall be a condition for the Development Advisory Board.*

I-10 Freeway Noise
The site is located approximately 500 feet from the I-10 Freeway centerline to the north and noise at the northern boundary of the site was measured at 66 to 68 dB CNEL, which would include freeway, airport, and railroad noise. If traffic volumes on the I-10 Freeway were to double, because of the logarithmic nature of noise, future noise levels would only be +3 dB CNEL higher. This assumes that traffic speeds remain the same. But in reality, if traffic volumes were to double, then freeway congestion would cause lower speeds, which would lower traffic noise levels.

4.6.2 Threshold of Significance

According to Appendix G of the CEQA Guidelines, a project could have a significant adverse impact on noise, if its implementation results in any of the following:

- Causes 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;
- Causes exposure of persons to or generation of excessive groundbourne vibration or groundbourne noise levels;
- Causes 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;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels; or,
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.



Proposed Residential Overlay Zone

Source: LAWA 2010

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Figure 4.6-3
Existing Airport Noise Contours
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The term "substantial increase" is not defined by any responsible agency. The limits of perceptibility by ambient grade instrumentation (sound meters) or by humans in a laboratory environment is around 1.5 dB. Under ambient conditions, people generally do not perceive that noise has clearly changed until there is a +3 dB difference. Thus, a threshold of 3 dB is commonly used to define "substantial increase" and will be used in the analysis below.

4.6.3 Environmental Impacts

Two characteristic noise sources are typically identified with land use redevelopment, such as that proposed for the project site. Construction activities, especially heavy equipment, will create short-term noise increases near the project site. Since there are no nearby noise-sensitive receptors, such as existing residential uses, this is not anticipated to be of concern. Upon completion, residential or commercial traffic may cause an incremental increase in area-wide noise levels throughout the project area. Future residential development under the proposed Amendment will cause a small increase in noise from area wide traffic, but the increase is small relative to the overall cumulative traffic noise. For the proposal, it is the noise from the surrounding community which is of concern.

Violation of Noise Standards *(Would the project cause 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?)*

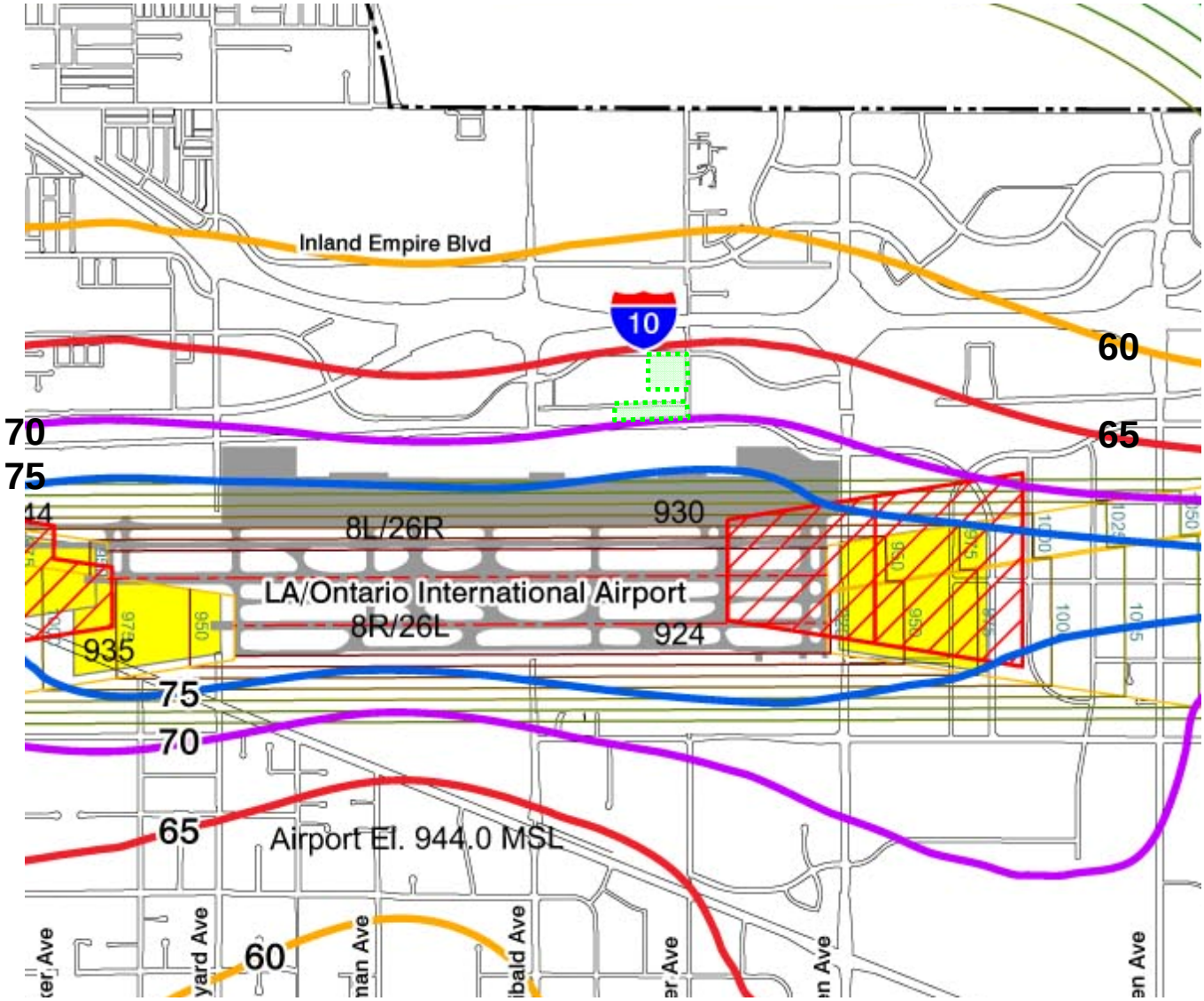
Because of the unique nature of mixed land uses, the City's Noise Ordinance contains a lower noise protection standard for residential uses in mixed use developments, than for purely residential development. The City's noise standard is 70 dB (15-minute average) during all hours for the residential portion of mixed use projects. Interior noise standards are 45 dBA from 7 AM to 10 PM and 40 dBA from 10 PM to 7 AM. Commercial land uses are actually afforded a greater level of noise intrusion protection. At the southwestern corner where future residences may share a property line with commercial development, the more stringent exterior noise standard for commercial use (65 to 60 dB) would paradoxically apply.

Aircraft Noise

As discussed earlier, the project site may be within the 65 dB CNEL noise contour for the Ontario International Airport by the year 2030 (see Figure 4.6-4, *2030 Airport Noise Contours*). Noise levels at the site from aircraft operations are currently less than 65 dB CNEL but would increase to 65 dB CNEL at the northern boundary and 70 dB CNEL at the southern boundary by 2030. Aircraft noise would exceed the Development Code standard of 60 to 65 dB. With standard construction, interior noise standards may also be exceeded. This is considered a significant adverse impact to future residential development on the site.

Impact 4.6.1: Future residential development would be exposed to aircraft noise exceeding the City's exterior and interior noise standards.

Aircraft noise propagates downward and cannot be reduced as effectively for exterior areas. Thus, indoor recreational areas are recommended for future residential uses.



Proposed Residential Overlay Zone

60 **dB CNEL noise contour**

Source: City of Ontario, 2010

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Figure 4.6-4
2030 Airport Noise Contours
Guasti Plaza Specific Plan Amendment
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Site and building design features would also need to ensure that interior noise levels in residential uses are within the City's 40 to 45 dB CNEL standard. The emphasis in any elevated airport noise environment is to adequately insulate structural interiors, even if the exterior levels exceed planning standards. When building plans are developed, a supplemental acoustical report verifying compliance with the City's interior noise standard should be prepared at the building permit stage, based on the selected structural features that provide noise control.

Noise control features may include insulation of outer walls and windows (i.e., concrete or brick exterior walls; upgraded drywall, doors, and roofs; dual-pane windows; tightly closed or sealed windows and doors; mechanical ventilation system or air conditioning system; air vents and inlets located away from the noisy facade or equipped with silencers; and openings or vents not facing noise sources).

Train Noise

Train noise levels at the site are estimated at 75 dB CNEL approximately 75 feet from the railroad track centerline. Thus, future residential development along the railroad tracks would be exposed to noise levels exceeding City's General Plan and Development Code noise standards. Normal exterior to interior noise attenuation with standard commercial construction ranges from -20 to -25 dB CNEL. Therefore, commercial/office uses could have interior noise levels of 40 to 45 dB CNEL, which is below the City's interior noise standard for commercial uses of 55 dB CNEL. Since office commercial activities are mainly conducted indoors, future commercial uses would be less sensitive to train noise. However, proposed residential uses would experience a significant adverse impact from train noise, exceeding the City's exterior noise standard of 65 dB CNEL and interior noise standard of 45 dB CNEL.

Impact 4.6.2: Future residential development along the southern section of the site would be exposed to train noise levels exceeding the City's exterior and interior noise standards.

Noise from freeways or trains travels horizontally and can be reduced by barriers, such as solid walls, berms, buildings or other structures, between the noise source and the receiver. The effectiveness of a barrier depends upon blocking the line of sight between the source and receiver, and is improved with increases in distance that the sound must travel to pass over the barrier as compared to a straight line from source to receiver.

Barrier effectiveness generally depends on the relative heights of the source, receiver, and barrier. Barriers are most effective when placed close to either the receiver or the source. For maximum effectiveness, barriers must be continuous and relatively airtight along their length and height. Earth, in the form of berms or the face of a depressed area, is an effective barrier material, as well as walls that have densities of 4 pounds per square foot or more.

Barriers to train noise may be provided in the form of walls, berms, or berm/wall combinations. The use of an earth berm in lieu of a solid wall will provide up to 3 dBA additional attenuation over that attained by a solid wall alone, due to the absorption provided by the earth. Thus, berm/wall combinations offer slightly better acoustical performance than solid walls, and are often preferred for aesthetic reasons.

For the site, carports or garages can also be used to form or complement a barrier shielding adjacent dwellings or an outdoor activity area, and could provide some noise mitigation for

exterior recreational uses adjacent to the railroad tracks. However, the wall must break the line-of-sight from the source to the receiver.

Preliminary conceptual plans for the site show 3 and 4-story residential buildings along the railroad track frontage. The buildings are approximately 87 feet from the track centerline. The plans show an 8-foot landscape buffer between the edge of the railroad right-of-way and the project site. Without any shielding, exterior noise exposure at balconies or patios facing the train tracks could be as high as 75 dB CNEL. Insertion of a noise wall or carport wall just past the 8-foot landscape buffer would reduce noise beyond the wall. However, a 15-foot high wall along the southern site boundary may not attenuate noise for 3rd and 4th story patios or balconies in units at the upper levels with a direct line-of-sight to the tracks. Thus, if adjacent residential buildings are as high as 4 stories, the wall would need to be capable of blocking noise up to 35 feet from ground level. A noise model was used to calculate effective wall height necessary to reduce exterior noise at 4th story balconies to below 65 dB CNEL. A wall height of 26 feet would be needed to block the line-of-sight from the train tracks to 4th story balconies and reduce 75 dB CNEL of railway noise to 67 dB CNEL, and a wall height of 28 feet would be needed to reduce noise at 4th story balconies facing the train tracks to 65 dB CNEL. If a 28-foot wall is not provided, patios and balconies and other exterior recreational areas would have to be located away from the southern facades of residential buildings located along the southern section of the site.

Buildings can be used to shield other structures or areas, to remove them from noise impacted areas. The use of one building to shield another can significantly reduce overall project noise control costs, particularly if the shielding structure is insensitive to noise.

Also, placement of outdoor recreational activity areas within the shielded portion of a building complex, such as a central courtyard, can be an effective method of providing a quiet retreat in an otherwise noisy environment. However, because overhead aircraft noise at the site could be 65 to 70 dB CNEL, a central courtyard would not be shielded from high noise levels.

Patios or balconies could be placed on the side of a building opposite the noise source, and "wing walls" can be added to buildings or patios to help shield sensitive uses. Again, this measure could assist in mitigating noise from roadways and trains, but not aircraft. It is unlikely that exterior recreational noise levels will be below 65 dB CNEL, even if recreational uses are sited in the interior of the complex.

Trees and other vegetation can also provide noise attenuation. However, approximately 100 feet of dense foliage (so that as no visual path extends through the foliage) is required to achieve a 5-dBA attenuation of noise. Thus, the use of vegetation as a noise barrier would not be considered a practical method of noise control for the site.

Site and building design features to ensure that interior noise levels for residential uses are within the City's 40 to 45 dB CNEL standard would also be needed to attenuate train noise.

Traffic Noise

Freeway noise was monitored at 66 to 68 dB along the northern property line. The development of planned commercial and office buildings to the north of the site would serve as barriers to freeway noise. However, increases in traffic volumes along New Guasti Road would increase noise levels in the project area to 72 dB CNEL at 50 feet from the roadway centerline in the future. At 100 feet from the roadway centerline, future traffic noise impacts are reduced by -3

dB, or would be 69 dB CNEL. Therefore, depending on building placement, traffic noise levels of up to 72 dB CNEL are possible along the northern site boundary. Noise levels along other area roadways will be much less, and in the low to mid-60 dB CNEL range. This exterior noise level is acceptable for commercial uses. However, traffic noise along the northern boundary of the site would expose potential on-site residents to noise levels exceeding the City's noise standards. This is a significant adverse impact.

Impact 4.6.3: Future residential development along the northern site boundary would be exposed to traffic noise levels exceeding the City's exterior and interior noise standards.

Barriers discussed above could reduce noise levels at exterior areas. Also, because of rail and aircraft noise sources near the site, residential dwellings will need to be designed to accommodate noise levels up to 75 dB CNEL. Thus, on-site roadway noise exposure could be mitigated by the same design features used to reduce interior noise levels from adjacent trains and aircraft operations to meet City standards.

Site and building design features to ensure that interior noise levels for residential uses are within the City's 40 to 45 dB CNEL standard would also be needed to attenuate traffic noise.

Groundbourne Noise and Vibration *(Would the project cause exposure of persons to or generation of excessive groundbourne vibration or groundbourne noise levels?)*

Vibration refers to energy transmitted in waves through the ground, as measured in meters per second squared (m/s^2), a unit of acceleration. Soils have varying transmission properties and vibration would depend on soil characteristics between the source and the receiver, as well as distance and duration. Vibration can reach levels that can cause structural damage. However, humans are very sensitive and can perceived vibration well below levels that could cause structural damage.

The proposed Amendment involves the construction and occupancy of residential dwelling units, along with community commercial uses and light industrial/business park uses within Guasti Plaza. The California Department of Transportation notes that excessive groundbourne vibration is typically associated with activities such as pile driving or blasting, neither of which would likely be required during site construction. Only minimal groundbourne vibrations would be created during site preparation and subsequent construction associated with future development on the site. Vibration detectability during construction in Southern California typically extends 50-100 feet from the source. No vibration-sensitive land uses are located within this distance from the site. Therefore, vibration impacts due to construction are expected to be less than significant.

Additionally, no excessive groundbourne vibrations would be created by the occupancy of the residential units. Thus, no violation of the City's standards for vibration, as may be typically generated by heavy industrial operations, is expected from future residential uses.

The project site would be subject to ground-borne vibration from train operations at the UPRR tracks along the southern boundary of the site, which may include rattling windows and throbbing floors, with cosmetic damage at stronger vibration levels. Rapid transit or light rail systems typically generate vibration levels of 70 VdB or more near their tracks. If there is unusually rough road or track, wheel flats, geologic conditions that promote efficient propagation

of vibration, or vehicles with very stiff suspension systems, the vibration levels from any source can be 10 decibels higher than typical. Hence, at 50 feet, the upper range for rapid transit vibration is around 80 VdB and the high range for heavy rail vibration is 85 VdB.

Soil and subsurface conditions are known to have a strong influence on the levels of ground-borne vibration. Vibration propagation is more efficient in stiff clay soils, and shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from the track. Soils in Ontario are comprised primarily of sand, silty sand, gravelly sand and sandy silt. These "soft" soils contribute to internal attenuation of vibration propagation, with an attenuation constant for stiff clay soils at 0.02 and for silty sands at 0.30.

Train vibration may be perceptible to people who are outdoors at the project site, but it is very rare for outdoor vibration to cause complaints. The vibration levels inside a building are a bigger concern, and are dependent on the vibration energy that reaches the building foundation, the coupling of the building foundation to the soil, and the propagation of the vibration through the building. The general guideline is that the heavier a building is, the lower the response will be to the incident vibration energy. Coupling losses from floor to floor within a building decrease vibration levels from the foundation upward. As a rule of thumb, vibration levels decrease by 1-2 dB per floor. Resilient floor coverings accelerate this rate.

The Federal Transit Administration's 2006 Transit Noise and Vibration Impact Assessment establishes thresholds of significance for vibration, as shown in Table 4.6-5, *Vibration Thresholds*.

TABLE 4.6-5
VIBRATION THRESHOLDS

Land Use Category	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

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.

Source: Noise Impact Analysis, 2009

The project site is exposed to an average of 43 daily train events per day, which is considered to fall under "Occasional Events" category. Thus, the threshold for residential use is 75 VdB and is 78 VdB for commercial uses.

Table 4.6-6, *Screening Distances*, shows the screening distances to reach the thresholds above, with a 5-decibel factor of safety. Because of the 5-decibel safety factor, the distances shown below are conservative.

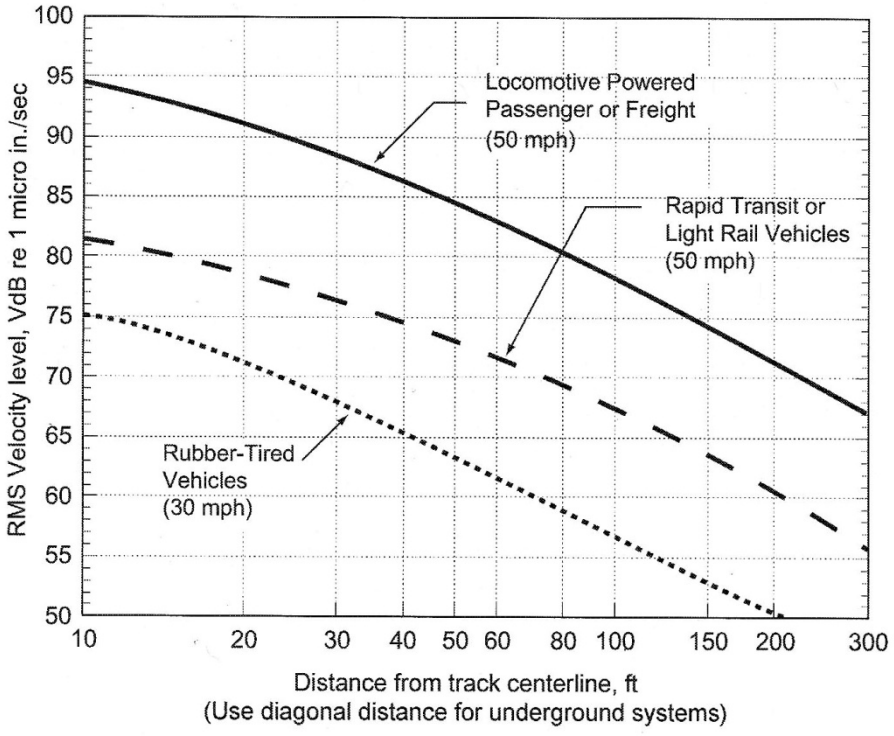
TABLE 4.6-6
SCREENING DISTANCES

Type of Project	Critical Distance for Land Use Categories* Distance from Right-of-Way or Property Line	
	Residences	Commercial Uses
Conventional Commuter Railroad	200	120
Rail Rapid Transit	200	120

TABLE 4.6-6
SCREENING DISTANCES

Type of Project	Critical Distance for Land Use Categories* Distance from Right-of-Way or Property Line	
	Residences	Commercial Uses
Light Rail Transit	150	100
Intermediate Capacity Transit	100	50
Source: Noise Impact Analysis, 2009		

As shown in the chart below, a locomotive powered passenger or freight train traveling at 50 mph would create a vibration level of 85 VdB at 50 feet from the track. Geometrical spreading losses would reduce this vibration level to 80 VdB at 85 feet from the track. Proposed commercial or residential uses are anticipated to have a minimum setback of approximately 85 feet from the track along the southern project perimeter. Thus, vibration would be 80 VdB or below.



Internal attenuation would further reduce the vibration level by an additional 3 VdB. The interior vibration level at the closest residence at the site is estimated in Table 4.6-7, *Projected Vibration Levels.*

TABLE 4.6-7
PROJECTED VIBRATION LEVELS

Floor Location	Residential Use	Office Use
First Floor	77	77
Second Floor	76	76
Third Floor	74	74
Fourth Floor	73	73
Fifth Floor	71	--

TABLE 4.6-7
PROJECTED VIBRATION LEVELS

Floor Location	Residential Use	Office Use
Significance Threshold	75	78
Source: Noise Impact Analysis, 2009		

As shown, future residential uses at the lowest floors may slightly exceed the adopted significance threshold for occasional events of 75 VdB. Office uses at the anticipated minimum setback would likely not exceed the 78-VdB threshold at any floor. Impacts on future residential uses are considered significant and adverse.

Impact 4.6-4: Future residential development may be exposed to vibration from nearby train operations.

According to the DOT Vibration Assessment, ground-borne vibration that is 0 to 5 decibels greater than the threshold is considered potentially significant, although there is a chance that actual ground-borne vibration levels will be below the impact threshold. Since no development plans have been submitted for future residential or commercial development at the project site, a site-specific vibration analysis would have to be conducted to analyze the estimated vibration levels and identify vibration control measures that may be needed for future residential uses. The analysis would account for adjustments to vibration projections based on specific receiver positions inside buildings, with consideration to the speed, wheel and rail type and condition, type of track support system, type of proposed building foundation, and number of floors above the basement level. These adjustments are strongly dependent on the frequency spectrum of the vibration source and the frequency dependence of the vibration propagation.

Increase in Ambient Noise Levels *(Would the project cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?)*

Traffic Noise Levels

Increase in traffic volumes on local streets and the nearby freeway would lead to an increase in traffic noise exposure at the site. Table 4.6-5, *Traffic Noise Projections*, summarizes the calculated 24-hour CNEL level at 50 feet from the roadway centerline along roadway segments near the site. Three traffic scenarios were evaluated: "existing conditions", "opening year-no project", and "opening year-with project", based on the traffic analysis for the Guasti Plaza Project Area Plan.

TABLE 4.6-8
TRAFFIC NOISE PROJECTIONS

Roadway		Existing	Opening Year-No Project	Opening Year-With Project
New Guasti Road -	W of Winery	68.5	68.5	73.6
	E of Winery	67.6	67.9	71.7
	W of Villa	67.1	67.1	71.3
	Villa-Biane	67.8	67.7	70.8
	Biane-Street 5	67.9	67.5	71.0
	Street 5-Turner	67.4	67.3	70.8
	E of Turner	68.4	68.4	71.9
Old Guasti Road -	Garrett-Gertrude	NA	NA	60.5
	Gertrude-Luisa	NA	NA	60.8
	Luisa-Villa	NA	NA	63.1
	Villa-Biane	NA	NA	64.7
	Biane-Turner	NA	NA	62.5

TABLE 4.6-8
TRAFFIC NOISE PROJECTIONS

Roadway		Existing	Opening Year-No Project	Opening Year-With Project
Turner Avenue -	Guasti-Brookside	62.1	59.1	66.3
	Brookside-Old Guasti	NA	NA	62.1
Source: Noise Impact Analysis, 2009				

The site is now largely vacant and future development will result in an increase in the traffic noise. As seen in Table 4.6-5, many roadway segments adjacent to the project site will experience increases of more than 3 dB CNEL and thus, exceed the significance threshold. However, land uses on New Guasti Road northeast, north, and west of the site will consist of commercial uses that are not considered noise sensitive. The project site will have the only noise-sensitive use in the project area. Thus, future residential development would be accompanied by an increase in noise levels that would affect adjacent land uses but future residents themselves would not experience the increase in noise levels. Also, traffic noise impacts would be mitigated by noise control measures that would be incorporated into building design and construction, as discussed above.

Stationary Noise
Adjacent to residential uses, the Guasti Plaza Specific Plan proposes the development of commercial and light industrial land uses within Guasti Plaza. These non-residential developments would be located across Biane Lane, from Old Guasti Road to New Guasti Road. However, these non-residential uses will abut the site and future residential development south of Old Guasti Road and at the western section of the Specific Plan area. Stationary noise sources at adjacent commercial and light industrial developments may include alarm systems, truck deliveries, landscaping maintenance, exterior mechanical equipment, and outdoor maintenance activities.

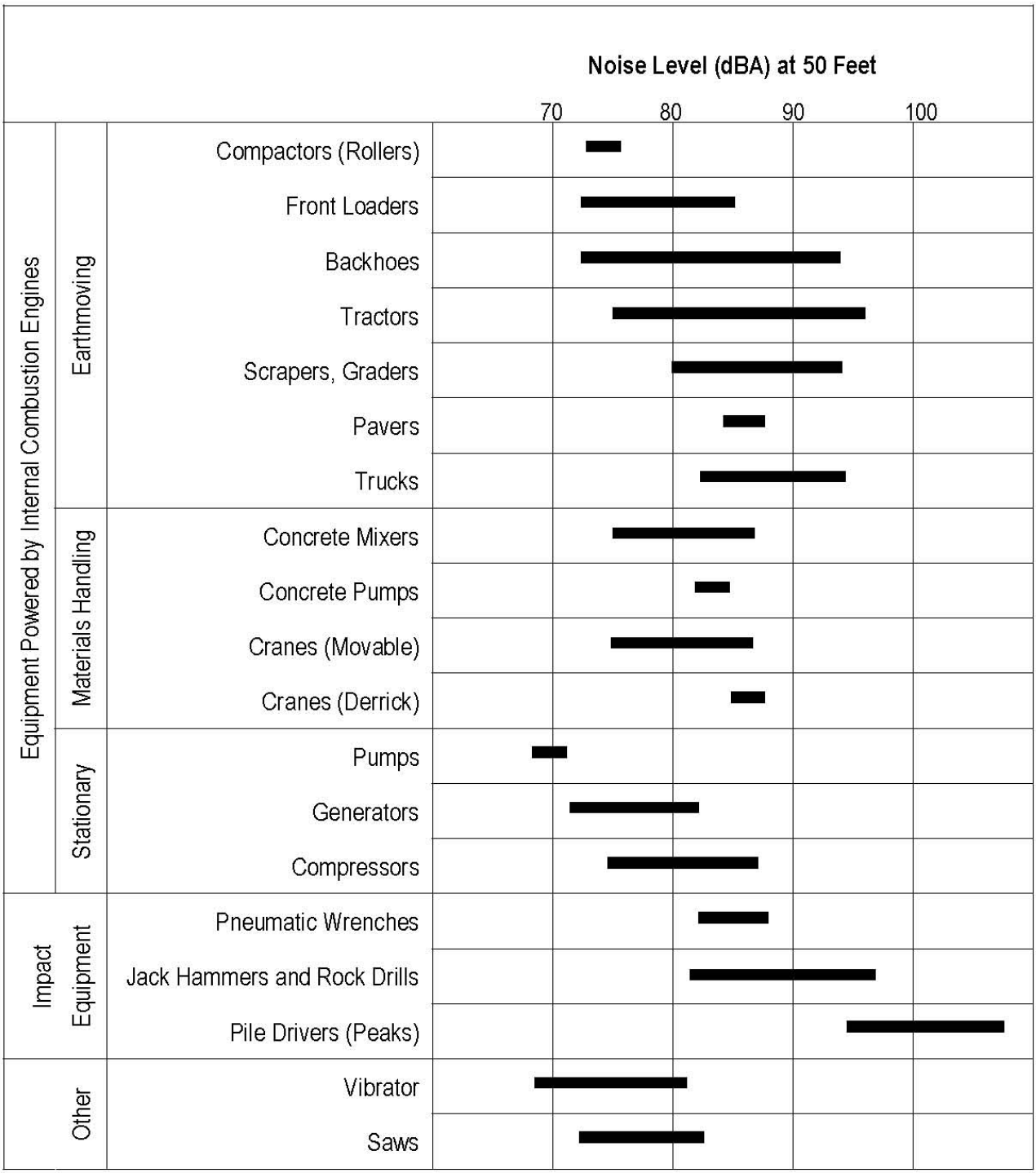
Thus, at the southwestern corner of the site, future residential development may be exposed to stationary noise levels that exceed the City's 60 to 65 dB CNEL standard where residences share a property line with commercial development. However, noise control measures for train noise at this location, that would be implemented as Mitigation Measures 4.6.2a and 4.6.2b, would reduce interior noise levels and are expected to also reduce noise impacts from abutting stationary noise sources. No significant noise impacts from stationary sources are expected.

Temporary or Periodic Noise *(Would the project cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?)*

Future residential uses under the proposed Amendment would involve the construction of buildings and infrastructure, which may lead to temporary, periodic increases in ambient noise levels during the construction period. Land uses near the project site would be exposed to short-term noise during construction activities on the site.

Temporary construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and its activity level. Short-term construction noise impacts tend to occur in discrete phases, dominated initially by earth-moving sources, then by foundation and building construction, and finally by finish construction.

As shown in Figure 4.6-5, *Noise from Construction Equipment*, heavy equipment noise can exceed 90 dBA, with an average of 85 dBA at 50 feet from the source when the equipment is operating at typical loads.



EPA PB 206717, Environmental Protection Agency, December 31, 1971, "Noise from Construction Equipment and Operations."

Figure 4.6-5
Noise from Construction Equipment
Guasti Plaza Specific Plan Amendment
Supplemental EIR

Most heavy equipment operate with varying load cycles over any extended period of time. The upper end of the noise range represents short-term effects, while the longer term averages are most representative of the lower end of the noise range.

Construction equipment noise is generally attenuated by a factor of 6 dB per doubling of distance. Thus, the loudest construction noise source may require 500 feet of distance between the source and the receiver to reduce the average 85 dBA noise level to 65 dBA. The church located across Turner Avenue is a sensitive receiver and may be adversely affected by construction noise. With most church activities conducted indoors, impacts on the church are expected to be less than significant.

If the proposed residential uses are developed and occupied first, they would represent noise-sensitive receivers for subsequent commercial construction to the north and west of the site.

However, these residential units are planned to be equipped with strongly upgraded structural noise protection. Noise control measures designed to reduce aircraft, train, and freeway noise will also mitigate potential construction equipment noise audibility. Thus, occupied dwelling units would not be exposed to high noise levels from adjacent construction activities. City regulations on time limits for construction activities would also confine construction noise to the daytime hours. Construction noise impacts from adjacent developments would be less than significant.

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

The Ontario International Airport is located south of the site and the 65-dB noise contour of this airport currently runs along the southern boundary of the project site. The projected 2030 noise contours show the 65-dB noise contour along the northern boundary of the project site. Thus, future residential uses would be exposed to noise levels associated with aircraft and airport operations. There are no private airstrips located near the project site, which may expose future residents and visitors to additional aircraft noise levels.

This impact has been analyzed above. As discussed above, future aircraft noise exposure (estimated at 65 to 70 dB CNEL on the site by 2030) would exceed the City's exterior noise standard for residential uses in mixed use projects (70 dB at the central section and 60 to 65 dB at the southwestern corner of the site). Mitigation would be needed to reduce aircraft noise from adversely affecting future residents of the site.

4.6.4 Previous Analysis

To the extent applicable, this Supplemental EIR tiers off previous environmental documents relating to the development of the project site, which include the EIR for the Guasti Plaza Specific Plan and the EIR for the Guasti Redevelopment Plan.

The following discussion summarizes the similarities/differences in potential impacts between the previous documents and this Supplemental EIR and, where similar impacts are present, applicable policies, standard conditions or mitigation measures in the previous documents are identified for incorporation or implementation by the current project, where appropriate.

Guasti Plaza Specific Plan EIR
The EIR for the Guasti Plaza Specific Plan indicated that future development in the Specific Plan area would be exposed to noise from the I-10 Freeway, UPRR tracks, and Ontario International Airport. New noise sources would also be created by construction activities, vehicle trips, and stationary sources. Construction noise impacts would be short-term and mitigation to restrict construction to the daytime weekday hours was provided. The previous EIR also stated that future developments within the Specific Plan area would lead to an increase in the ambient noise levels. However, office and commercial uses would be exposed to acceptable noise levels of 70 to 75 dBA CNEL or less. Mitigation measures were outlined to comply with noise standards and restrict construction to the daytime weekday hours. Impacts were expected to be less than significant after mitigation.

The EIR for the Guasti Plaza Specific Plan also indicated that existing and projected aircraft noise contours from the Ontario International Airport extend into the Specific Plan area, but these noise levels are normally acceptable for commercial and industrial uses.

> *Consistent with the EIR for the Specific Plan, future residential development would generate construction noise, traffic noise, and new noise sources that may affect future residents. However, projected airport noise levels are not normally acceptable for residential uses. Noise standards for residential uses are more stringent and additional mitigation would be needed to address freeway and traffic noise, train noise and aircraft noise. Future residential development would have to implement noise control measures to achieve the City's interior and exterior noise standards.*

A number of mitigation measures were provided in the EIR for Guasti Plaza Specific Plan:

1. Prior to the issuance of any building permit, applicants for future development within the Project Area shall submit evidence to the satisfaction of the City that all applicable exterior and interior noise standards established by the General Plan and implementing noise ordinances will be met. Applicable standards shall include State and local standards for exterior and interior noise exposure for both new construction and rehabilitated existing structures.

   This mitigation remains applicable to future residential development under the proposed Specific Plan Amendment. A quantitative analysis of proposed noise reduction features would have to be submitted to the City to prove compliance with the standards. It is expected that interior noise standards can be met, but exterior noise levels will remain above 65 dB CNEL.

2. Site preparation and construction activities shall be limited to daytime weekday hours.

   This mitigation remains applicable to future residential development under the proposed Specific Plan Amendment as a standard condition.

Guasti Redevelopment Plan EIR
The EIR for the Guasti Redevelopment Plan indicated that increases in ambient noise levels would occur but would not be significant. Planned commercial and industrial land uses would be compatible with existing noise levels generated by stationary sources near the Project Area, including airport noise exposure along the southern section of the Project Area. No mitigation measures for noise were provided in the EIR for Guasti Redevelopment Plan.

With more stringent City noise standards for residential uses, future residential development proposed under the Amendment would be exposed to noise levels requiring mitigation.

4.6.5 Standard Conditions and Mitigation Measures

Standard Conditions

The implementation of the following standard conditions would prevent adverse noise impacts to residents of the site:

Standard Condition 4.6.1: Site preparation and construction activities for future residential development shall be confined to the hours between 7:00 AM and 6:00 PM on weekdays and between 9:00 AM and 6:00 PM on Saturdays or Sundays, in accordance with the City's noise regulations in the Ontario Development Code.

Standard Condition 4.6.2: Future residential development shall comply with the City's Building Requirements for New Residential Construction in the 70 CNEL to 75 CNEL Noise Zone, as found in the Ontario Municipal Code, Chapter 15, Sound Transmission Control in High Noise Impact Areas.

Standard Condition 4.6.3: Future residential development shall comply with Article 33, Environmental Performance Standards, in Title 9 of the City's Development Code as it relates to vibration.

Mitigation Measures

Mitigation measures that would reduce potentially significant adverse impacts related to noise and/or that have been identified in the EIR for the Guasti Plaza Specific Plan and found to be applicable to the proposal include the following:

Mitigation Measure 4.6.1a: Future residential development shall be designed to provide common recreational areas within an indoor central courtyard and private patios and balconies as enclosed atriums.

Mitigation Measure 4.6.1b: Future residential development shall be designed with upgraded acoustical features and specialized construction methods for exterior walls, exterior windows, exterior doors, roof/ceiling construction, floors, ventilation, fireplaces, and wall and ceiling openings.

Mitigation Measure 4.6.1c: Rental and real estate disclosures shall be provided advising renters and homebuyers that there is a nearby airport that operates on a 24-hour basis and that will be generating noise on the airport, during the approach and departure and in the airspace above the site.

Mitigation Measure 4.6.1d: The property owner shall provide an avigation easement for aircraft noise to the Ontario International Airport, to be recorded against the property, prior to the occupancy of the dwelling units.

Mitigation Measure 4.6.2a: A berm and/or solid block wall shall be provided along the southern boundary of the site to serve as barriers to the balconies on upper stories facing the railroad tracks. Alternatively, patios and balconies should be placed on the side of a building opposite the noise source, and "wing walls" can be added to buildings or patios to help shield outdoor uses.

Mitigation Measure 4.6.2b: Future residential development shall be designed with upgraded acoustical features and specialized construction methods to block out train noise and meet the City's interior noise standards. This may include buildings along the railroad tracks that do not have living rooms and bedrooms with windows or walls along the southern façade or having sufficient sound insulation on exterior walls and windows.

Mitigation Measure 4.6.3a: Future residential development shall be designed to provide common recreational areas away from New Guasti Road and Turner Avenue where noise levels over 65 dB CNEL are projected at 50 feet from the roadway centerline.

Mitigation Measure 4.6.3b: Patios and balconies of residential buildings along New Guasti Road should not be placed on the north side of the building, in the absence of a wall or building that would obstruct freeway noise. Rather, patios and balconies should be placed on the side of a building opposite the noise source, and "wing walls" can be added to buildings or patios to help shield outdoor uses.

Mitigation Measure 4.6.3c: Prior to the issuance of any building permit, future residential development shall provide evidence to the City that all applicable exterior noise standards for recreational and open space uses and interior noise standards for living areas in both new construction and rehabilitated existing structures will be met through a quantitative analysis of proposed noise reduction features.

Mitigation Measure 4.6.4: Prior to the issuance of any building permit, future residential development shall submit a vibration analysis to the City that identifies the potential vibration levels from nearby train operations and the vibration control measures that would be incorporated into the design of the project to prevent significant vibration impacts on residential uses and meet City standards.

4.6.6 Unavoidable Significant Adverse Impacts

Future residential development under the proposed Amendment would generate noise from construction activities and vehicle trips, as well as expose future residents to noise sources in the area. These sources include vehicle traffic noise from the I-10 Freeway, train noise from the UPRR railroad tracks, and aircraft noise from the Ontario International Airport. These noise sources would adversely affect future residential development, which are more sensitive to noise and vibration than planned commercial office uses.

Implementation of the standard conditions and recommended mitigation measures would reduce noise impacts on future residents of the site. However, noise from aircraft, trains and freeway traffic in the surrounding area currently exceed the City's exterior noise standards for residential uses and future residential development would be exposed to these noise levels. With conventional wood-frame stucco construction, interior noise levels could also exceed the

City's interior noise standards for residential uses. Site design and building construction that would provide noise control are provided as mitigation to bring noise levels at interior living areas and recreational areas down to City standards but exterior areas are expected to continue to experience high noise levels. With no feasible and reasonable mitigation measure for exterior noise, noise impacts on future residents would remain significant and adverse. Unavoidable significant adverse noise impacts on future residential uses are expected with the proposed Amendment.