IV.J NOISE

1. Introduction

This section analyzes potential noise impacts that would be associated with implementation of the proposed project. The analysis describes the existing noise environment within the vicinity of the proposed project, estimates future noise levels at surrounding land uses resulting from construction and operation of the proposed project, identifies the potential for significant impacts, and provides mitigation measures to address significant impacts. In addition, an evaluation of the potential cumulative noise impacts of the proposed project and known related projects is also provided.

2. Environmental Setting

a) Noise Basics

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perceptibility of sound is subjective and the physical response to sound complicates the analysis of its impact on people. Sound pressure magnitude is measured and quantified using a logarithmic ratio of pressures, the scale of which describes the level of sound in decibels (dB). The human hearing system is not equally sensitive to sound at all frequencies. Therefore, to approximate this human frequency-dependent response, the A-weighted filter system is used to adjust measured sound levels. The A-weighted sound level is expressed as "dBA."

Although the A-weighted scale accounts for the range of people's response, and therefore, is commonly used to quantify individual event or general community sound levels, the degree of annoyance or other response effects also depends on several other perceptibility factors. These factors include:

- Ambient (background) sound level;
- Magnitude of sound event with respect to the background noise level;
- Duration of the sound event;
- Number of event occurrences and their repetitiveness; and
- Time of day that the event occurs.

People judge the relative magnitude of sound sensation by subjective terms such as "loudness" or "noisiness." A change in sound level of 3 dB is considered "just perceptible,"

a change in sound level of 5 dB is considered "clearly noticeable," and a change (increase or decrease) of 10 dB is recognized as "twice or half as loud."[1]

In an outdoor environment, sound levels attenuate through the air as a function of distance. Such attenuation is called "distance loss" or "geometric spreading" and is based on the source configuration, point source or line source. Noise may be generated from a point source, such as a piece of construction equipment, or from a line source, such as moving motor vehicles along a roadway. Due to spreading losses, noise attenuates or decreases with distance. The rate of attenuation is a function of both distance and the type of terrain over which the noise passes. Over "hard" sites such as developed areas with pavement, noise from a line source attenuates at a rate of 3.0 dBA per doubling of distance. Over "soft" sites such as undeveloped open space, vegetated, or landscaped areas, noise from a line source attenuates more rapidly at a rate of 4.5 dBA per doubling of distance. The attenuation rate for point source noise over a "hard" site is 6.0 dBA per doubling of distance and over a "soft" site is 7.5 dBA per doubling of distance.[2] These conditions represent the extremes and most areas will actually contain a combination of both "hard" and "soft" site elements, with the noise attenuation placed somewhere in between these two attenuation factors.

In addition, structures (e.g., buildings and solid walls) and natural topography (e.g., hills) that obstruct the line-of-sight between a noise source and a receptor further reduce the noise level if the receptor is located within the "shadow" of the obstruction, such as behind a sound wall. This type of sound attenuation is known as "barrier insertion loss." If a receptor is located behind the wall but still has a view of the source (i.e., line-of-sight not fully blocked), some barrier insertion loss would still occur, however to a lesser extent. Additionally, a receptor located on the same side of the wall as a noise source may actually experience an increase in the perceived noise level as the wall reflects noise back to the receptor, thereby compounding the noise. Noise barriers can provide noise level reductions ranging from approximately 5 dBA (where the barrier just breaks the line-of-sight between the source and receiver) to an upper range of 20 dBA with a more substantial barrier.[3]

Several rating scales have been developed to analyze the adverse effect of community noise on people. Since environmental noise fluctuates over time, these scales consider that the effect of noise is dependent upon the total acoustical energy content, as well as the time and duration of occurrence. The most frequently used noise descriptors, including those used by the City of Ontario (City), are summarized below.

Equivalent Sound Level (L_{eq}). L_{eq} is a measurement of the acoustic energy content of noise averaged over a specified time period. Thus, the L_{eq} of a time-varying sound and that of a steady sound are the same if they deliver the same amount of energy to the receptor's ear

[1] Engineering Noise Control, Bies & Hansen, 1988.
[2] Caltrans' 1998 Technical Noise Supplement, N-2142 (Ground Absorption). A "hard" or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt, concrete, and very hard packed soils. An acoustically "soft" or absorptive site is characteristic of normal earth and most ground with vegetation.
[3] Caltrans' 1998 Technical Noise Supplement.

during exposure. L_{eq} for one-hour periods, during the daytime or nighttime hours, and 24 hours are commonly used in environmental assessments. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during day or night.

Day-Night Sound Level (L_{dn}). L_{dn}, the day-night average noise, is a 24-hour L_{eq} with a 10-decibel penalty added to noise events occurring at nighttime. Nighttime is defined as 10:00 p.m. to 7:00 a.m. The effect of this penalty is that, in the calculation of L_{dn}, an event during nighttime hours is equivalent to an event during the daytime hour that is 10 decibels louder. This accounts for higher sensitivity of people to noise events during nighttime hours when background noise is lower and most people are sleeping.

Community Noise Equivalent Level (CNEL). Similar to L_{dn}, CNEL is a 24-hour-period average noise but with 5 dBA added to the noise levels produced in the evening, from 7:00 p.m. to 10:00 p.m., and 10 dBA added to the noise levels produced at night from 10:00 p.m. to 7:00 a.m. The values of L_{dn} and CNEL rarely differ by more than 1 dBA, with CNEL being the more restrictive scale.

b) Ground-Borne Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The peak particle velocity (PPV) or the root mean square (RMS) velocity, in terms of inches/seconds, is usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the vibration signal, while RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is typically used for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response. The RMS vibration velocity level can be presented in inches/second or VdB (referenced to 1 micro-inches/second). Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Man-made vibration issues are therefore usually confined to short distances (i.e., 100 feet or less) from the source.

c) Regulatory Frame Work

Government agencies have established noise standards and guidelines to protect citizens from potential hearing damage and other adverse physiological and social effects associated with noise. Standards and guidelines applicable to the proposed project are discussed below.

1) The Ontario Plan General Plan

The overall purpose of a general plan noise element is to protect citizens from the harmful and annoying effects of exposure to excessive noise, and to protect the represented economic base by preventing the encroachment of noise sensitive land uses into areas affected by existing uses that generate high noise levels. The City adopted The Ontario Plan (TOP) in 2010 that serves as the general plan for the entire City including the New Model Colony (NMC). The following policies of the Noise Section of the Safety Element of TOP are applicable to the proposed project:

- S4-1 Noise Mitigation. We utilize the City's Noise Ordinance, building codes and subdivision and development codes to mitigate noise impacts.
- S4-2 Coordination with Transportation Authorities. We collaborate with airport owners, FAA, Caltrans, SANBAG, SCAG, neighboring jurisdictions, and other transportation providers in the preparation and maintenance of, and updates to transportation-related plans to minimize noise impacts and provide appropriate mitigation measures.
- S4-3 Airport Noise Mitigation. We aggressively pursue funding and utilize programs to reduce effects of aircraft noise in impacted areas of our community.
- S4-4 Truck Traffic. We manage truck traffic to minimize noise impacts on sensitive land uses.
- S4-5 Roadway Design. We design streets and highways to minimize noise impacts.
- S4-6 Airport Noise Compatibility. We utilize information from Airport Land Use Compatibility Plans to prevent the construction of new noise sensitive land uses within airport noise impact zones.

TOP established compatibility of various land uses with exterior noise levels. These City adopted guidelines are referred to as Noise Level Exposure and Land Use Compatibility Guidelines and are provided in Figure IV.J-1.

2) City of Ontario Municipal Code

The City of Ontario Municipal Code (CCMC), Chapter 29, Noise, provides exterior/interior noise standards and specific noise restrictions, exemptions, variances for exterior point and stationary noise sources, and ground borne vibration limits. Table IV.J-1 provides the maximum exterior noise levels. Several of these requirements are applicable to the proposed project and are discussed below.

Sec. 5-29.04. Exterior Noise Standards.

(a) The following exterior noise standards (Table IV.J-1), unless otherwise specifically indicated, shall apply to all properties within a designated noise zone.

Table IV.J-1: Maximum Exterior Noise Levels

Type of Land Use/Noise Zone	Maximum Allowable Noise Levels, Leq (dBA)	
	Exterior	
	7:00 a.m. to 10:00 p.m.	10:00 p.m. to 7:00 a.m.
Single Family Residential / Noise Zone I	65	45
Multi-family residential and mobile home parks/ Noise Zone II	65	50
Commercial Property/Noise Zone III	65	60
Residential Portion of Mixed Use/Noise Zone IV	70	70
Manufacturing and Industrial, Other Uses/Noise Zone V	70	70
Source: City of Ontario Municipal Code, Section 5-29.04.		

(1) If the ambient noise level exceeds the resulting standard, the ambient noise level shall be the standard.

(2) Measurements for compliance are made on the affected property pursuant to § 5-29.15.

(b) It is unlawful for any person at any location within the incorporated area of the City to create noise, or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which noise causes the noise level, when measured at any location on any other property, to exceed either of the following:

(1) The noise standard for the applicable zone for any fifteen-minute (15) period; and

(2) A maximum instantaneous (single instance) noise level equal to the value of the noise standard plus twenty (20) dBA for any period of time (measured using A-weighted slow response).

(c) In the event the ambient noise level exceeds the noise standard, the maximum allowable noise level under such category shall be increased to reflect the maximum ambient noise level.

(d) The Noise Zone IV standard shall apply to that portion of residential property falling within one hundred (100) feet of a commercial property or use, if the noise originates from that commercial property or use.

(e) If the measurement location is on a boundary between two (2) different noise zones, the lower noise level standard applicable to the noise zone shall apply.

Sec. 5-29.06. Exemptions.

The following activities shall be exempted from the provisions of this chapter:

(d) Noise sources associated with construction, repair, remodeling, demolition or grading of any real property. Such activities shall instead be subject to the provisions of § 5-29.09

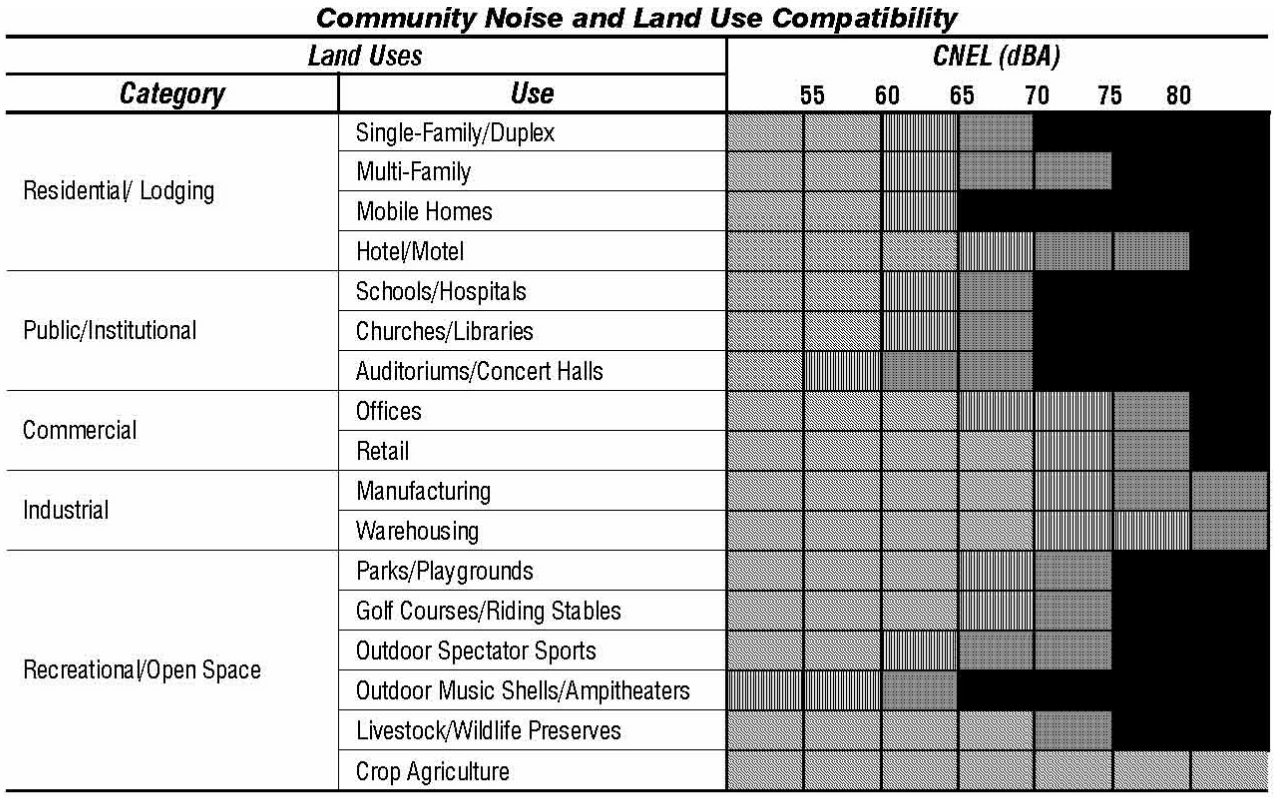
Sec. 5-29.09. Construction activity noise regulations.

a) No person, while engaged in construction, remodeling, digging, grading, demolition or any other related building activity, shall operate any tool, equipment or machine in a manner that produces loud noise that disturbs a person of normal sensitivity who works or resides in the vicinity, or a Police or Code Enforcement Officer, on any weekday except between the hours of 7:00 a.m. and 6:00 p.m. or on Saturday or Sunday between the hours of 9:00 a.m. and 6:00 p.m.

3) Ground-Borne Vibration

In accordance with the City Municipal Code, vibration shall not be detectable beyond the property line of the site from which the vibration is emanating, but this applies to ground-borne vibrations from long-term operations activities (on-site, stationary sources), not construction. Therefore, Federal Transit Administration (FTA) criteria are used to access the project construction related vibration impacts.

With respect to ground-borne vibration from construction activities, the FTA and Caltrans have adopted guidelines/recommendations to limit ground-borne vibration based on the age and/or condition of the structures that are located in close proximity to construction activity. A technical discussion of construction activity-related vibration is provided in Section 12.2 of the FTA's Transit Noise and Vibration Impacts Assessments. As described therein, a ground-borne vibration level of 0.2 inch-per-second peak particle velocity (PPV) should be considered as damage threshold criterion for structures deemed "fragile," and a ground-borne vibration level of 0.12 inch-per-second PPV should be considered as damage threshold criterion for structures deemed "extremely fragile," such as historic buildings. With respect to residential and commercial structures, Caltrans' technical publication titled "Transportation- and Construction-Induced Vibration Guidance Manual" June 2004, provides a vibration damage potential threshold criteria of 0.5 inch-per-second PPV for older residential structures, 1.0 inch-per-second PPV for newer residential structures, and 2.0 inch-per-second PPV for modern industrial/ commercial buildings.



Source: The Ontario Plan, Draft EIR, The Planning Center April 2009

Figure IV.J-1
City of Ontario Land Use Compatibility Guidelines for Noise Impacts

Michael Brandman Associates

3. Existing Conditions

a) Ambient Noise Levels

Noise monitoring was performed using an Extech Model 407780 Type 2 integrating sound level meter. The Extech meter was programmed in "slow" mode to record the sound pressure level at 1-second intervals in A-weighted form. The sound level meter and microphone was mounted approximately five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before monitoring using an Extech calibrator, Model 407766. The noise level measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

The noise monitoring locations were selected in order to obtain noise measurements of the current noise sources impacting the project site and the project vicinity, and to provide a baseline for any potential noise impacts that may be created by development of the proposed project. The noise measurements were recorded between 10:16 hours and 11:29 hours on Wednesday, July 11, 2012. At the start of the noise monitoring, the temperature was 78°F with fair skies and no wind.

Ambient noise measurements were made at four locations, representing the existing nearby land uses in the vicinity of the project site, and depicted in Figure IV.J-2.

Table IV.J-2 presents the existing noise environment in the project vicinity. Based on field observation and measured sound data, the existing noise environment in the vicinity of the project site includes auto traffic.

As shown on Table IV.J-2, the measured (L_{eq}) noise levels ranged from a low of 60.9 dBA at location R1 to a high of 73.6 dBA (L_{eq}) at location R2. Locations R1, R2, and R3 exceed the City's daytime exterior noise standard of 65 dBA for single-family residential, multi-family residential and mobile home parks, and commercial property uses.

b) Roadway Noise Levels

To further characterize the area's noise environment, the CNEL noise levels generated by existing traffic on local roadways was calculated using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108), as modified for CNEL and the "Calveno" energy curves. Site-specific information is entered, such as roadway traffic volumes, roadway active width, source-to-receiver distances, travel speed, noise source and receiver heights, and the percentages of automobiles, medium trucks, and heavy trucks that the traffic is made up of throughout the day, amongst other variables.

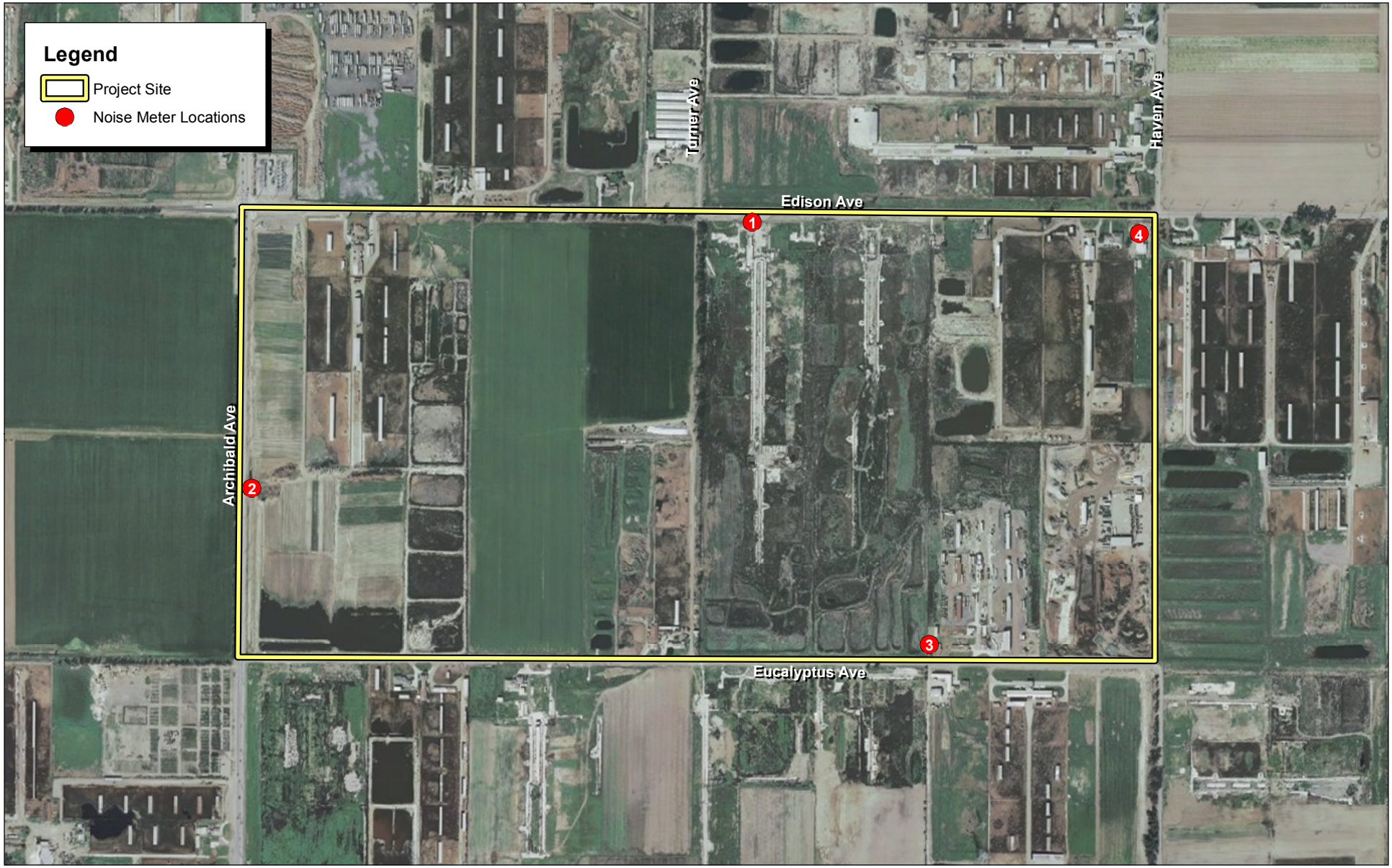
In order to determine the height above the road grade from where the noise is being emitted, each type of vehicle has been analyzed independently with autos at road grade, medium trucks at 2.3 feet above road grade, and heavy trucks at 8 feet above road grade. These elevations were determined through a noise-weighted average of the elevation of the exhaust

pipe, tires, and mechanical parts in the engine, which are the primary noise emitters from a vehicle.

Table IV.J-2: Summary of Ambient Noise Measurements

Noise Monitoring Locations	Measured Ambient Noise Levels		
	L_{eq}	L_{max}	L_{min}
R1 North Boundary East Edison Avenue	65.1	85.2	41.0
R2 West Boundary South Archibald Avenue	73.6	87.8	41.2
R3 South Boundary Eucalyptus Avenue	60.9	80.8	36.8
R4 Northeast Boundary East Edison Avenue at Haven Avenue	66.2	86.7	44.1
Source: Michael Brandman Associates, 2012. Refer to Appendix I for noise meter printouts.			

The traffic noise prediction model calculates the 24-hour CNEL noise levels based on specific information including; Average Daily Traffic Volume (ADT), percentages of day, evening and nighttime traffic volumes relative to ADT, vehicle speed and distance between the noise receptor and the roadway. Vehicle mix/distribution information used in the noise calculation is shown in Table IV.J-3 Table IV.J-8. As indicated in Table IV.J-5 in Section 4c) provides the calculated CNEL for the analyzed roadway segments as a result of existing traffic volumes ranged from a low of 52.5 dBA CNEL along Schaefer Avenue to a high of 72.0 dBA CNEL along Archibald Avenue at a distance of 50 feet based on surface-street traffic volumes only. Noise levels at the nearest sensitive receptors to each analyzed roadway segment may exceed normally acceptable noise levels at residential areas (i.e., 65 dBA CNEL or lower).



Source: ESRI World Imagery. MBA Field Survey and GIS Data, 2012.

Michael Brandman Associates

NORTH

800 400 0 800

Feet

Figure IV.J-2
Project Site and Noise Meter Locations

c) Vibration-Sensitive Receptor Locations

With respect to structures, vibration-sensitive receptors generally include historic buildings, buildings in poor condition, and uses that require precision instruments (e.g., operating rooms or scientific laboratories). No vibration-sensitive structures such as historic buildings and fragile buildings or uses such as hospital operation rooms and scientific laboratories are currently present within 100 feet of the project site that may be affected by the proposed project.

4. Environmental Impacts

a) Methodology

1) On-Site Construction

Construction noise impacts were evaluated by estimating the noise levels generated by construction activity, calculating the construction-related noise level at nearby sensitive receptor property line locations, and comparing construction-related noise to ambient noise levels (i.e., noise levels without construction noise) to determine significance.

2) Off-Site Roadway Noise

Noise impacts related to vehicular traffic were modeled using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108), as modified for CNEL and the "Calveno" energy curves. Site-specific information is entered, such as roadway traffic volumes, roadway active width, source-to-receiver distances, travel speed, noise source and receiver heights, and the percentages of automobiles, medium trucks, and heavy trucks that the traffic is made up of throughout the day, amongst other variables.

Table IV.J-3 presents the traffic flow distributions (vehicle mix) used in this noise impact analysis. These distributions were obtained from Caltrans and from field observations of similar roads. The vehicle mix provides the hourly distribution percentages of automobiles, medium trucks, and heavy trucks for input into the FHWA Models.

Table IV.J-3: Roadway Vehicle Mix

Vehicle Type	Percent of ADT, (%)			Total
	Daytime hours (7 a.m. to 7 p.m.)	Evening Hours (7 p.m. to 10 p.m.)	Nighttime Hours (10 p.m. to 7 a.m.)	
Automobile	69.5	12.9	9.6	92.0
Medium Truck[a]	1.6	0.8	0.6	3.0
Heavy Truck[b]	3.5	1.0	0.5	5.0

[a] Medium Truck - 2 axle trucks based on field observations.
[b] Heavy Truck - 3 or more axles trucks and buses based on field observations.
Source: Michael Brandman Associates, 2012.

3) Stationary Point-Source Noise

Stationary point-source noise impacts were evaluated by identifying the noise levels generated by outdoor stationary noise sources such as rooftop mechanical equipment, outdoor recreational areas, etc., estimating the noise level from each noise source at surrounding residential property locations, and comparing such noise levels to ambient noise levels to determine significance.

b) Significance Thresholds

The following thresholds of significance were developed for this noise impact analysis based on the plans and policies described above and in accordance with CEQA Guidelines, Appendix G. As indicated in Appendix G of the CEQA Guidelines, a significant noise impact would occur if the proposed project results in:

a) 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?

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

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

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

e) 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?

f) 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 Initial Study concluded that no impacts were related to exposure from a private airstrip. Impacts related to groundborne vibration were less than significant. Refer to Appendix A for a discussion related to these four thresholds.

1) Construction Noise

Per Sec. 5-29.09, Construction activity noise regulations, of the Ontario Municipal Code:

> No person, while engaged in construction, remodeling, digging, grading, demolition or any other related building activity, shall operate any tool, equipment or machine in a manner that produces loud noise that disturbs a person of normal sensitivity who works or resides in the vicinity, or a Police or Code Enforcement Officer, on any weekday except between the hours of

7:00 a.m. and 6:00 p.m. or on Saturday or Sunday between the hours of 9:00 a.m. and 6:00 p.m.

2) Off-Site Transportation (Vehicle Traffic)

As previously discussed, with respect to the community noise assessment, changes in noise levels of less than 3 dBA, in an urban settings, are generally not discernable to most people, while changes greater than 5 dBA are readily noticeable and would be considered a significant increase. Therefore, the significance threshold for off-site transportation noise source is based on human perceptibility to changes in noise levels (increases), with consideration of existing ambient noise conditions, and City's land use noise compatibility guidelines (Figure IV.J-1). A threshold of 5 dBA is used where existing ambient noise conditions fall within the City's acceptable noise environment. Generally, the dividing line for acceptable noise is between "normally compatible" and "normally incompatible" as described Figure IV.J-1. Where the existing ambient noise level is already above the City's acceptable noise zone, a more conservative 3 dBA threshold is used. Therefore, the proposed project would have a significant impact on noise levels from off-site transportation sources if one of the two following criteria is exceeded:

- The proposed project would cause ambient noise levels to increase by 5 dBA CNEL or more and the resulting noise would fall on a land use within an area categorized as either "clearly compatible" or "normally compatible" (Figure IV.J-1); or
- The proposed project would cause ambient noise levels to increase by 3 dBA CNEL or more and the resulting noise would fall on a land use within an area categorized as either "normally incompatible" or "clearly incompatible."

3) On-Site Stationary Noise Sources

Project-related stationary noise sources generate noise levels that would exceed City's exterior noise levels shown in Table IV.J-1.

Table IV.J-4: Maximum Vibration in M Districts

Frequency (Cycles Per Second)	Vibration Displacement (inches)	
	Steady State	Impact
Under 10	0.0055	0.0010
10-19	0.0044	0.0008
20-29	0.0033	0.0006
30-39	0.0002	0.0004
40+	0.0001	0.0002
Source: City of Ontario Municipal Code, Section 9-1.3310. Table 33-3, Maximum Vibration in M (Industrial) Districts.		

c) Analysis of Project Impacts

1) Construction

Project development activities would primarily include site preparation (grading and excavation) and construction of internal roadways and other infrastructure, driveways, followed by the building of proposed structures. Noise impacts from construction activities are generally a function of the noise generated by construction equipment, the equipment location, the sensitivity of nearby land uses, and the timing and duration of the noise-generating activities.

In order to construct the proposed project, portions of the existing site would be graded. Site preparation activities typically involve the use of heavy equipment, such as scrapers, dozers, tractors, loaders, etc. Trucks would also be used to deliver equipment and building materials, and to haul away landscape and construction debris. Smaller equipment, such as jackhammers, pneumatic tools, saws, and impact hammers would also be used throughout the project site during the construction phases. This equipment would generate both steady-state and episodic noise that could be heard both on and off the project site. Refer to Table IV.J-4.

Individual pieces of construction equipment that would be used for project construction produce maximum noise levels of 76 dBA to 90 dBA at a reference distance of 50 feet from the noise source, as shown in Table IV.J-5. These maximum noise levels would occur when equipment is operating under full power conditions or during "impact" activities such as percussive pile driving. However, equipment used on construction sites often operates under less than full power condition, or part power. To more accurately characterize construction-period noise levels, the average (L_{eq}) noise level associated with each construction stage is provided in Table IV.J-6. These average noise levels are based on the quantity, type, and usage factors for each type of equipment that would be used during each construction stage, and is typically attributable to multiple pieces of equipment operating simultaneously. As shown in Table IV.J-6, the maximum construction-period noise level can range from 76 dBA to 90 dBA at a reference distance of 50 feet.

In general, the first and noisiest construction phase is site preparation (i.e., grading and excavation), which would involve movement of construction equipment to and from the project site, earth moving, and compaction of soils. High noise levels created during site preparation would be associated with the operation of heavy-duty trucks, scrapers, dozers, graders, backhoes, and front-end loaders. When construction equipment is operating, noise levels are approximately 86 dBA at a distance of 50 feet from the construction area. During grading activities, heavy-duty equipment would only intermittently pass near the project boundaries as the majority of grading would take place more central to the project site.

Table IV.J-5: Maximum Noise Levels Generated by Typical Construction Equipment

	Maximum Sound Levels at Indicated Distance (dBA)a			
Type of Equipment	**25 feet**	**50 feet**	**100 feet**	**200 feet**
Air Compressor	84	78	72	66
Backhoe	84	78	72	66
Concrete Mixer	85	79	73	67
Crane, Mobile	87	81	75	69
Dozer	88	82	76	70
Grader	91	85	79	73
Jack Hammer	95	89	83	77
Loader	85	79	73	67
Paver	83	77	71	65
Pneumatic Tool	91	85	79	73
Pump	87	81	75	69
Roller	86	80	74	68
Saw (concrete)	96	90	84	78
Scraper	90	84	78	72
Truck	82	76	70	64
Minimum Sound Level	*82*	*76*	*70*	*64*
Maximum Sound Level	*96*	*90*	*84*	*78*

[a] Sound levels at 25 feet, 100 feet and 200 feet are calculated based on reference noise levels at 50 feet. Calculation assumes a drop-off rate of 6-dB per doubling of distance, which is appropriate for use in characterizing point-source (such as construction equipment) sound attenuation over a hard surface propagation path.
Source: FHWA Roadway Construction Noise Model User's Guide, Table 1, 2006.

During the second stage of construction, foundation forms are constructed and concrete foundations are poured. Primary noise sources include heavy concrete trucks and mixers, cranes, and pneumatic drills. At 50 feet from the source, noise levels are approximately 77 dBA.

The third and fourth stages consist of interior and exterior building construction, and site cleanup, respectively. Primary noise sources associated with the third phase include use of diesel generators, compressors, and light truck traffic and hammering. Noise levels would typically be within the 83 dBA range at a distance of 50 feet. The fourth and final stage typically involves the use of trucks, landscape rollers and compactors, with noise levels generally in the 86 dBA range.

Table IV.J-6: Construction Average L_{eq} Noise Levels by Distance and Construction Stage

	Sound Level in dBA (L_{eq}) at Indicated Distance				
Construction Stage	**25 Feet**	**50 Feet**	**100 Feet**	**200 Feet**	**400 Feet**
Site Preparation / Grading	92	86	80	74	68
Foundations	83	77	71	65	59
Structural	89	83	77	71	65
Finishing	92	86	80	74	68
Assumes a hard surface propagation path drop-off rate of 6-dB per doubling of distance (Sound Level at distance X = Sound level at 50 ft - 20LOG (x/50)), which is appropriate for use in characterizing point-source (such as construction equipment) sound attenuation. Source: L.A. CEQA Thresholds Guide, 2006.					

Construction activities would temporarily increase the existing ambient noise in close proximity of the construction site. Currently, no noise sensitive uses are located around the site; however, there are planned residential and institutional developments adjacent to the project site, which could be built and occupied prior to project construction. However, construction activities would be required to comply with the City's allowable hours as described above and would be temporary. However, mitigation measures are proposed to ensure noise generated by construction activities is less than significant.

d) Ground-Borne Vibration during Construction

Construction activities can generate varying degrees of ground vibration, depending on the construction procedures and the construction equipment used. The operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of a construction site often varies depending on soil type, ground strata, and construction characteristics of the receptor building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Ground-borne vibrations from construction activities rarely reach levels that damage structures. The FTA has published standard vibration velocities for construction equipment operations. The peak particle velocities for construction equipment pieces expected to be used during project construction are listed in Table IV.J-7.

The proposed project would generate ground-borne vibration during site clearing and grading activities or large bulldozer operation. Based on the vibration data provided in Table IV.J-7, vibration velocities from the operation of construction equipment would range from approximately 0.003 to 0.089 inch per second PPV at 25 feet from the source of activity. As this estimated level of project-related construction vibration is considerably below the 1.0

inches per second PPV significance threshold (potential building damage), vibration impacts associated with construction would be less than significant.

Table IV.J-7: Typical Vibration Velocities for Potential Project Construction Equipment

Equipment	Approximate Peak Particle Velocity at 25 ft (inch/second)	Approximate Peak Particle Velocity at 50 ft (inch/second)
Large bulldozer	0.089	0.031
Loaded trucks	0.076	0.027
Jackhammer	0.035	0.017
Small bulldozer	0.003	0.001
Source: USDOT Federal Transit Administration, 1995.		

1) Operation Noise (Post-Construction)

This section provides a discussion of potential noise impacts related to the long-term operation of the proposed project, following completion of construction, to neighboring noise-sensitive receptor locations. Specific noise sources considered herein include roadway traffic volumes, mechanical equipment/point sources (i.e., HVAC equipment), courtyard areas, outdoor balconies, parking areas, and refuse collection areas.

On-Site

Future residents of the proposed project would generate and would be exposed to on-site noise sources typical of residential neighborhood related activities including; air conditioning units, lawn care equipment, radio/stereo systems, domestic animals, etc. These noise sources contribute to the ambient noise levels experienced in all similarly-developed areas and typically do not exceed the noise standards for the types of land uses proposed on the project site. In addition, these noise sources are consistent with the planned developments adjacent to the project site. Therefore, residential-related on-site noise impacts would be less than significant.

In addition, future on- and off-site residential developments would surround the proposed public schools and park. Noise from the public schools and park would be generated by a variety of sources including voices, public address systems, parking lot noise, and most notably sports activities. These noise levels may be in excess of the exterior noise standards presented in the City Municipal Code for residential uses. These sources would generate short-term and intermittent noise levels. It should be noted that public schools and parks are commonly located near residential areas with little or no compatibility problems. In general, the public schools and park would be designed with features that would be consistent with the General Plan. These design features may include, but would not be limited to locating student pick-up and drop-off areas as far away from residences as feasible, locating loading and shipping facilities away from adjacent noise sensitive uses, configuring buildings such

that they serve as a buffer between play field and residences, minimizing the use of outside speakers and amplifiers, and erecting noise attenuation barriers between play fields and residences. Nonetheless, public school and park uses could generate noise levels in excess of the standards set forth in the City Municipal Code for residential uses if proper design consideration and features were not put in place. Therefore, it is anticipated that noise impacts on residential uses from the public school and park activities could be significant without incorporation of mitigation measures.

Off-Site Traffic Noise

Future roadway noise levels were calculated along various arterial segments adjacent to and within the proposed developments that would be utilized by project traffic. Roadway-noise attributable to project development was calculated using the traffic noise model previously described and compared to baseline noise levels that would occur under the "No Project" condition.

According to the project traffic study, the project is expected to generate a maximum 15,200 average daily trips (ADT) at horizon year 2030. The daily trips at other roadway segments would be less as traffic would spread throughout the area. Traffic attributed to the proposed project would increase existing and future traffic without project total daily traffic traveling along the major off-site thoroughfares within the project vicinity. This increase in roadway traffic volumes was analyzed to determine if any traffic-related noise impacts would result from project development. Table IV.J-8 provides the calculated traffic noise levels (CNEL) at roadways in the vicinity of the project site.

The largest project-related traffic noise impact is anticipated to occur along the segment of Schaefer Avenue, west of Archibald Avenue, where project-related traffic could add 6.0 dBA CNEL to this roadway segment. The existing traffic volume at this segment is only 100 vehicles a day. The project will add 300 vehicles per day at this location. However, the noise level generated by this addition of traffic would still be well below the 65 dBA residential standard. This area is characterized by agricultural uses, which are not deemed "sensitive" land uses. Therefore, even with the increase in traffic, the noise levels generated would still be compatible with surrounding land uses and would even be compatible with future residential land uses, if such uses were proposed. The increase in project-related traffic noise at all other roadway segments would be less, which would be below the project's 5 dBA significance threshold. Therefore, project-related roadway noise impacts would be less than significant.

Table IV.J-8: Project Traffic Noise Contributions

Road Segment	Existing (2012)		Existing Plus Project			2030				
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	2030 without Project		2030 Plus Project ADT	Total	Project-Specific Increase
						ADT	dB CNEL			
NS Streets										
Archibald Avenue										
n/o SR-60	18,300	70.3	19,000	70.5	0.2	37,878	73.5	37,961	73.5	0.0
at SR-60 EB Ramps	4,450	64.2	5,450	65.1	0.9	—	—	—	—	—
s/o SR-60	27,200	72.0	28,600	72.3	0.3	31,288	72.7	31,650	72.7	0.0
n/o Schafer Avenue	13,550	69.0	15,300	69.5	0.5	17,365	70.1	17,720	70.2	0.1
s/o Schafer Avenue	13,600	69.0	15,600	69.6	0.6	14,660	69.4	15,285	69.5	0.1
n/o Park Street	0	—	2,350	61.4	—	0	—	2,350	61.4	—
s/o Park Street	0	—	1,500	59.5	—	0	—	1,500	59.5	—
n/o Eucalyptus Avenue	15,950	69.7	17,450	70.1	0.4	15,905	69.7	15,432	69.6	-0.1
s/o Eucalyptus Avenue	14,950	69.4	15,800	69.7	0.3	17,487	70.1	17,669	70.2	0.1
A Street										
n/o Edison Avenue	0	—	150	49.5	—	—	—	150	49.5	—
s/o Edison Avenue	0	—	2,000	60.7	—	—	—	2,000	60.7	—
Turner Avenue										
n/o Edison Avenue	0	—	250	51.7	—	3,007	62.5	3,148	62.7	0.2
s/o Edison Avenue	0	—	3,000	62.5	—	—	—	3,000	62.5	—

Table IV.J 8 (cont.): Project Traffic Noise Contributions

Road Segment	Existing (2012)		Existing Plus Project			2030				
						2030 without Project		2030 Plus Project ADT	Total	Project-Specific Increase
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	ADT	dB CNEL			
H Avenue										
n/o Schafer Avenue	0	—	1,400	59.2	—	8,692	67.1	9,202	67.3	0.2
s/o Schafer Avenue	0	—	1,400	59.2	—	9,572	67.5	9,854	67.6	0.1
n/o Park Street	0	—	2,050	60.8	—	0	—	2,050	60.8	—
s/o Park Street	0	—	2,150	61.0	—	0	—	2,150	61.0	—
n/o Eucalyptus Avenue	0	—	2,150	61.0	—	6,015	65.5	6,132	65.6	0.1
s/o Eucalyptus Avenue	1,050	57.9	2,600	61.8	3.9	6,348	65.7	6,746	66.0	0.3
B Street										
n/o Park Street	0	—	3,050	62.5	—	0	—	3,050	62.5	—
EW Streets										
SR-60 WB ramps										
w/o Archibald Avenue	8,200	66.8	8,500	67.0	0.2	22,817	71.3	22,942	71.3	0.0
e/o Archibald Avenue	4,450	64.2	4,450	64.2	0.0	19,366	70.6	19,060	70.5	-0.1
SR-60 EB ramps										
w/o Archibald Avenue	7,650	66.5	8,100	66.8	0.3	23,893	71.5	24,211	71.5	0.0
e/o Archibald Avenue	8,450	67.0	8,450	67.0	0.0	17,050	70.0	17,014	70.0	0.0
Schaefer Avenue										
w/o Archibald Avenue	100	47.7	400	53.7	6.0	8,056	66.8	8,214	66.8	0.0
e/o Archibald Avenue	300	52.5	350	53.1	0.6	6,241	65.7	6,182	65.6	-0.1

Table IV.J 8 (cont.): Project Traffic Noise Contributions

Road Segment	Existing (2012)		Existing Plus Project			2030				
						2030 without Project		2030 Plus Project ADT	Total	Project-Specific Increase
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	ADT	dB CNEL			
w/o H Avenue	0	—	50	44.7	—	6,170	65.6	6,038	65.5	-0.1
Edison Avenue										
w/o A Street	0	—	2,700	62.0	—	0	—	2,700	62.0	—
e/o A Street	0	—	3,100	62.6	—	0	—	3,100	62.6	—
w/o Turner Avenue	0	—	3,100	62.6	—	20,599	70.8	20,155	70.7	-0.1
e/o Turner Avenue	0	—	3,000	62.5	—	18,849	70.5	18,262	70.3	-0.2
Park Street										
w/o Archibald Avenue	0	—	300	52.5	—	0	—	300	52.5	—
e/o Archibald Avenue	0	—	3,800	63.5	—	0	—	3,800	63.5	—
w/o A Street	0	—	3,800	63.5	—	0	—	3,800	63.5	—
e/o A Street	0	—	2,900	62.3	—	0	—	2,900	62.3	—
w/o Turner Avenue	0	—	2,900	62.3	—	0	—	2,900	62.3	—
e/o Turner Avenue	0	—	3,200	62.8	—	0	—	3,200	62.8	—
w/o B Street	0	—	3,200	62.8	—	0	—	3,200	62.8	—
e/o B Street	0	—	4,000	63.7	—	0	—	4,000	63.7	—
w/o H Avenue	0	—	4,000	63.7	—	0	—	4,000	63.7	—
e/o H Avenue	0	—	300	52.5	—	0	—	300	52.5	—

Table IV.J 8 (cont.): Project Traffic Noise Contributions

Road Segment	Existing (2012)		Existing Plus Project			2030				
						2030 without Project		2030 Plus Project ADT	Total	Project-Specific Increase
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	ADT	dB CNEL			
Eucalyptus Avenue										
w/o Archibald Avenue	0	—	600	55.5	—	12,552	68.7	12,804	68.8	0.1
e/o Archibald Avenue	1,100	58.1	1,500	59.5	1.4	6,741	66.0	7,170	66.3	0.3
w/o H Avenue	1,050	57.9	1,500	59.5	1.6	6,895	66.1	6,937	66.1	0.0
e/o H Avenue	0	—	450	54.2	—	7,639	66.5	7,613	66.5	0.0

Notes:
* The uniform distance of 50 feet allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies.
NS = North-South n/o = north of SR = State Route EB = eastbound s/o = south of WB = westbound
w/o = west of e/o = east of ADT = average daily trips db = decibels CNEL = community noise equivalent level
— = no data available
Source: Michael Brandman Associates, 2013.

2) Land Use Noise Compatibility

The proposed development would include residential areas, schools, and parks, which would be exposed to existing and future ambient noise surrounding the project site.

Traffic noise

The existing and future traffic roads surrounding and within the project site would affect the proposed planning areas. Table IV.J-8 provides the projected traffic noise levels for roadway segments adjacent to and within the proposed development as function of distance from the centerline of a given roadway. The noise model assumes straight-line attenuations/reductions in noise levels of 3 dBA per doubling distance from a road centerline with no intervening structures. Noise impacts from roadway traffic on the proposed residential, school, and park uses are discussed below:

Residential Development - The proposed project would locate sensitive residential receptors (i.e., proposed residential buildings) near main thoroughfares: Archibald Avenue, Edison Avenue, and Haven Avenue. As indicated on Table IV.J-8, the project site would be exposed to traffic noise levels up to 69.6 dBA CNEL at a distance of 50 feet from the roadway centerline. Incorporation of the mitigation measures (provided in subsection IV.J.5) would ensure that exterior noise levels at the boundaries of proposed residential uses do not exceed the 65 dBA residential standard.

School Development - The proposed project would develop a high school along Edison Avenue. As shown in Table IV.J-8, the noise level along this road segment is 70.8 dBA at a distance of 50 feet from the centerline. Incorporation of the mitigation measures (provided in subsection IV.J.5) would reduce potential impacts associated with the introduction of institutional uses to a less than significant level and ensure that traffic noise levels do not exceed the City's Land Use Compatibility Guidelines of 65 dBA CNEL for public institutional uses.

Park Development - The proposed project would incorporate the development of the City Grand Park. While Grand Park itself would not be a substantial source of noise, Grand Park could be exposed to noise levels from nearby Archibald Avenue, Merrill Avenue (Eucalyptus Avenue), and Haven Avenue. As shown in Table IV.J-8, the park site is adjacent to roadways that generate noise levels up to 69.6 dBA at a distance of 50 feet from the roadway centerline. These levels meet the "normally acceptable" 70 dBA CNEL for Parks and Playgrounds uses (presented in Figure IV.J-1). Incorporation of the mitigation measures (provided in subsection IV.J.5) would ensure that potential noise impacts associated from the introduction of park uses remains less than significant.

Aircraft noise

The project site is located approximately 2 miles northeast of the Chino Airport and 3.9 miles south of the Ontario International Airport. Per each of the airport's Airport Land Use Plan the Compatibility Maps contained within the Chino Airport's and Ontario International Airport's Airport Land Use Compatibility Plans, the project site is located outside of 65

CNEL noise contours. Therefore, noise due to aircraft at the project site would be compatible for proposed residential, school, and park developments. It is likely that aircraft noise would be audible at the project site. However, the project building sound isolation requirements for traffic noise would also provide adequate attenuation of the aircraft sound levels. Thus, the proposed project would not expose people to excessive noise levels from airport activities, and no impacts would occur due to project development.

5. Mitigation Measures

a) Construction Mitigation Measures

Construction-related noise has the potential to result in significant impacts at sensitive receptors. Thus, the following measures are recommended to minimize construction-related noise impacts:

E-1 All project construction vehicles or equipment, fixed or mobile, be equipped with standard and properly operating and maintained mufflers.

E-2 Stockpiling and/or vehicle staging areas be located as far as practical from existing residential units on and off the project site.

E-3 Whenever feasible, schedule the noisiest construction operations to occur together to avoid continuing periods of the greatest annoyance.

b) Operation Mitigation Measures

The following mitigation measures are recommended to reduce the noise impacts from the proposed project:

E-4 Active recreational uses that are likely to draw cheering crowds, elicit loud play, or have amplified game announcements (i.e., stadiums, soccer fields, tennis courts, basketball courts, etc.) shall be located within the park's interior and away from surrounding residential and "noise sensitive" uses.

E-5 Educational and recreational land uses (including educational campus, parks, and stadiums) shall be designed in such a manner that:

- locate and orient vehicle access points away from residential and/or noise sensitive parcels.
- locate loading and shipping facilities away from adjacent noise sensitive uses;
- incorporate structural building materials that mitigate sound transmission;
- minimize the use of outside speakers and amplifiers;
- configure interior spaces to minimize sound amplification and transmission; and
- incorporate fences, walls, landscaping and other noise buffers, and barriers between incompatible uses, as appropriate.

E-6 Sound barrier walls or earth berms of sufficient height and length shall be provided to reduce exterior noise levels to 65 CNEL or lower at outdoor noise

sensitive uses, including residential backyards/courtyards and school playgrounds. Prior to the issuance of grading permits, an acoustical analysis report shall be prepared by a qualified acoustical consultant and submitted to the City Planning Department by the developer. The report shall specify the noise barriers' height, location, and types capable of achieving the desired mitigation affect.

E-7 Parks placed in the development areas where noise from traffic exceeds or is forecasted to exceed 70 dBA CNEL shall incorporate the following:

- Sound barrier walls or earth berms of sufficient height and length shall be designed by a qualified acoustical consultant to reduce exterior noise levels to 70 CNEL or lower; or
- Passive recreation areas, such as picnic tables, shall be located away from the roadway as far as possible.

E-8 Prior to the issuance of building permit, an acoustical analysis shall be prepared by a qualified acoustical consultant for all new residential developments that are within 65 dBA CNEL or higher, for the purpose of documenting that an acceptable interior noise level of 45 dBA (CNEL) or below will be achieved with the windows and doors closed. The report shall be submitted at plan check to the City for approval.

6. Level of Significance After Mitigation

With incorporation of the above mitigation measures, construction noise levels would still increase the existing ambient noise levels at noise sensitive receptors within 300 feet from the boundaries of construction site. However, noise levels will be experienced for short-durations as only portions of the project site will be under construction at any one time. The majority of the time construction noise levels at sensitive locations will be much lower due to reduced construction activity and the phasing of construction (i.e., construction noise levels at a given location will be reduced as construction activities conclude or move to another more distant location of the site). Regardless, short-term construction noise would be less than significant because all construction activity would proceed in compliance with existing City requirements and proposed conditions of approval. In addition, Mitigation Measures E-1, E-2, and E-3 would pro-actively reduce construction generated noise levels to the extent feasible.

With implementation of Mitigation Measures E-4 and E-5, the noise impacts from school and park uses would be reduced to a less than significant level. Mitigation Measures E-6 and E-7 would reduce the exterior noise environments at proposed residential and school uses to meet the City's exterior noise standards and will reduce the noise impact to less than significant. In addition, Mitigation Measure E-8 will ensure that interior noise environments of residential structures meet the State and City noise insulation requirements. Thus, noise impacts would be reduced to less than significant.

7. Cumulative Impacts

Proposed project developments and other planned developments (related projects) would likely contribute to cumulative noise impacts. The potential for cumulative noise impacts to occur are specific to the location of each related project and their stationary noise sources from the project site, as well as the cumulative traffic that these projects would add to the surrounding roadway network.

Noise from on-site construction activities would only affect the areas immediately adjacent to the project site, less than 500 feet from the construction site, due to sound attenuation provided by the distance and the intervening buildings between the construction sites and the noise sensitive receptors. Since the timing of the construction activities for these related projects cannot be defined, any quantitative analysis that assumes multiple, concurrent construction projects would be entirely speculative. Construction activities from the cumulative projects would generate noise at each project site and cumulative construction noise could exceed ambient noise levels at the nearest residences. However, those noise levels would be intermittent, temporary and would cease at the end of the construction phase, and would comply with time restrictions and other relevant provisions in the City's Municipal Code. Noise associated with cumulative construction activities would be reduced to the degree reasonably and technically feasible through proposed mitigation measures for each individual project and compliance with locally adopted and enforced noise ordinances. As construction activities would be required to comply with the City's allowable hours as described above and would be temporary, construction related noise would result in a less than significant noise impact.

The project site and surrounding area would be developed and would generate noise that would contribute to cumulative noise from a number of community noise sources including vehicle travel, mechanical equipment (e.g., HVAC systems), and lawn maintenance activities. Due to City's provisions that limit on-site stationary-source noise such as outdoor air-conditioning equipment, noise levels would be less than significant at the property line for each related project. As the project's stationary-source impacts would be less than significant, stationary-source noise impacts attributable to cumulative development would also be less than significant. However, the proposed project and other developments in the project would produce traffic volumes that are capable of generating a roadway noise impact.

Cumulative noise impacts due to roadway traffic have been assessed based on the project's contribution to the noise generated by traffic during the Year 2030 scenarios (with and without project). As indicated in Table IV.J-8, the 2030 plus project scenario would contribute a maximum of 0.3 dBA over the 2030 without project scenario along the road segment of Merrill/Eucalyptus Avenue west of Haven Avenue. This cumulative increase in noise level is well below the 5.0 dBA significance threshold and would not result in a change of land use category, and therefore, would be less than significant.