

## **APPENDIX C1**

**Environmental Noise Assessment, j.c  
brennan associates, 2011**

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# Environmental Noise Assessment

## Fiddymment Ranch EIR

Roseville, California

Job # 2010-121

Prepared For:

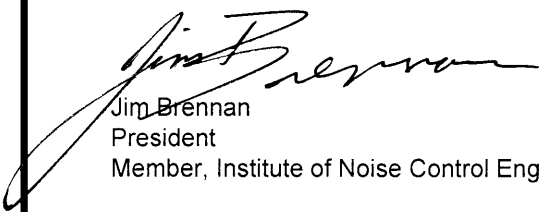
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# NOISE

## INTRODUCTION

The proposed Fiddymment Ranch Specific Plan Amendment 3 project (Proposed Project) is located within the City of Roseville, California. The project proposes to amend the West Roseville Specific Plan (WRSP) to accommodate up to 1,905 additional residential units in an area referred to as Fiddymment Ranch. Under the WRSP, the Fiddymment Ranch area is planned for development of 4,207 residential units. Under the proposed Fiddymment Ranch Specific Plan Amendment 3 project, buildout of the Fiddymment Ranch area would accommodate up to a total of 6,112 residential units.

Potential noise sources in the project vicinity include traffic noise on local roadways, aircraft overflights from McClellan Air Park, the Roseville Energy Park and the Pleasant Grove Waste Water Treatment Plant (PGWWTP). Based on field observations, the PGWWTP is not a major contributor to the noise environment on the project site. Therefore the PGWWTP will not be discussed in this document. However, the Roseville Energy Park is expected to contribute to the noise environment. An analysis of the Roseville Energy Park is discussed later in this document.

The purpose of this analysis is to identify potential impacts and mitigation measures related to the project. The analysis focuses on traffic noise due to and upon the project site, McClellan Air Park aircraft overflights on the project site, Roseville Energy Park noise upon the project site, proposed on-site commercial activities (truck circulation, loading docks, mechanical equipment, and parking lot activities), school and park activities, and project construction noise. Figure 1 shows the project site.

## ACOUSTIC TERMINOLOGY<sup>1</sup>

### *Fundamentals of Acoustics*

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective: one person's music is another's headache.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in

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<sup>1</sup> For an explanation of these terms, see Appendix A: "Acoustical Terminology"

levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (Leq), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The Leq is the foundation of the composite noise descriptor, Ldn, and shows very good correlation with community response to noise.

The day/night average level (Ldn) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because Ldn represents a 24-hour average, it tends to disguise short-term variations in the noise environment. CNEL is similar to Ldn, but includes a +3 dB penalty for evening noise.

Table 1 lists several examples of the noise levels associated with common situations.

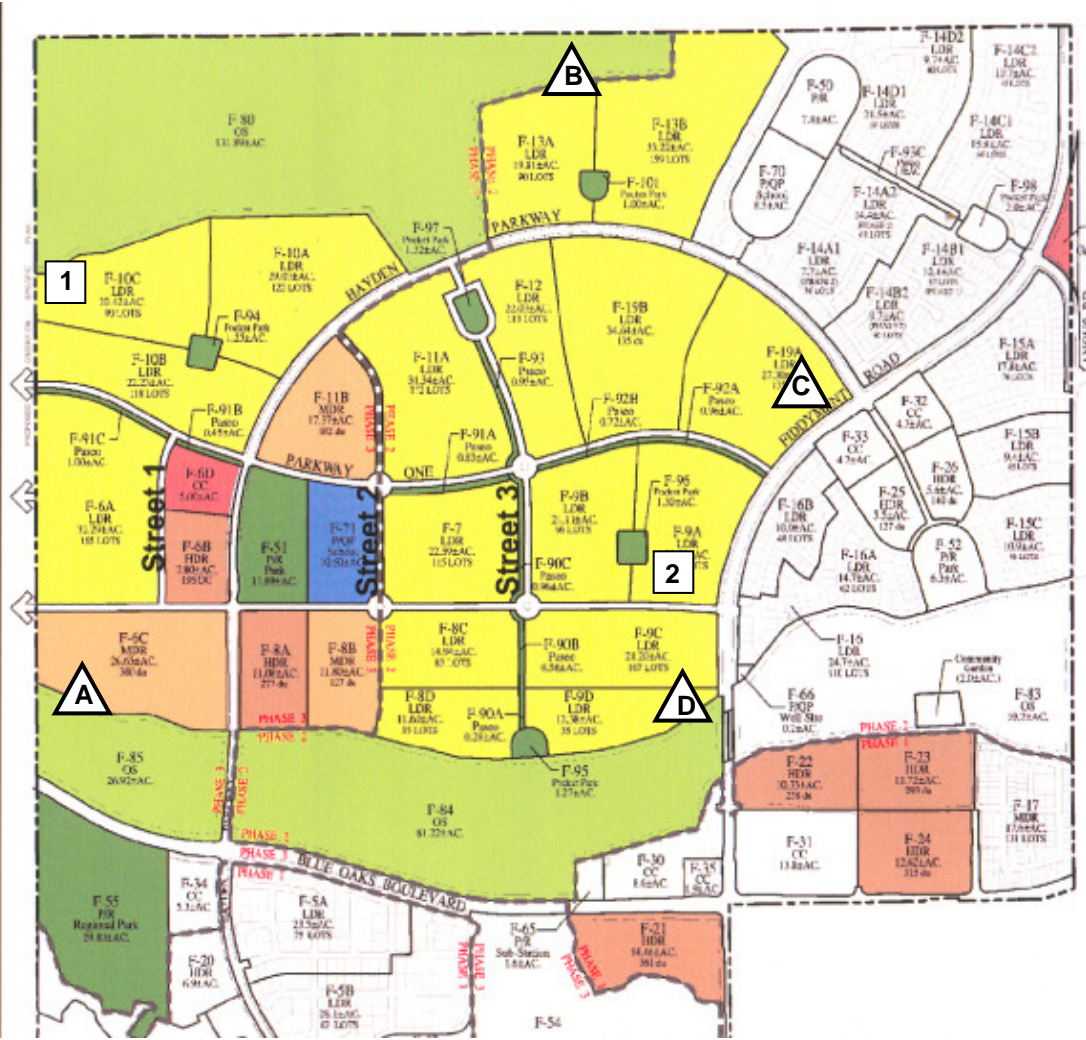
### **Effects of Noise on People**



The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

**Figure 1**  
**Fiddlyment Ranch – City of Roseville, California**  
**Conceptual Land Use Plan and Noise Locations**



-  : Continuous Noise Measurement Site
-  : Short Term Noise Measurement Site

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Table 1 Typical Noise Levels		
Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing
Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. October 1998.		

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending

on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

## **EXISTING CONDITIONS**

The existing noise environment on the project site is defined primarily by traffic noise on Fiddymont Road, aircraft overflights, and distant industrial noise from the Roseville Energy Park.

### **Existing Land Uses**

Some land uses are considered more sensitive to ambient noise levels than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, existing sensitive land uses include residential uses along the west property line. Approved residential uses to the west of the project site have not yet been constructed.

### **Existing Ambient Noise Levels**

To quantify the existing ambient noise environment in the project vicinity, four continuous 24-hour noise level measurements and two short-term noise level measurements were conducted on the project site on July 30-31, 2008. The noise measurement locations are shown on Figure 1. The noise level measurement survey results are provided in Table 2. Appendix B contains a graphical representation of the 24-hour noise measurement results.

The sound level meters were programmed to collect hourly noise level intervals at each site during the survey. The maximum value (L<sub>max</sub>) represents the highest noise level measured during an interval. The average value (L<sub>eq</sub>) represents the energy average of all of the noise measured during an interval. The median value (L<sub>50</sub>) represents the sound level exceeded 50 percent of the time during an interval.

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

<p align="center"><b>Table 2</b>  <b>Summary of Existing Background Noise Measurement Data</b>  <b>July 30-31, 2008</b></p>								
Site	Location	Ldn	Average Measured Hourly Noise Levels, dB					
			Daytime (7am-10pm)			Nighttime (10pm-7am)		
			Leq	L50	Lmax	Leq	L50	Lmax
Continuous 24 hour noise level measurements								
A	Southwest Corner of Project Site	52.8 dB	47.8	44.8	62.0	46.1	44.6	53.3
B	Northern Border of Project Site	46.0 dB	41.2	33.8	60.5	39.3	34.5	53.5
C	Eastern Portion of Project Site	58.3 dB	55.2	51.5	70.3	50.9	44.7	64.8
D	Southeast Corner of Project Site	53.8 dB	49.4	45.0	63.8	46.9	40.9	60.8
Short-term noise level measurements								
1	Northwest Corner of Project Site	NA	31.7	30.0	43.8	@ 1:15 p.m. 7/30/08		
		NA	34.9	34.2	49.3	@ 9:37 a.m. 7/31/08		
2	Southeastern Portion of the Project Site	NA	43.1	33.0	62.0	@ 1:43 p.m. 7/30/08		
		NA	46.1	43.4	57.1	@ 10:04 a.m. 7/31/08		
Source: j.c. brennan & associates, Inc., 2008								

**Existing Roadway Noise Levels**

To predict existing noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The model is based upon the Calveno reference noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly Leq values for free-flowing traffic conditions.

Traffic volumes for existing conditions were obtained from DKS Transportation Consultants. Truck percentages and vehicle speeds on the local area roadways were estimated from field observations.

Table 3 shows the existing traffic noise levels in terms of Ldn at a reference distance of 100 feet from the centerlines of the existing project-area roadways identified in the traffic study (existing conditions). This table also shows the distances to existing traffic noise contours. A complete listing of the FHWA Model input data is contained in Appendix C.

<p align="center"><b>Table 3</b>  <b>Existing Traffic Noise Levels and Distances to Contours</b>  <b>Fiddymnt Ranch EIR – City of Roseville, California</b></p>					
Roadway	Segment	Ldn @ 100 Feet	Distance to Ldn Contours		
			70 dB	65 dB	60 dB
Fiddymnt	North of Hayden North	53.5 dBA	8'	17'	37'

Fiddymment	Hayden North to Blue Oaks	60.0 dBA	22'	47'	101'
Fiddymment	Blue Oaks to Hayden South	63.5 dBA	37'	79'	170'
Fiddymment	Hayden South to Pleasant Grove	66.2 dBA	55'	120'	258'
Fiddymment	Pleasant Grove to Baseline	66.4 dBA	57'	123'	266'
Blue Oaks	West of Fiddymment	46.1 dBA	3'	5'	12'
Blue Oaks	Fiddymment to Del Web	62.0 dBA	29'	63'	135'
Blue Oaks	Del Web to Foothills	67.7 dBA	71'	152'	328'
Hayden (South)	West of Fiddymment	52.2 dBA	6'	14'	30'
Notes: Distances to traffic noise contours are measured in feet from the centerlines of the roadways. Source: FHWA-RD-77-108 with inputs from DKS Associates, and j.c. brennan & associates, Inc. 2010.					

## REGULATORY CONTEXT

### Federal

There are no federal regulations related to noise that apply to the Proposed Project.

### State

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new multifamily residential units (hotels, motels, apartments, condominiums, and other attached dwellings) in California. These standards require that acoustical studies be performed prior to construction at residential building locations where the existing exterior Ldn exceeds 60 dBA. Such acoustical studies are required to establish mitigation measures that will limit maximum Ldn noise levels to 45 dBA in any habitable room.

California Environmental Quality Act (CEQA) establishes guidelines for new projects in order to prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible. The CEQA guidelines that pertain to this project are discussed later in this document under the *Standards of Significance*.

### City of Roseville General Plan Noise Element

The City of Roseville General Plan Noise Element provides the following goals and policies relative to noise.

#### Goals:

1. Protect City residents from the harmful and annoying effects of exposure to excessive noise.
2. Protect the economic base of the City by preventing incompatible land uses from encroaching upon existing or planned noise-producing uses.

#### **Policies – Transportation Noise**

1. Allow the development of new noise-sensitive land uses (which include but are not limited to residential, schools, and hospitals) only in areas exposed to existing or projected levels of noise from transportation noise sources which satisfy the levels specified in Table IX-1 (*Table 4 of this report*). Noise mitigation measures may be required to reduce noise in outdoor activity areas and interior spaces to the levels specified in Table IX-1 (*Table 4 of this report*).

#### **Policies – Fixed Noise Source**

6. Allow the development of new noise-sensitive uses (which include, but are not limited to, residential, school, and hospitals) only where the noise level due to fixed (non-transportation) noise sources satisfies the noise level standards of Table IX-3 (*Table 5 of this report*). Noise mitigation may be required to meet Table IX-3 performance standards.
7. Require proposed fixed noise sources adjacent to noise-sensitive uses to be mitigated so as not to exceed the noise level performance standards of Table IX-3 (*Table 5 of this report*).

#### **Policies – General**

9. Where noise mitigation measures are required to achieve the standards of Tables IX-1 (*Table 4 of this report*) and IX- 3 (*Table 5 of this report*), the emphasis of such measures should be placed on site planning and project design. These measures may include, but are not limited to, building orientation, setbacks, landscaping, and building construction practices. The use of noise barriers, such as soundwalls, should be considered as a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project.
10. Regulate construction-related noise to reduce impacts on adjacent uses consistent with the City's Noise Ordinance.

**Table 4**  
**(Table IX-1 of the Roseville General Plan Noise Element)**  
**Maximum Allowable Noise Exposure Transportation Noise Sources**

Land Use	Outdoor Activity Areas <sup>1</sup> Ldn/CNEL, dB	Interior Spaces	
		Ldn/CNEL, dB	Leq, dB <sup>2</sup>
Residential	60 <sup>3</sup>	45	--
Transient Lodging	60 <sup>3</sup>	45	--
Hospitals & Nursing Homes	60 <sup>3</sup>	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	60 <sup>3</sup>	--	40
Office Buildings	65	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

1. Outdoor activity areas for residential developments are considered to be the back yard patios or decks of single family dwelling, and the patios or common areas where people generally congregate for multi-family development.  
  
 Outdoor activity areas for non-residential developments are considered to be those common areas where people generally congregate, including pedestrian plazas, seating areas and outside lunch facilities.  
  
 Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.
  2. As determined for a typical worst-case hour during periods of use.
  3. Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 75 dB Ldn/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels area in compliance with this table.
- Note:** Where a proposed use is not specifically listed on this table, the use shall comply with the noise exposure standards for the nearest similar use as determined by the Planning Department. Commercial and industrial uses have not been listed because such uses are not considered to be particularly sensitive to noise exposure.

Source: City of Roseville, 2025 General Plan.

<b>Table 5</b> <b>(Table IX-3 of the City of Roseville General Plan Noise Element)</b> <b>Performance Standards for Non-Transportation Noise Sources</b>		
Noise Level Descriptor	Daytime (7 a.m. - 10 p.m.)	Nighttime (10 p.m. - 7 a.m.)
Hourly Average (Leq)	50 dB	45 dB
Maximum Level (Lmax)	70 dB	65 dB
<p>Each of the noise levels specified above should be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of noise complaints. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).</p> <p><b>(The following amendment is proposed for the City of Roseville General Plan Noise Element Table IX-3: “For municipal power plants consisting primarily of broadband, steady-state noise sources, the hourly Leq noise standard may be increased by up to 10 dBA, but not exceeding 55 dBA Leq.”)</b></p> <p>No standards have been included for interior noise levels. Standard construction practices should, with exterior noise levels identified, result in acceptable interior noise levels.</p> <p>Source: City of Roseville, 2020 General Plan.</p>		

### **City of Roseville Noise Ordinance:**

The City of Roseville has a Municipal Code of Ordinances establishes noise level criteria for sensitive receptors. The criteria are identical to the performance standards in the General Plan Noise Element shown in Table 5 above. The ordinance also establishes exemptions for certain activities. The following exemptions which are pertinent to this project have been identified.

#### **9.24.030 Exemptions**

*Sound or noise emanating from the following sources and activities are exempt from the provisions of the noise ordinance:*

*A. Sound sources typically associated with residential uses (e.g., Children at play, air conditioning and similar equipment, but not including barking dogs).*

*B. Sound sources associated with property maintenance (e.g., lawn mowers, edgers, blowers, pool pumps, power tools, etc.), provided such activities take place between the hours of 8:00 a.m. and 9:00 p.m.*

*D. The normal operation of public and private schools typically consisting of classes and other school-sponsored activities.*

*G. Private construction (e.g., construction, alteration, or repair activities) between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 8:00 p.m. Saturday and Sunday. Provided, however, that all construction equipment shall be fitted with factory installed muffling devices and that all construction equipment shall be maintained in good working order.*

#### **9.24.120 Sound Limits for Industrial Properties**

*Notwithstanding the provisions of Section 9.20.100 (Table 5 of this document), it is unlawful for any person to create any sound, or to allow the creation of any sound, on property with an industrial zoning designation that is owned, leased, occupied or otherwise controlled by such person where an industrial land use shares a common property line with a sensitive receptor or is separated from a sensitive receptor by a roadway, which causes the exterior sound level when measured at the property line of any affected sensitive receptor to exceed the ambient sound level by seven dBA, or exceed the sound level standards as set forth in (Table 5 of this document) by seven dBA, whichever is greater.*

**9.24.130 Sound Limits for Events on Public Property**

*Notwithstanding the provisions of Section 9.24.100, sound sources associated with outside activities on public property (e.g. athletic events, sporting events, fairs, and entertainment events) between the hours of 8:00 a.m. and 10:30 p.m., Sunday through Thursday, and between the hours of 8:00 a.m. and 11:00 .m. on Fridays, Saturdays, and city-recognized holidays, shall not exceed 80 dBA, Lmax at the property line of the property on which the event is being held.*

**Determination of a Significant Increase in Noise Levels:**

Another means of determining a potential noise impact is to assess a person’s reaction to changes in noise levels due to a project. Table 6 is commonly used to show expected public reaction to changes in environmental noise levels. This table was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels.

<p align="center"><b>Table 6</b>  <b>Subjective Reaction To Changes In Noise Levels of Similar Sources</b></p>		
Change in Level, DBA	Subjective Reaction	Factor Change in Acoustical Energy
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or Half) as Loud	10.0
<p>Source: Architectural Acoustics, M. David Egan, 1988.</p>		

**Vibration Criteria**

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person’s perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels

defined in terms of peak particle velocities.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events.

Though the City of Roseville does not have vibration criteria, Table 7, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second.

Table 7 indicates that the threshold for damage to structures ranges from 2 to 6 in/sec. One-half this minimum threshold or 1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage. The general threshold at which human annoyance could occur is notes as 0.1 in/sec p.p.v.

<b>Table 7 Effects of Vibration on People and Buildings</b>			
Peak Particle Velocity inches/second	Peak Particle Velocity mm/second	Human Reaction	Effect on Buildings
0-.006	0.15	Imperceptible by people	Vibrations unlikely to cause damage of any type
.006-.02	0.5	Range of Threshold of perception	Vibrations unlikely to cause damage of any type
.08	2.0	Vibrations clearly perceptible	Recommended upper level of which ruins and ancient monuments should be subjected
0.1	2.54	Level at which continuous vibrations begin to annoy people	Virtually no risk of architectural damage to normal buildings
0.2	5.0	Vibrations annoying to people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
1.0	25.4		Architectural Damage
2.0	50.4		Structural Damage to Residential Buildings
6.0	151.0		Structural Damage to Commercial Buildings
Source: <u>Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic</u> , Caltrans 1976.			

## **IMPACTS AND MITIGATION MEASURES**

Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria or ordinances, or substantially increase noise levels at noise-sensitive land uses.

## **Standards of Significance**

CEQA guidelines state that implementation of the project would result in significant noise impacts if the project would result in either of the following:

- a. Exposure of persons to or generation of noise levels in excess of standards established in the City of Roseville General Plan. Specifically, exterior and interior noise levels shown in Table 4 for residential uses exposed to transportation noise sources, and the Table 5 standards for residential uses exposed to non-transportation noise sources.
- b. Exposure of persons to or generation of excessive groundborne vibrations or groundborne noise levels.
- c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, as defined by Table 6. For this analysis, an increase of more than 4 dB is considered a significant impact.
- d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project, as defined by Table 6.
- 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, where the project would expose people residing or working in the area to excessive noise levels.
- f. For a project within the vicinity of a private airstrip, where the project would expose people residing or working in the project area to excessive noise levels.

The project site is not located within two miles of an airport. However, the City of Roseville has requested that noise impacts associated with aircraft overflights associated with the McClellan Air Park are addressed.

## **Method of Analysis**

### ***Traffic Noise Impact Assessment Methodology***

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels are predicted at a representative distance for both existing and future, project and no-project conditions for the Proposed Project. Noise impacts are identified at existing noise-sensitive areas if the noise level increases which result from the project or alternative exceed the City's significance threshold.

To describe existing and projected noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The model is based upon the

CALVENO reference noise emission factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly Leq values for free-flowing traffic conditions. To predict traffic noise levels in terms of Ldn, it is necessary to adjust the input volume to account for the day/night distribution of traffic.

Average daily traffic volumes were provided by the project traffic consultant. Truck usage and vehicle speeds on the local area roadways were estimated from field observations. The predicted increases in traffic noise levels on the local roadway network for existing and future scenarios which would result from the project are provided in terms of Ldn at a standard distance of 100 feet from the centerlines of the project-area roadways.

### ***Roseville Energy Park Impact Methodology***

The Roseville Energy Park (REP) is located approximately 2,000 feet southwest of project vicinity. As a means of assessing the potential noise impacts associated with the REP at the proposed project site, noise measurements conducted by j.c. brennan & associates, Inc. staff were used.

### ***Aviation Noise Impact Methodology***

Aviation noise was addressed through use of data provided by the Sacramento County Airport System noise monitoring report for the Creekview Specific Plan project site, which is directly adjacent to, and west of the Fiddymont Ranch project site. The potential for sleep disturbance is discussed based upon the results of single event noise measurements conducted on the Creekview Specific Plan project site.

### ***Commercial Land Use Impact Methodology***

Commercial retail uses can also produce noise which may affect adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components which may be annoying to individuals who live in the nearby vicinity. In addition, noise generation from fixed noise sources associated with the project may vary based upon climatic conditions, time of day and existing ambient noise levels. The primary noise sources generally include truck deliveries, on-site truck circulation, trash pickup, parking lot use, HVAC equipment and loading docks.

### **Mechanical Equipment**

Heating, air conditioning and ventilation equipment can be a primary noise source associated with commercial or retail uses. These types of equipment are often mounted on roof tops, located on the ground or located within mechanical rooms. The noise sources can take the form of fans, pumps, air compressors, chillers or cooling towers.

Noise levels from these types of equipment can vary significantly. Noise levels from these types of sources generally range between 45 dB to 70 dB at a distance of 50 feet. However, numerous noise control strategies can be utilized to mitigate noise levels to less than significant levels.

## Loading Docks

Loading docks and their associated activities have a potential to produce noise levels which exceed the noise level criteria at adjacent noise sensitive land uses. Noise sources associated with loading docks include trucks idling, truck circulation on the sites, refrigeration units on trucks, pallets dropping and fork lifts operating on the site.

Noise monitoring conducted at loading docks indicate that typical hourly average noise levels at a distance of 50 feet can range between 55 dB Leq and 60 dB Leq, and maximum noise levels range between 80 dB and 84 dB at a distance of 50 feet.

Generally sound walls and setbacks can be used to mitigate loading dock and truck circulation noise impacts. These strategies can be utilized individually or in combination with one another.

### ***Schools and Parks Impact Methodology***

Children playing at neighborhood parks or elementary school playgrounds are often considered potentially significant noise sources which could adversely affect adjacent noise-sensitive land uses. Typical noise levels associated with groups of approximately 50 children playing at a distance of 50 feet generally range from 55 to 60 dB Leq, with maximum noise levels ranging from 70 to 75 dB. It is expected that the playground areas would be utilized during daytime hours. Therefore, noise levels from the playgrounds would need to comply with the City of Roseville exterior noise level standards at the nearest residential uses. Based upon the reference noise level data discussed above, the 55 dB Leq noise contour would be located approximately 100 feet from the center of playgrounds. The 75 dB Lmax contour would be located at approximately 50 feet from the perimeter of the playgrounds.

Given the proximity of most parks or elementary schools to residential uses, the potential for exceedance of the City of Roseville noise standards exists, depending on the orientation and proximity of the play areas to those nearest residences, the number of children using the play areas at a given time, and the types of activities the children are engaged in.

### ***Construction Noise Impact Methodology***

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. Activities involved in construction would generate maximum noise levels, as indicated in the analysis of this impact, ranging from 85 to 90 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours.

Noise would also be generated during the construction phase by increased truck traffic on area roadways and on-site grading. A significant project-generated noise source would include truck traffic associated with transport of heavy materials and equipment to and from construction sites and the movement of heavy construction equipment on the project site, especially during site grading. This noise increase would be of short duration, and would likely occur primarily during daytime hours. Construction activities would need to comply with the City of Roseville Noise Ordinance criteria.

***Construction Vibration Impact Methodology***

The types of construction vibration impact include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural. Table 8 shows the typical vibration levels produced by construction equipment.

<p align="center"><b>Table 8</b> <b>Vibration Levels for Varying Construction Equipment</b></p>		
Type of Equipment	Peak Particle Velocity @ 25 feet (inches/second)	Approximate Velocity Level @ 25 feet (VdB)
Large Bulldozer	0.089	87
Loaded Trucks	0.076	86
Small Bulldozer	0.003	58
Auger/drill Rigs	0.089	87
Jackhammer	0.035	79
Vibratory Hammer	0.070	85
Vibratory Compactor/roller	0.210	94

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Guidelines, May 2006

**SPECIFIC IMPACTS AND MITIGATION MEASURES**

**Impact 1 Short-Term Construction-Generated Noise Levels.** Implementation of the proposed project would result in short-term construction activities associated with individual development projects in the Plan area. These construction activities could potentially expose sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels. This is considered to be a **potentially significant** impact.

***Construction Noise Impact Assessment Methodology***

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. Activities involved in typical construction and demolition would generate maximum noise levels, as indicated in Table 9, ranging from 76 to 90 dB at a distance of 50 feet.

A significant project-generated noise source would include truck traffic associated with transport of heavy materials and equipment to and from construction sites and the movement of heavy construction equipment on the project site. This noise increase would be of short duration, and would occur primarily during daytime hours, as regulated by the City of Roseville Noise Ordinance.

<p style="text-align: center;"><b>Table 9</b>  <b>Construction Equipment Noise</b>  <b>Fiddymment Ranch Development – City of Roseville, California</b></p>	
Type of Equipment	Maximum Level, dB at 50 feet
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

Source: *Roadway Construction Noise Model User's Guide*. Federal Highway Administration. FHWA-HEP-05-054. January 2006.

The *City of Roseville Municipal Code* exempts construction-generated noise that occurs between the hours of 7 a.m. to 7 p.m. Monday through Friday, and 8 a.m. and 8 p.m. Saturday and Sunday from the applicable noise standards, provided that all construction equipment is fitted with factory installed muffling devices and maintained in good working order. This impact is considered **potentially-significant**.

**Mitigation for Impact 1**

The following mitigation measures are required for the Proposed Project to minimize construction noise impacts.

**MM1a:** Construction activities shall comply with the requirements of the City of Roseville Noise Ordinance.

**MM1b:** Locate fixed construction equipment such as compressors and generators as far as possible from sensitive receptors. Shroud or shield all impact tools, and muffle or shield all intake and exhaust ports on power construction equipment.

**MM1c :** Designate a disturbance coordinator and conspicuously post this person's number around the project site and in adjacent public spaces. The disturbance coordinator will receive all public complaints about construction noise disturbances and will be responsible for determining the cause of the complaint, and implement any feasible measures to be taken to alleviate the problem.

**Significance after Mitigation: Less-than-significant.**

**Impact 2**    **Long-Term Traffic Noise Levels at Existing Noise-Sensitive Receivers.** Implementation of the proposed project would result in an increase of average daily vehicle trips in the Plan area. The increased traffic volumes would not result in a noticeable (4 dB or greater) increase in traffic noise along roadways at sensitive receptors in and within the vicinity of the Plan area. This is considered to be a **less than significant** impact.

In order to assess changes in traffic noise levels associated with the project, the FHWA model was once again used. Traffic noise levels for Existing with and without project, and Year 2025 with and without the project, were evaluated. Tables 10 and 11 show the predicted traffic noise level increases related to the project on the local roadway network for each scenario. Appendix C provides the complete inputs and results to the FHWA model for each of the traffic scenarios.

Table 10 data indicates that under the Existing Conditions and Existing Plus Project conditions, that the proposed project would result in traffic noise level increases of more than 4 dB along Fiddymment Road from Blue Oaks Boulevard to the north access of Hayden Parkway. However, there are no existing noise sensitive receivers along this roadway segment. In addition, no land uses are located along these segments of Fiddymment Road which would exceed the City of Roseville noise level criteria. In addition, traffic noise levels along Blue Oaks would increase more than 4 dB west of Fiddymment and from Fiddymment to Del Webb. Currently there are no residences along Blue Oaks, west of Fiddymment. The portion of Blue Oaks Boulevard from Fiddymment to Del Webb currently has residential development adjacent to Blue Oaks. However, this development currently includes sound walls and mitigation which anticipated increases in traffic noise as part of the project design. In addition, no residences will be exposed to traffic noise levels exceeding the allowable 75 dB Ldn exterior noise level standard.

Table 11 data indicates under the 2025 Conditions and the 2025 Plus Project Conditions, that the project will not contribute more than a +0.3 dB increase in traffic noise levels. . In addition, no residences will be exposed to traffic noise levels exceeding the allowable 75 dB Ldn exterior noise level standard. **Therefore, this impact is considered less than significant.**

**Mitigation for Impact 2:    None Required.**

**Table 10**  
**Predicted Existing No Project and Existing Plus Project Traffic Noise Levels**  
**Fiddymment Ranch EIR – City of Roseville, California**

Roadway	Segment	Distance <sup>1</sup>	Traffic Noise Levels (dBA, Ldn)			Distance to Ldn Contours Existing			Distance to Ldn Contours Existing Plus Project		
			Existing	Existing Plus Project	Change	70 dB	65 dB	60 dB	70 dB	65 dB	60 dB
Fiddymment	North of Hayden North	100 feet	53.5	54.8	+1.3	8'	17'	37'	10	21	45
Fiddymment	Hayden North to Blue Oaks	100 feet	60.0	65.1	<b>+5.1</b>	22'	47'	101'	47	101	218
Fiddymment	Blue Oaks to Hayden South	100 feet	63.5	65.4	+1.9	37'	79'	170'	49	106	229
Fiddymment	Hayden South to Pleasant Grove	100 feet	66.2	66.8	+0.6	55'	120'	258'	61	132	285
Fiddymment	Pleasant Grove to Baseline	100 feet	66.4	66.9	+0.5	57'	123'	266'	62	134	289
Blue Oaks	West of Fiddymment	100 feet	46.1	62.5	<b>+16.4</b>	3'	5'	12'	32	69	148
Blue Oaks	Fiddymment to Del Webb	100 feet	62.0	66.5	<b>+4.5</b>	29'	63'	135'	58	125	270
Blue Oaks	Del Web to Foothills	100 feet	67.7	69.0	+1.3	71'	152'	328'	86	185	398
Hayden (South)	West of Fiddymment	100 feet	52.2	54.0	+1.8	6'	14'	30'	9	18	40

<sup>1</sup>Distances are measured in feet from the centerline of the roadway.

**Bold** indicates an increase in traffic noise levels of greater than 4 dB.

Source: FHWA-RD-77-108 with inputs from DKS Associates, Caltrans and j.c. brennan & associates, Inc.

**Table 11  
 Predicted 2025 No Project and 2025 Plus Project Traffic Noise Levels  
 Fiddymment Ranch EIR – City of Roseville, California**

Roadway	Segment	Distance <sup>1</sup>	Traffic Noise Levels (dBA, Ldn)			Distance to Ldn Contours 2025			Distance to Ldn Contours 2025 Plus Project		
			2025	2025 Plus Project	Change	70 dB	65 dB	60 dB	70 dB	65 dB	60 dB
Fiddymment	North of Hayden North	100 feet	61.3	61.6	+0.3	26	57	122	28	60	128
Fiddymment	Hayden North to Blue Oaks	100 feet	67.7	68.0	+0.3	70	152	327	73	157	339
Fiddymment	Blue Oaks to Hayden South	100 feet	68.5	68.5	0	79	171	369	80	172	371
Fiddymment	Hayden South to Pleasant Grove	100 feet	70.8	70.8	0	113	244	526	113	244	525
Fiddymment	Pleasant Grove to Baseline	100 feet	69.5	69.5	0	93	201	432	93	200	430
Blue Oaks	West of Fiddymment	100 feet	67.5	67.6	+0.1	68	146	315	70	150	323
Blue Oaks	Fiddymment to Del Webb	100 feet	69.7	69.9	+0.2	95	205	443	99	213	460
Blue Oaks	Del Web to Foothills	100 feet	72.0	72.1	+0.1	135	291	628	138	297	640
Hayden (South)	West of Fiddymment	100 feet	55.5	55.4	-0.1	11	23	50	11	23	49

<sup>1</sup>Distances are measured in feet from the centerline of the roadway.

Source: FHWA-RD-77-108 with inputs from DKS Associates, Caltrans and j.c. brennan & associates, Inc.

**Impact 3 Traffic Noise Impacts at Future Noise-Sensitive Land Uses Developed Within the Project Area.** Proposed residential land uses located adjacent to any of the major project-area arterial roadways may be impacted by exterior noise levels exceeding 60 dB Ldn and interior noise levels exceeding 45 dB Ldn. Because it is likely that residential uses will be developed within areas exposed to projected future traffic noise levels in excess of the applicable noise standards, this impact is considered significant according to the Project’s Significance Criteria. This is considered to be a **potentially significant** impact.

An analysis of traffic noise levels was conducted for the internal street system of the project site, and along Fiddymment Road and Blue Oaks Road where future residential uses may be located adjacent to those roadways. Where cumulative traffic volumes were less than 4,000 ADT, it was assumed that the traffic noise levels would comply with the City exterior noise level criterion of 60 dB Ldn and the interior noise level criterion of 45 dB Ldn. The FHWA traffic noise prediction model was used to predict CIP 2025 Plus Project traffic noise levels at the proposed residential land uses associated with the project. Table 12 shows the predicted traffic noise levels at the proposed residential uses which have the outdoor activity area adjacent to the major project-area roadways with a projected ADT of 4,000 or more vehicles.

Roadway	Segment	Receiver Type <sup>1</sup>	Approximate Distance to Outdoor Activity Area <sup>2</sup>	Predicted Traffic Noise Levels, Ldn No Mitigation
Hayden	Blue Oaks to Collector One	MDR/HDR	75'	<b>64.9 dB</b>
Hayden	Collector One to Parkway One	MDR/LDR	75'	<b>61.8 dB</b>
Hayden	North/South Collector to Fiddymment	LDR	75'	<b>61.8 dB</b>
Collector One	North/South Collector to Fiddymment	LDR	75'	<b>63.4 dB</b>
Parkway One	West of Hayden	LDR	75'	<b>60.9 dB</b>
Fiddymment	Hayden North to Blue Oaks	LDR	100'	<b>68.0 dB</b>
Blue Oaks	West of Fiddymment	HDR	100'	<b>67.6 dB</b>

<sup>1</sup> LDR – Low Density Residential. MDR – Medium Density Residential. HDR – High Density Residential.  
<sup>2</sup> Distances are measured in feet from the centerlines of the roadways to the assumed outdoor activity areas.  
**Bold** indicates predicted traffic noise levels greater than the 60 dB Ldn criteria.  
Source: FHWA-RD-77-108 with inputs from DKS Associates, and j.c. brendan & associates, Inc.

Based upon the above analysis contained in Table 12, traffic noise levels on Hayden Parkway, portions of Collector One, Parkway One, Blue Oaks Road and Fiddymment Ranch Road are predicted to have traffic noise levels greater than the 60 dB Ldn exterior noise level standard. No residential receivers are expected to be exposed to roadway traffic noise levels in excess of 70 dB Ldn. Therefore, interior noise levels are expected to comply with the 45 dB Ldn interior noise level criterion.

The degree by which traffic noise levels will exceed the City of Roseville exterior noise level standard will depend on the proximity of the proposed noise-sensitive uses to the major roadways within the project vicinity, and the individual noise generation of those roadways. Because it is likely that residential uses will be developed within areas exposed to projected future traffic noise levels in excess of the applicable noise standards, this impact is considered significant according to

the Project's Significance Criteria. **Therefore, this impact is considered potentially significant in need of mitigation.**

**Mitigation for Impact 3:**

**MM 3:** Future residential development adjacent to Fiddymment Road, Blue Oaks Boulevard, Hayden Parkway, Collector One (Crawford Parkway), and Parkway One (Holt Parkway) shall include a property line sound wall to reduce traffic noise levels in compliance with the 60 dB Ldn standard. If site conditions are such that base of wall, roadway centerline and building pads are all the same elevation, the required height of the sound walls adjacent to Fiddymment Road and Blue Oaks Boulevard is 8-feet, and the required height of the sound walls adjacent to Hayden Parkway, Collector One (Crawford Parkway), and Parkway One (Holt Parkway) is 6-feet. This also assumes a typical setback of 75 feet from the roadway centerline to the barrier, and a setback of 20 to 25 feet from the barrier to the building façade. If site conditions are such that the base of the wall, roadway centerline and building pads are not all the same elevation, or the setbacks are significantly different than those assumed in the barrier analysis, an analysis of traffic noise barrier effectiveness shall be completed for each Fiddymment Ranch tentative map that includes residential development adjacent to these roadways. The analysis shall be conducted by a qualified acoustical consultant and shall specify the measures required to achieve compliance with the City of Roseville 60 dB Ldn exterior noise level standard at the outdoor activity areas.

**Significance after Mitigation:        Less than Significant.**

**Impact 4    Roseville Energy Park (REP) Noise Impacts at Future Noise-Sensitive Land Uses Developed Within the Project Area.** The City of Roseville Noise Ordinance allows up to 7 dBA above the standards contained in General Plan Noise Element Table IX-3 for industrial uses adjacent to residential areas. Therefore, nighttime noise levels can be as high as 52 dBA Leq. In addition, the City of Roseville is proposing to amend the General Plan Noise Element to allow municipal power plants to produce noise levels up to 10 dBA higher than the standards contained in Table IX-3. During most hours, the REP was observed to generate noise levels less than 52 dB Leq at the project site. This is considered to be a **less than significant** impact.

j.c. brennan & associates, Inc. conducted a detailed evaluation of the REP noise levels for the Creekview Specific Plan. Based upon noise level measurements conducted in the field adjacent to the west property line of the Fiddymment Ranch project site, portions of the project site will be exposed to noise levels ranging between 45 dB Leq and 48 dB Leq, . Louder noise levels are typically associated with startup of the REP or during periods of peak operations. The increased noise levels due to startup are generally due to increased combustion and increased turbine speeds associated with a “cold start”. The City ordinance has an industrial limit that allows noise levels to exceed the above standards by 7 dB at sensitive receptors, and the proposed General Plan amendment proposes allowing power plants to produce noise level up to 10 dBA higher than the standards, as discussed earlier. Therefore, this impact is considered **less than significant**.

## Mitigation for Impact 4: None Required

**Impact 5 Impacts of Commercial Land Uses on Planned Noise-Sensitive Uses in the Project Area.** Because the zoning of the commercial uses adjacent to residential uses could generate noise levels which exceed the City's standards, the potential for adverse noise impacts exists, even though it cannot practically be quantified at this time. At this time, specific uses are not known and tentative maps for this land use have not been provided. As a result, it is not feasible to identify specific noise impacts associated with the proposed commercial land uses. This would be a **potentially significant impact**.

In general, where these land uses adjoin residential property lines, mitigation measures should be included. The primary noise sources are parking lot noise, HVAC equipment and light truck deliveries. In this case, 6-7 foot tall sound walls would typically provide adequate isolation of parking lot and delivery truck activities. HVAC equipment should be located either at ground level or when located on roof-tops, the building facades should include parapets for shielding.

Where commercial uses adjoin common residential property lines, and loading docks or truck circulation routes face the residential areas, the following mitigation measures should be included in the project design:

- Loading docks and truck delivery areas should maintain a minimum distance of 30 feet from residential property lines;
- Property line barriers should be 6 to 8 feet in height. Circulation routes for trucks should be located a minimum of 30-feet from residential property lines;
- All heating, cooling and ventilation equipment should be located within mechanical rooms where possible;
- All heating, cooling and ventilation equipment shall be shielded from view with solid barriers;
- Emergency generators shall comply with the local noise criteria at the nearest noise-sensitive receivers;
- In cases where loading docks or truck delivery circulation routes are located less than 100 feet from residential property lines, an acoustical evaluation shall be submitted to verify compliance with the City of Roseville Noise Level Performance Standards.

## Mitigation for Impact 5:

**MM 5:** Where commercial uses abut residential property lines or loading docks/truck circulation routes face residential areas, the following mitigation measures should be included in the project design:

- Loading docks and truck delivery areas should maintain a minimum distance of 30 feet from residential property lines;
- Property line barriers should be 6 to 8 feet in height. Circulation routes for trucks should be located a minimum of 30-feet from residential property lines;

- All heating, cooling and ventilation equipment should be located within mechanical rooms where possible;
- All heating, cooling and ventilation equipment shall be shielded from view with solid barriers or building parapets;
- Emergency generators shall comply with the City of Roseville Municipal Code Noise Ordinance at the nearest noise-sensitive receivers.
- Delivery/loading activities shall comply with the requirements of the City of Roseville Municipal Code Noise Ordinance.

**Significance after Mitigation:      Less than Significant**

**Impact 6      Impact of Neighborhood Parks on Future Noise-Sensitive Uses Within the Project Area.** Noise from active recreation parks could generate noise levels in excess of the City of Roseville standards. Noise associated with park uses has been frequently cited as a potential source of annoyance at noise-sensitive areas. However, The City of Roseville Noise Ordinance provides exemptions for residential areas, including children at play. In addition, maintenance activities such as lawn mowing are required to take place between 8:00 a.m. and 9:00 p.m. **Therefore, this impact is considered potentially significant.**

**Mitigation for Impact 6:**

**MM 6a:**      Maintenance activities such as lawn mowing shall take place between 8:00 a.m. and 9:00 p.m.

**MM 6b:**      Activities at neighborhood parks should be limited to the hours of 8:00 a.m. to 9:00 p.m.

**Significance after Mitigation:      Less than Significant.**

<b>Impact 7</b>	<b>Impact of Proposed School Playgrounds on Future Noise-Sensitive Uses in the Project Area.</b> As stated in the methodology section of this report, children playing at elementary school playgrounds are often considered potentially significant noise sources which could adversely affect adjacent noise-sensitive land uses. However, The City of Roseville Noise Ordinance provides exemptions the normal operation of public and private schools typically consisting of classes and other school-sponsored activities; <b>Therefore, this impact is considered less than significant</b>
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**Mitigation for Impact 7: None Required**

**Impact 8      Impacts of Aviation Noise on Planned Noise-Sensitive Uses in the Project Area.** The project site is located outside of the McClellan Airfield 60 dB Ldn/CNEL contour. Although there is a potential for some sleep disturbance to future residents in the Fiddlyment Ranch area, the maximum percent of people being awakened is considered to be fairly low. This is considered to be a **less than significant** impact.

### ***Exterior Noise Level Standard:***

Figure 2 indicates that the 60 dB CNEL “Theoretic Capacity” noise contour for McClellan Airfield would remain south of Elverta Road. Therefore, exterior noise levels from aircraft operations are not predicted to exceed the City of Roseville 60 dB Ldn/CNEL exterior noise level standard on the project site. Additionally, aircraft operations are not predicted to exceed the City’s 45 dB Ldn/CNEL interior noise level standard on the project site.

### ***Sleep Disturbance:***

The California Airport Noise Regulations provides a discussion on the potential for sleep disturbance from aircraft operations. The following are excerpts from that study:

*The extent to which environmental noise disturbs human sleep patterns varies greatly from individual to individual as well as from one time to another for any particular individual. Whether an individual is aroused by a noise depends upon the individual’s sleep state and sleep habits, the loudness or suddenness of the noise, the information value of the noise (a child crying, for example), and other factors.*

*Early studies of the effects of noise on sleep disturbance produced varying results. A major factor in these differences, though, is whether the study evaluated people sleeping in a laboratory or in their own homes. Generally laboratory studies have shown considerably more sleep disturbance than is evident in field studies. More recent studies, all conducted in the field, have produced relatively consistent results. These studies have included:*

- *A 1990 British Study;*
- *A 1992 U.S. Air Force study on residents near Castle Air Force Base and Los Angeles International Airport; and*
- *A 1995 study comparing the effects of the closure of Stapleton International Airport with the opening of Denver International Airport.*

*In 1997, the Federal Interagency Committee on Aviation Noise (FICAN) sought to put the subject to rest with publication of a recommended new dose-response curve predicting awakening. This curve was calculated using data from the above three studies, among others. The 1997 FICAN curve represents the upper limit of the observed field data and should be interpreted as predicting the maximum percent of the exposed population expected to be behaviorally awakened.*

For the purposes of evaluating the potential for sleep disturbance due to interior noise from aircraft operations over the project site, j.c. brennan & associates, Inc. utilized the methods described in ANSI/ASA S12.9-2008/Part 6, along with the FICAN research, as described in Annex B of the ANSI procedures. The ANSI procedures calculate the probability of behavioral awakenings while accounting for the predicted mean indoor sound exposure level (SEL) at the future residential uses on the project site and the number of observed nighttime aircraft events provided by the Sacramento County Airport System. Appendix D provides the complete inputs and results of the sleep disturbance calculations.

During the 7 days of noise monitoring aircraft operations by the Sacramento County Airport System on the Creekview site, directly west of the Fiddymont Site, only 1 nighttime (10:00 p.m. to 7:00 a.m.) event occurred having an SEL of 75 dB or greater. The event occurred on December 14, 2006

a 12:49 a.m. with an SEL of 82.6 dB.

Using an exterior SEL of 82.6 dB, and assuming that typical construction practices will achieve an exterior to interior noise level reduction of 25 dB with the windows in the closed position, the interior SEL would be approximately 57.6 dB. Based upon the ANSI procedures, the maximum percent awakened would be approximately 2.6 percent. FICAN explained that, “because the adopted curve represents the upper limit of the data presented, it should be interpreted as predicting the maximum percent of the exposed population expected to be behaviorally awakened, or the maximum percent awakened” (FICAN 1997).

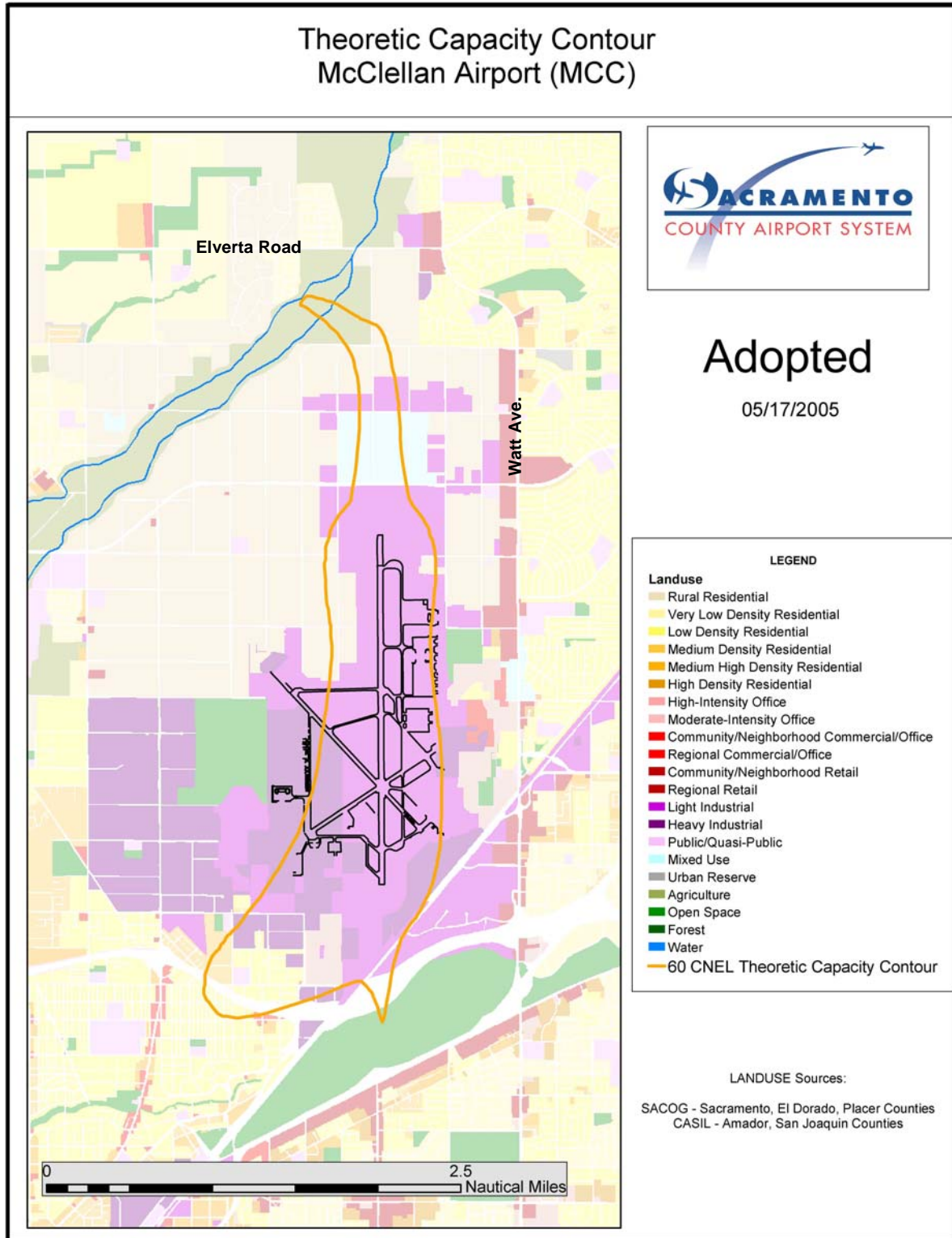
The maximum percent awakened is considered to be fairly low in the Fiddyment Ranch area. In addition, as a part of the project description, disclosures of aircraft overflights will be provided to all residents. Therefore, this impact is considered **less than significant**.

#### **Mitigation for Impact 8: None Required**

**Impact 9 Construction Vibration.** The primary construction activities associated with the project would occur when the infrastructure such as roadways and utilities are constructed. Some construction is expected to occur within the vicinity of existing residences. However, comparing Table 8 which contains the criteria for acceptable vibration levels to Table 9, which shows potential vibration impacts, it is not expected that vibration impacts would occur which would cause any structural damage. **This impact is considered to be less than significant.**

#### **Mitigation for Impact 9: None Required**

**Figure 2**  
 McClellan Airport Noise Contours – 60 dB CNEL  
 Fiddlyment Ranch – City of Roseville, California

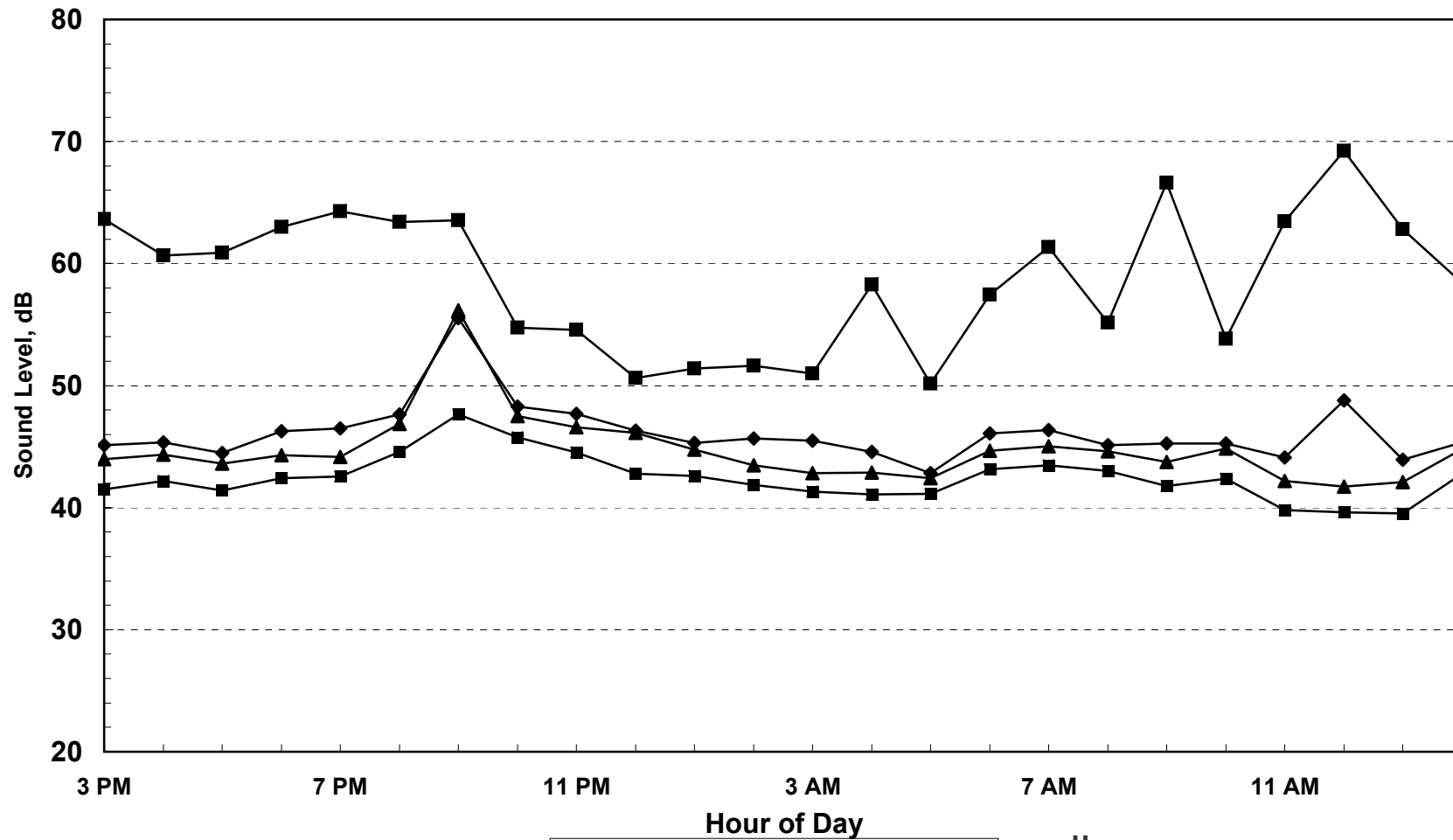


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## Appendix A Acoustical Terminology

<b>Acoustics</b>	The science of sound.
<b>Ambient Noise</b>	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
<b>Attenuation</b>	The reduction of an acoustic signal.
<b>A-Weighting</b>	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
<b>Decibel or dB</b>	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
<b>CNEL</b>	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
<b>Frequency</b>	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
<b>Ldn</b>	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
<b>Leq</b>	Equivalent or energy-averaged sound level.
<b>Lmax</b>	The highest root-mean-square (RMS) sound level measured over a given period of time.
<b>L(n)</b>	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one hour period.
<b>Loudness</b>	A subjective term for the sensation of the magnitude of sound.
<b>Noise</b>	Unwanted sound.
<b>Peak Noise</b>	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
<b>RT<sub>60</sub></b>	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
<b>Sabin</b>	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
<b>SEL</b>	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.
<b>Threshold of Hearing</b>	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
<b>Threshold of Pain</b>	Approximately 120 dB above the threshold of hearing.
<b>Impulsive</b>	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
<b>Simple Tone</b>	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B  
 24hr Continuous Noise Monitoring  
 Fiddymont Ranch EIR - Site A  
 July 30-31, 2008

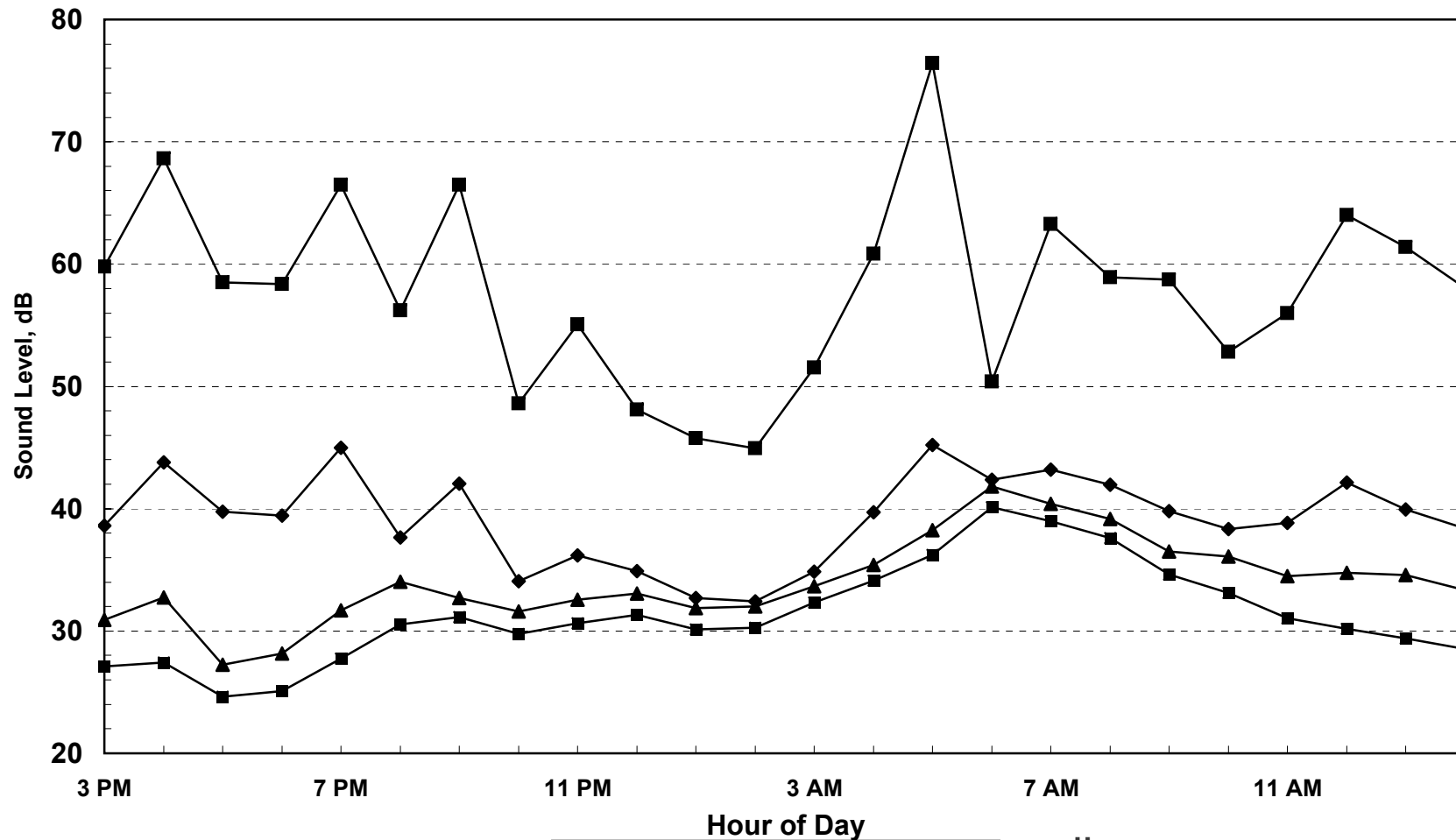


Ldn = 52.8 dB

◆ Leq    ■ Lmax    ▲ L50    ■ L90



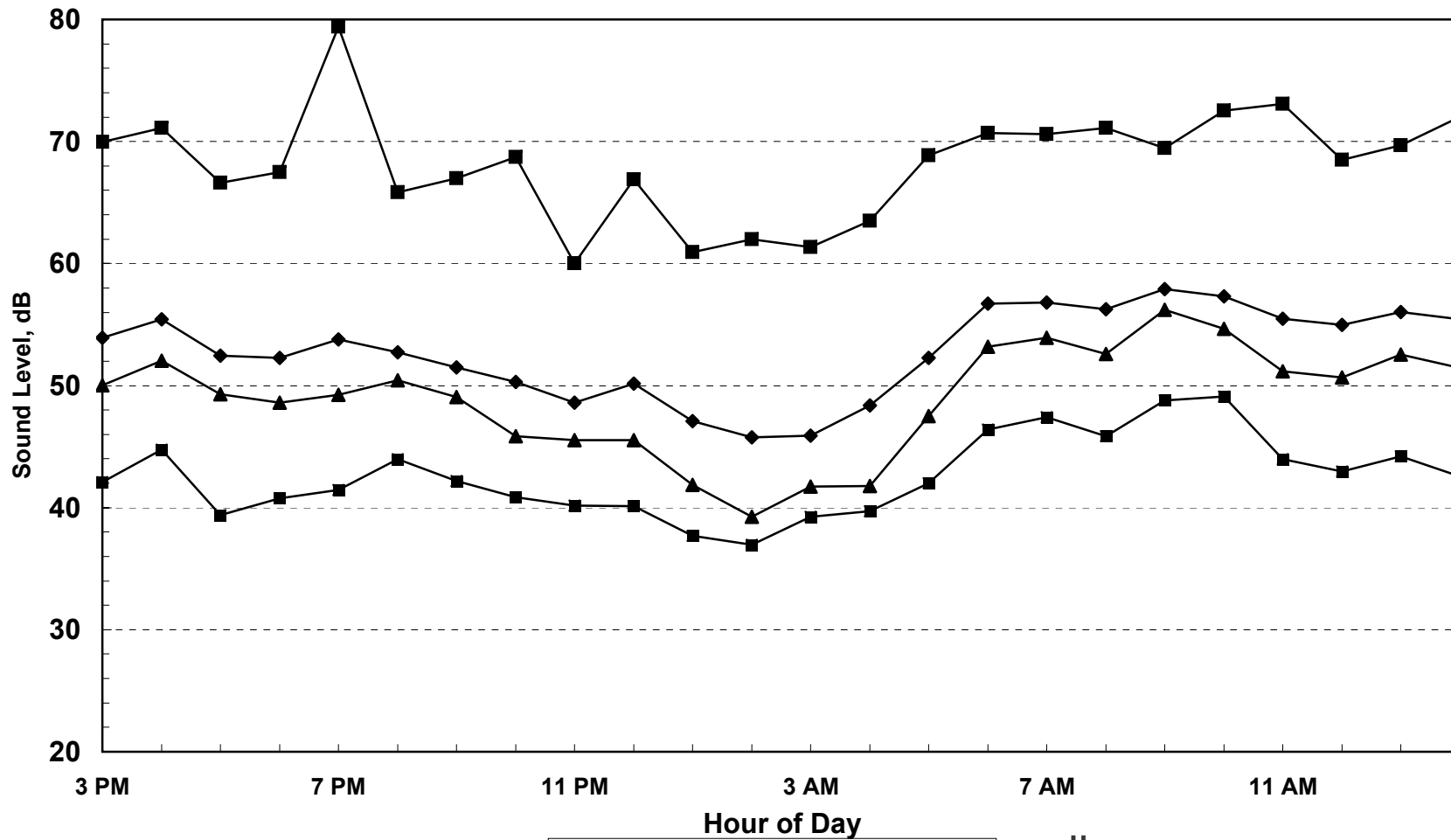
Appendix B  
 24hr Continuous Noise Monitoring  
 Fiddymt Ranch EIR - Site B  
 July 30-31, 2008



Ldn = 46.0 dB

◆ Leq    ■ Lmax    ▲ L50    ■ L90

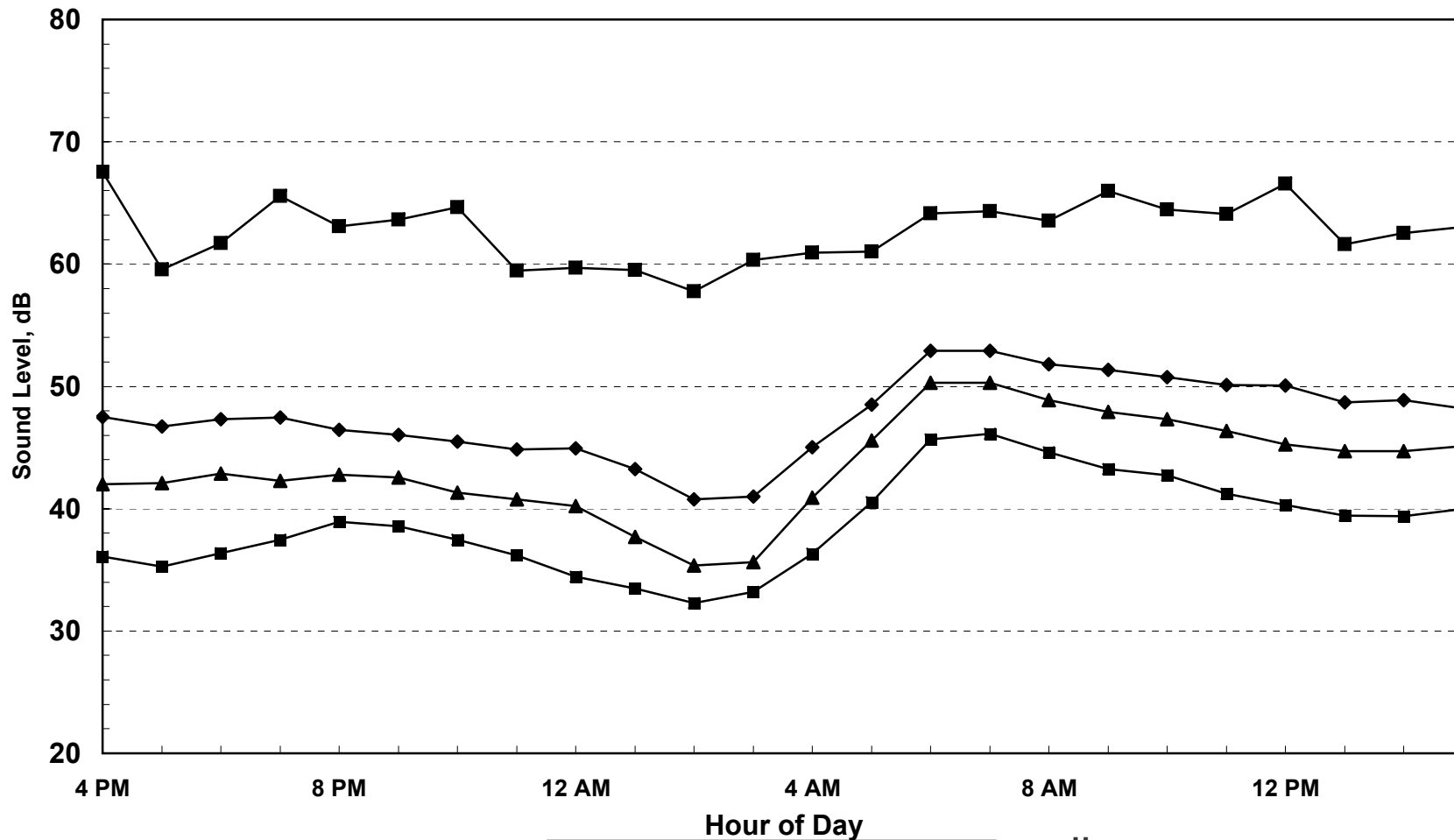
Appendix B  
 24hr Continuous Noise Monitoring  
 Fiddymnt Ranch EIR - Site C  
 July 30-31, 2008



Ldn = 58.3 dB

◆ Leq    ■ Lmax    ▲ L50    ■ L90

Appendix B  
 24hr Continuous Noise Monitoring  
 Fiddymt Ranch EIR - Site D  
 July 30-31, 2008



Ldn = 53.8 dB

◆ Leq    ■ Lmax    ▲ L50    ■ L90



Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Data Input Sheet**

Project #: 2010-121 Fiddlyment Ranch

Description: Existing

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Fiddlyment	North of Hayden North	1,100	83		17	2	1	45	100	
2	Fiddlyment	Hayden North to Blue Oak	5,000	83		17	2	1	45	100	
3	Fiddlyment	Blue Oaks to Hayden South	11,000	83		17	2	1	45	100	
4	Fiddlyment	Blue Oaks to Pleasant Grove	20,500	83		17	2	1	45	100	
5	Fiddlyment	Pleasant Grove to Baseline	21,500	83		17	2	1	45	100	
6	Blue Oaks	West of Fiddlyment	200	83		17	2	1	45	100	
7	Blue Oaks	Fiddlyment to Del Webb	7,800	83		17	2	1	45	100	
8	Blue Oaks	Del Webb to Foothills	29,500	83		17	2	1	45	100	
9	Hayden (South)	West of Fiddlyment	1,900	83		17	2	1	30	100	

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Predicted Levels**

Project #: 2010-121 Fiddlyment Ranch  
 Description: Existing  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Fiddlyment	North of Hayden North	52.2	43.6	45.1	53.5
2	Fiddlyment	Hayden North to Blue Oak	58.8	50.2	51.7	60.0
3	Fiddlyment	Blue Oaks to Hayden South	62.2	53.6	55.1	63.5
4	Fiddlyment	Blue Oaks to Pleasant Grove	64.9	56.3	57.8	66.2
5	Fiddlyment	Pleasant Grove to Baseline	65.1	56.5	58.0	66.4
6	Blue Oaks	West of Fiddlyment	44.8	36.2	37.7	46.1
7	Blue Oaks	Fiddlyment to Del Webb	60.7	52.1	53.6	62.0
8	Blue Oaks	Del Webb to Foothills	66.5	57.9	59.4	67.7
9	Hayden (South)	West of Fiddlyment	49.5	43.2	47.3	52.2

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Noise Contour Output**

Project #: 2010-121 Fiddlyment Ranch  
 Description: Existing  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	----- Distances to Traffic Noise Contours -----				
			75	70	65	60	55
1	Fiddlyment	North of Hayden North	4	8	17	37	79
2	Fiddlyment	Hayden North to Blue Oak	10	22	47	101	217
3	Fiddlyment	Blue Oaks to Hayden South	17	37	79	170	366
4	Fiddlyment	Blue Oaks to Pleasant Grove	26	55	120	258	555
5	Fiddlyment	Pleasant Grove to Baseline	27	57	123	266	573
6	Blue Oaks	West of Fiddlyment	1	3	5	12	25
7	Blue Oaks	Fiddlyment to Del Webb	14	29	63	135	291
8	Blue Oaks	Del Webb to Foothills	33	71	152	328	707
9	Hayden (South)	West of Fiddlyment	3	6	14	30	65



Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Data Input Sheet**

Project #: 2010-121 Fiddlyment Ranch

Description: Existing + Project

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (cB)
1	Fiddlyment	North of Hayden North	1,500	83		17	2	1	45	100	
2	Fiddlyment	Hayden North to Blue Oaks	16,000	83		17	2	1	45	100	
3	Fiddlyment	Blue Oaks to Hayden South	17,200	83		17	2	1	45	100	
4	Fiddlyment	Blue Oaks to Pleasant Grove	23,900	83		17	2	1	45	100	
5	Fiddlyment	Pleasant Grove to Baseline	24,400	83		17	2	1	45	100	
6	Blue Oaks	West of Fiddlyment	8,900	83		17	2	1	45	100	
7	Blue Oaks	Fiddlyment to Del Webb	22,000	83		17	2	1	45	100	
8	Blue Oaks	Del Webb to Foothills	39,400	83		17	2	1	45	100	
9	Hayden (South)	West of Fiddlyment	2,900	83		17	2	1	30	100	

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Predicted Levels**

Project #: 2010-121 Fiddlyment Ranch  
 Description: Existing + Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Fiddlyment	North of Hayden North	53.6	45.0	46.4	54.8
2	Fiddlyment	Hayden North to Blue Oaks	63.8	55.2	56.7	65.1
3	Fiddlyment	Blue Oaks to Hayden South	64.2	55.5	57.0	65.4
4	Fiddlyment	Blue Oaks to Pleasant Grove	65.6	57.0	58.5	66.8
5	Fiddlyment	Pleasant Grove to Baseline	65.7	57.1	58.6	66.9
6	Blue Oaks	West of Fiddlyment	61.3	52.7	54.2	62.5
7	Blue Oaks	Fiddlyment to Del Webb	65.2	56.6	58.1	66.5
8	Blue Oaks	Del Webb to Foothills	67.8	59.1	60.6	69.0
9	Hayden (South)	West of Fiddlyment	51.4	45.1	49.2	54.0

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Noise Contour Output**

Project #: 2010-121 Fiddlyment Ranch  
 Description: Existing + Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	----- Distances to Traffic Noise Contours -----					
			75	70	65	60	55	
1	Fiddlyment	North of Hayden North	5	10	21	45	97	
2	Fiddlyment	Hayden North to Blue Oaks	22	47	101	218	470	
3	Fiddlyment	Blue Oaks to Hayden South	23	49	106	229	494	
4	Fiddlyment	Blue Oaks to Pleasant Grove	29	61	132	285	615	
5	Fiddlyment	Pleasant Grove to Baseline	29	62	134	289	623	
6	Blue Oaks	West of Fiddlyment	15	32	69	148	318	
7	Blue Oaks	Fiddlyment to Del Webb	27	58	125	270	582	
8	Blue Oaks	Del Webb to Foothills	40	86	185	398	858	
9	Hayden (South)	West of Fiddlyment	4	9	18	40	86	

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Data Input Sheet**

Project #: 2010-121 Fiddlyment Ranch  
 Description: 2025 CIP No Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Fiddlyment	North of Hayden North	6,700	83		17	2	1	45	100	
2	Fiddlyment	Hayden North to Blue Oaks	29,300	83		17	2	1	45	100	
3	Fiddlyment	Blue Oaks to Hayden South	35,100	83		17	2	1	45	100	
4	Fiddlyment	Blue Oaks to Pleasant Grove	59,900	83		17	2	1	45	100	
5	Fiddlyment	Pleasant Grove to Baseline	44,600	83		17	2	1	45	100	
6	Blue Oaks	West of Fiddlyment	27,700	83		17	2	1	45	100	
7	Blue Oaks	Fiddlyment to Del Webb	46,200	83		17	2	1	45	100	
8	Blue Oaks	Del Webb to Foothills	78,000	83		17	2	1	45	100	
9	Hayden (South)	West of Fiddlyment	4,100	83		17	2	1	30	100	

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Predicted Levels**

Project #: 2010-121 Fiddlyment Ranch  
 Description: 2025 CIP No Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Fiddlyment	North of Hayden North	60.1	51.5	52.9	61.3
2	Fiddlyment	Hayden North to Blue Oaks	66.5	57.9	59.3	67.7
3	Fiddlyment	Blue Oaks to Hayden South	67.3	58.6	60.1	68.5
4	Fiddlyment	Blue Oaks to Pleasant Grove	69.6	61.0	62.5	70.8
5	Fiddlyment	Pleasant Grove to Baseline	68.3	59.7	61.2	69.5
6	Blue Oaks	West of Fiddlyment	66.2	57.6	59.1	67.5
7	Blue Oaks	Fiddlyment to Del Webb	68.4	59.8	61.3	69.7
8	Blue Oaks	Del Webb to Foothills	70.7	62.1	63.6	72.0
9	Hayden (South)	West of Fiddlyment	52.9	46.6	50.7	55.5

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Noise Contour Output**

Project #: 2010-121 Fiddlyment Ranch  
 Description: 2025 CIP No Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Distances to Traffic Noise Contours -----					
			75	70	65	60	55	
1	Fiddlyment	North of Hayden North	12	26	57	122	263	
2	Fiddlyment	Hayden North to Blue Oaks	33	70	152	327	704	
3	Fiddlyment	Blue Oaks to Hayden South	37	79	171	369	794	
4	Fiddlyment	Blue Oaks to Pleasant Grove	53	113	244	526	1134	
5	Fiddlyment	Pleasant Grove to Baseline	43	93	201	432	932	
6	Blue Oaks	West of Fiddlyment	31	68	146	315	678	
7	Blue Oaks	Fiddlyment to Del Webb	44	95	205	443	954	
8	Blue Oaks	Del Webb to Foothills	63	135	291	628	1352	
9	Hayden (South)	West of Fiddlyment	5	11	23	50	108	



**Appendix C**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Data Input Sheet**

Project #: 2010-121 Fiddlyment Ranch  
 Description: 2025 CIP With Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Fiddlyment	North of Hayden North	7,200	83		17	2	1	45	100	
2	Fiddlyment	Hayden North to Blue Oaks	31,000	83		17	2	1	45	100	
3	Fiddlyment	Blue Oaks to Hayden South	35,500	83		17	2	1	45	100	
4	Fiddlyment	Blue Oaks to Pleasant Grove	59,700	83		17	2	1	45	100	
5	Fiddlyment	Pleasant Grove to Baseline	44,200	83		17	2	1	45	100	
6	Blue Oaks	West of Fiddlyment	28,800	83		17	2	1	45	100	
7	Blue Oaks	Fiddlyment to Del Webb	48,900	83		17	2	1	45	100	
8	Blue Oaks	Del Webb to Foothills	80,400	83		17	2	1	45	100	
9	Hayden (South)	West of Fiddlyment	4,000	83		17	2	1	30	100	

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Predicted Levels**

Project #: 2010-121 Fiddymment Ranch  
 Description: 2025 CIP With Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Fiddymment	North of Hayden North	60.4	51.8	53.3	61.6
2	Fiddymment	Hayden North to Blue Oaks	66.7	58.1	59.6	68.0
3	Fiddymment	Blue Oaks to Hayden South	67.3	58.7	60.2	68.5
4	Fiddymment	Blue Oaks to Pleasant Grove	69.6	61.0	62.4	70.8
5	Fiddymment	Pleasant Grove to Baseline	68.3	59.6	61.1	69.5
6	Blue Oaks	West of Fiddymment	66.4	57.8	59.3	67.6
7	Blue Oaks	Fiddymment to Del Webb	68.7	60.1	61.6	69.9
8	Blue Oaks	Del Webb to Foothills	70.9	62.2	63.7	72.1
9	Hayden (South)	West of Fiddymment	52.7	46.5	50.6	55.4



Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Noise Contour Output**

Project #: 2010-121 Fiddlyment Ranch  
 Description: 2025 CIP With Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	----- Distances to Traffic Noise Contours -----				
			75	70	65	60	55
1	Fiddlyment	North of Hayden North	13	28	60	128	276
2	Fiddlyment	Hayden North to Blue Oaks	34	73	157	339	731
3	Fiddlyment	Blue Oaks to Hayden South	37	80	172	371	800
4	Fiddlyment	Blue Oaks to Pleasant Grove	53	113	244	525	1132
5	Fiddlyment	Pleasant Grove to Baseline	43	93	200	430	926
6	Blue Oaks	West of Fiddlyment	32	70	150	323	696
7	Blue Oaks	Fiddlyment to Del Webb	46	99	213	460	991
8	Blue Oaks	Del Webb to Foothills	64	138	297	640	1380
9	Hayden (South)	West of Fiddlyment	5	11	23	49	106

**Appendix C**  
**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**  
**Data Input Sheet**

Project #: 2010-121 Fiddymment Ranch  
 Description: Internal 2025 CIP With Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Fiddymment	Hayden North to Blue Oaks	31,000	83		17	2	1	45	100	
2	Hayden	Blue Oaks to Collector One	9,900	83		17	2	1	45	75	
3	Hayden	Collector One to Parkway One	4,900	83		17	2	1	45	75	
4	Hayden	N/S Collector to Fiddymment	4,900	83		17	2	1	45	75	
5	Collector One	N/S Collector to Fiddymment	7,100	83		17	2	1	45	75	
6	Parkway One	West of Hayden	4,000	83		17	2	1	45	75	
7											
8											
9											



Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Predicted Levels**

Project #: 2010-121 Fiddlyment Ranch  
 Description: Internal 2025 CIP With Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Fiddlyment	Hayden North to Blue Oaks	66.7	58.1	59.6	68.0
2	Hayden	Blue Oaks to Collector One	63.6	55.0	56.5	64.9
3	Hayden	Collector One to Parkway One	60.6	52.0	53.5	61.8
4	Hayden	N/S Collector to Fiddlyment	60.6	52.0	53.5	61.8
5	Collector One	N/S Collector to Fiddlyment	62.2	53.6	55.1	63.4
6	Parkway One	West of Hayden	59.7	51.1	52.6	60.9

Appendix C

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model  
Noise Contour Output**

Project #: 2010-121 Fiddlyment Ranch  
 Description: Internal 2025 CIP With Project  
 Ldn/CNEL: Ldn  
 Hard/Soft: Soft

Segment	Roadway Name	Segment Description	----- Distances to Traffic Noise Contours -----					
			75	70	65	60	55	
1	Fiddlyment	Hayden North to Blue Oaks	34	73	157	339	731	
2	Hayden	Blue Oaks to Collector One	16	34	74	159	342	
3	Hayden	Collector One to Parkway One	10	21	46	99	214	
4	Hayden	N/S Collector to Fiddlyment	10	21	46	99	214	
5	Collector One	N/S Collector to Fiddlyment	13	27	59	127	274	
6	Parkway One	West of Hayden	9	19	40	87	187	