

**NOISE ASSESSMENT TECHNICAL REPORT**  
**for the**  
**Placer County Government Center Master Plan Update**  
**Placer County, California**

*Prepared for:*

**Placer County Department of Facility Services**  
*Contact: Paul Breckenridge*

*Prepared by:*

**DUDEK**  
1102 R Street Sacramento, California 95811  
*Contact: Christopher Barnobi*

**AUGUST 2018**



# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## TABLE OF CONTENTS

<b><u>Section</u></b>	<b><u>Page No.</u></b>
<b>ACRONYMS AND ABBREVIATIONS.....</b>	<b>VI</b>
<b>1 INTRODUCTION.....</b>	<b>1</b>
1.1 Purpose.....	1
1.2 Project Location and Description.....	1
1.2.1 Location .....	1
1.2.2 Project Description.....	1
<b>2 NOISE BACKGROUND AND TERMINOLOGY .....</b>	<b>9</b>
2.1 Fundamentals of Environmental Noise.....	9
<b>3 NOISE REGULATION AND MANAGEMENT .....</b>	<b>13</b>
3.1 Federal.....	13
3.2 State.....	14
3.3 Local: Auburn/Bowman Community Plan .....	16
3.4 Local: Placer County General Plan.....	19
3.5 Local: Placer County Airport Land Use Compatibility Plan .....	22
3.6 Local: Placer County Noise Ordinance.....	23
<b>4 EXISTING NOISE CONDITIONS.....</b>	<b>27</b>
4.1 Prior and Existing On-Site Uses .....	27
4.2 Ambient Noise Measurements .....	27
4.3 Modeled Existing Transportation Noise .....	33
<b>5 THRESHOLDS OF SIGNIFICANCE.....</b>	<b>39</b>
5.1 Noise Significance Criteria .....	39
<b>6 IMPACTS AND MITIGATION.....</b>	<b>41</b>
6.1 Transportation Noise Exposure.....	41
6.1.1 Traffic Noise Generation Impact Analysis Master Plan .....	41
6.1.2 Traffic Noise Exposure Impact Analysis Multifamily Residential.....	44
6.1.3 Traffic Noise Exposure Impact Analysis Health and Human Services Building .....	45
6.1.4 Mitigation Measures .....	46
6.2 General Operations Noise .....	46
6.2.1 Impact Analysis .....	46
6.2.2 Mitigation Measures .....	46

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## TABLE OF CONTENTS (CONTINUED)

<u>Section</u>	<u>Page No.</u>
6.3 Construction Noise Analysis.....	47
6.3.1 Construction Analysis Health and Human Services Building and Multifamily Residential Projects .....	49
6.3.2 Construction Noise Analysis - Master Plan Level .....	52
6.3.3 Mitigation Measures .....	52
6.4 Ground-borne Vibration.....	52
6.4.1 Impact Analysis .....	52
6.4.2 Mitigation Measures .....	54
<b>7 REFERENCES.....</b>	<b>55</b>

## APPENDICES

A	FHWA Traffic Model Noise Results
B	Ambient Noise Measurement Data
C	Roadway Noise Construction Model (RNCM) Input and Results Data Sheets

## FIGURES

1	Project Location .....	5
2	Plan Area Overview .....	7
3	Noise Measurement Locations.....	31
4	Noise Modeling Locations .....	37

## TABLES

1	Outside-to-Inside Noise Attenuation (dBA) .....	11
2	Significance of Changes in Noise Exposure.....	13
3	Land Use Compatibility for Community Noise Environments .....	16
4	Noise Level Performance Standards for New Projects Affected by or Including Non-Transportation Sources (Table 14 of the Auburn/Bowman Community Plan) .....	17
5	Maximum Allowable Noise Exposure for Transportation Noise Sources (Table 16 of the Auburn/Bowman Community Plan).....	18
6	Requirements for an acoustical analysis (Table 15 in Noise Element) .....	19

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## TABLE OF CONTENTS (CONTINUED)

	<u>Page No.</u>
7 Allowable L <sub>dn</sub> Noise Levels Within Specified Zone Districts <sup>1</sup> Applicable to New Projects Affected by or Including Non-Transportation Noise Sources.....	19
8 Sound Level Standards (On-site).....	25
9 Short-Term Sound Level Measurements .....	28
10 Long-Term Sound Level Measurements .....	28
11 Traffic Data for Vicinity Roadways .....	34
12 Existing CNEL for Vicinity Roadways .....	35
13 Existing Traffic Noise Modeling Results at Representative Receivers .....	41
14 Cumulative Traffic Noise Model Results at Representative Receivers .....	43
15 Cumulative Traffic Noise Model Results at Representative Receivers.....	44
16 Cumulative Traffic Noise Model Results at Representative Receivers.....	45
17 Typical Construction Equipment Noise Levels .....	48
18 Typical Construction Equipment Noise Levels .....	49
19 Construction Noise Modeling Summary Results.....	51
20 Construction Vibration PPV .....	53

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulation
CNEL	community noise equivalent level
dB	decibel
dBA	A-weighted decibel
DOT	U.S. Department of Transportation
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
Hz	hertz
L <sub>dn</sub>	day-night sound level
Leq	equivalent sound level
L <sub>min</sub>	minimum sound level
L <sub>max</sub>	maximum sound level
L <sub>xx</sub>	percentile exceeded sound level, where xx is a percentage
RMS	root mean square
SR	State Route
VdB	vibration decibels

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

## **1 INTRODUCTION**

### **1.1 Purpose**

This technical noise report evaluates noise effects of the project including noise generation potential associated with construction and operation of the proposed Placer County Government Center Master Plan Update and two specific projects within the Master Plan Update scope. Noise generation sources from future implementation of the project include traffic, mechanical equipment, and short-term construction operations.

### **1.2 Project Location and Description**

#### **1.2.1 Location**

The project site (study area) is located west of State Highway 49 between Bell Road and Atwood Road and east of Deseret Drive in Placer County, California. The study area occurs in Section 32, Township 13 North, and Range 8 East of the U.S. Geological Survey Auburn 7.5-minute quadrangle. The approximate center of the study area corresponds to 38°56'17.92" north latitude and 121°06'33.22" west longitude.

The study area consists of approximately 200 acres of mostly developed land with several undeveloped lots that have been managed (mowed or disked) or turned into open space (such as parks or fields). Upon review of historical aerial photographs, many of these lots were previously developed with buildings constructed in the early 1940s. Several buildings were demolished between 2005 and 2008 as part of Placer County's (County's) implementation of the 2003 DeWitt Government Center Facility Plan (2003–2010), which was the prior master plan update for the study area (Figure 1, Project Location and Figure 2, Plan Area Overview).

The Placer County Government Center (PCGC) is located in Placer County with residential, institutional, and commercial uses in the vicinity of the site. Please refer to Figure 1 for an illustration of the regional setting of the project. Please refer to Figure 2 for an illustration of the PCGC project area, including relationship to the roadway system just described and location indicators at the Health and Human Services Project (HHS) and Multifamily Residential Project (MFR).

#### **1.2.2 Project Description**

The project proposes to update the 1993 Master Plan for the PCGC and to establish a long-term vision and ongoing facilities planning guide, which the County intends to employ for capital improvement projects on the PCGC campus with a 20-year planning horizon. The PCGC Master Plan Update includes a campus vision, development context and guiding principles, site and

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

facilities assessment, facility utilization study, transportation and circulation planning, infrastructure and utilities planning, landscape and open space planning, an economic development study, site and facilities planning, zero net energy and water planning, and a phasing and implementation plan.

The proposed plan consists of various development types: county facilities, retail/service commercial, offices, multifamily and single-family residential units; public park facilities and trails; and open space. The plan proposes modifications to existing roadways; new roadways at certain key locations to provide greater connectivity; improvements to transit, bicycle, and pedestrian facilities; and corresponding circulation connections.

## **PCGC Master Plan Update Project-Level Components**

A summary of the project's proposed components considered to be relevant for this noise assessment are summarized below.

### ***Health and Human Services Building***

The proposed PCGC Master Plan Update would involve construction of a new HHS building near the center of the PCGC campus, southwest of the proposed roundabout that would connect County Center Drive with B Avenue. It would be bounded by existing B Avenue, C Avenue, Rustic Lane, and Richardson Drive. Under the proposed PCGC Master Plan Update, Rustic Lane would be renamed to County Center Drive and extended to the southeast. The HHS building would be placed on the eastern portion of this site, with frontages on B Avenue, County Center Drive, and C Avenue, and with parking extending westerly to Richardson Drive.

This area currently supports Buildings 107, 108, and 109 at 11464 B Avenue/11465 C Avenue, 11474 B Avenue/11475 C Avenue, and 11484 B Avenue/11485 C Avenue, all of which would be demolished to accommodate construction of the proposed HHS building; this represents a total of 29,195 square feet of demolition.

The HHS building would be constructed on behalf of the County under a currently undetermined design and construction delivery process. Detailed building plans will be prepared in the future. The following description of the proposed HHS building is based on the Facility Programming Report (County of Placer 2016), which defines the anticipated site; building size, usage, space types, and adjacencies; and basic building systems.

The County has found that the “current HHS facilities are insufficient for current use and future growth. Many of these existing facilities do not provide adequate work environments, and cannot be expanded to meet the needs of the department’s expected growth” (County of Placer 2016). The

## **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

proposed new building would allow the County to respond to its increasing population and shifting demographics, which contribute to increased demands for County public services. Further, the proposed new HHS building would allow the County to consolidate the six HHS divisions (i.e., Administration, Adult System of Care, Children’s System of Care, Environmental Health, Human Services, and Public Health) in a single location. The divisions, which often share common clientele, are currently housed in separate facilities on the PCGC campus and in privately owned leased spaces in the Auburn area. Consolidating the divisions in a modern facility will improve the public service experience for residents and HHS employees, and will allow County staff to better connect with County residents who need services through updated technology.

The HHS building is expected to consist of approximately 135,701 square feet of building space on a 5.6-acre site, with up to 10,226 square feet of amenity space, for a total size of 145,927 square feet. The building would house the existing approximately 435 HHS employees, and would accommodate the anticipated employee growth over the next 20 years. Projections of staff growth for the HHS division were developed based on “increasing population densities within the Auburn service areas of the County; expansion of services to unincorporated areas of the County; administrative conformance with new regulations; and ongoing maintenance of existing infrastructure” (County of Placer 2016). Based on the staffing projections completed in preparation of the Facility Programming Report, it is expected that the HHS building would house up to approximately 577 employees in 2035 (County of Placer 2016).

The building is planned to consist of three stories, with a maximum building height of 45 feet. Building design, materials, colors, and landscaping must conform to the design guidelines incorporated in the proposed PCGC Master Plan Update. Site improvements would include parking, vehicle and pedestrian circulation, landscaping, and stormwater infrastructure. The building and associated improvements would be located on 5.6 acres. Building space would include a main lobby, conference and team rooms, open and private office areas, training and interview rooms, storage and work rooms, break rooms, central storage, and a receiving area. Outdoor spaces for the facility would include patios, a play area, a garden, and a service/loading dock. The building site is anticipated to accommodate parking for 406 employees initially, with the potential to add 56 spaces in the future. Parking would also be provided for 48 visitors and 40 fleet vehicles. The parking lot would extend from the building westerly to Richardson Drive.

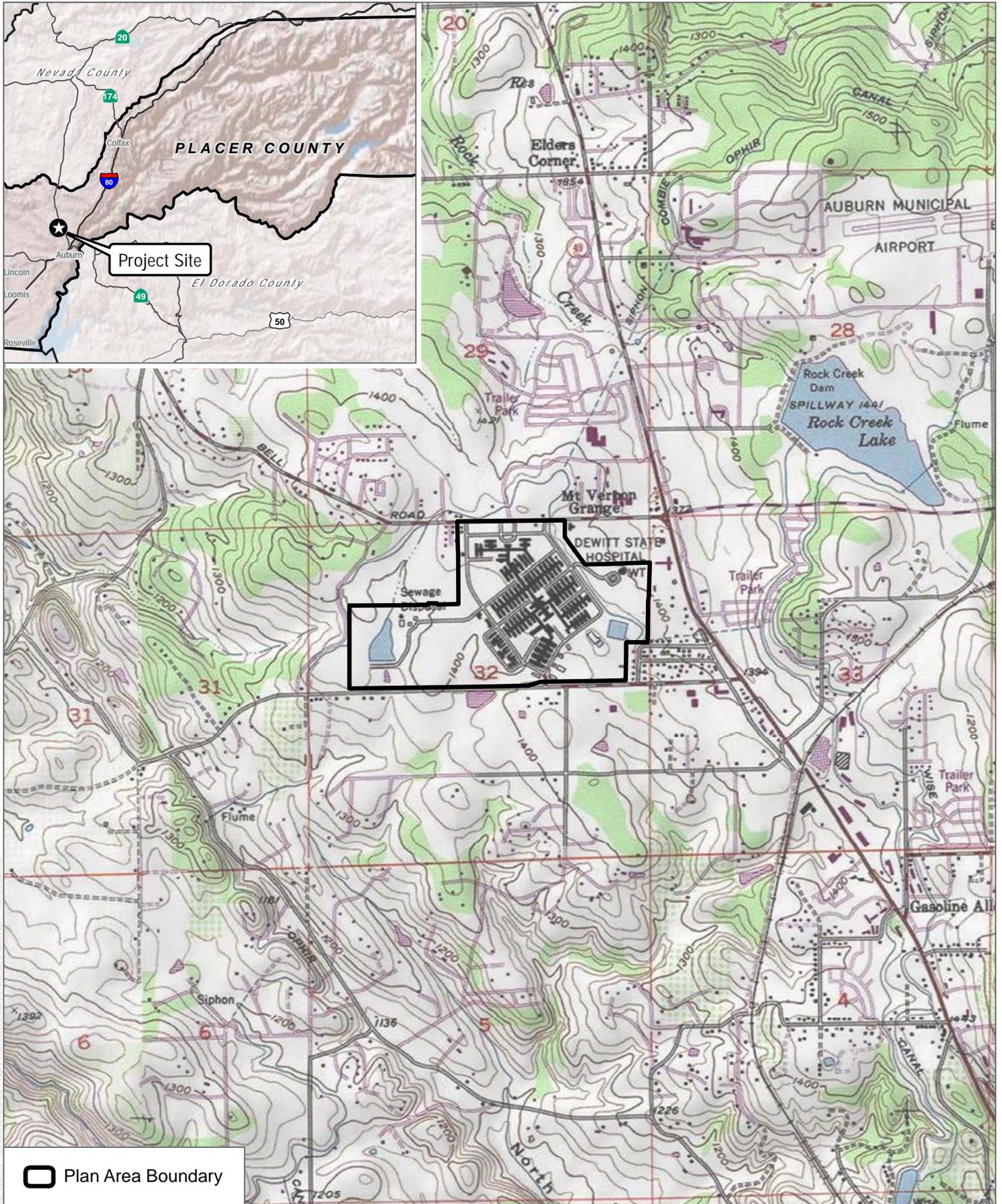
### ***Multifamily Residential***

The proposed PCGC Master Plan Update would provide multifamily residential use in the northeastern portion of the project site on the east side of First Street.

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK



SOURCE: USGS 7.5-Minute Series Auburn Quadrangle

FIGURE 1

Project Location

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK



SOURCE: Bing Maps 2018; Placer County 2016

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

## **2 NOISE BACKGROUND AND TERMINOLOGY**

### **2.1 Fundamentals of Environmental Noise**

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting called “A” weighting is typically used for quieter noise levels which de-emphasizes the low frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the “noise level” and is referenced in units of dBA.

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dBA are not typically noticed by the human ear (U.S. DOT 1980). Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA increase is readily noticeable (EPA 1973). The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual’s noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment. The background, or ambient, noise level gradually changes throughout a typical day, corresponding to distant noise sources, such as traffic volume, as well as changes in atmospheric conditions.

Noise levels are generally higher during the daytime and early evening when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed “community noise equivalent level” (CNEL) was developed, wherein noise measurements are weighted, added, and averaged over a 24-hour period to reflect magnitude, duration, frequency, and time of occurrence. A complete definition of CNEL is provided below.

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level ( $L_{eq}$ ), the minimum and maximum sound levels ( $L_{min}$  and  $L_{max}$ ), percentile-exceeded sound levels ( $L_{xx}$ ), the day–night sound level ( $L_{dn}$ ), and the CNEL. Below are brief definitions of these measurements and other terminology used in this report.

- *Decibel* (dB) is a unitless measure of sound on a logarithmic scale which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- *A-weighted decibel* (dBA) is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- *Equivalent sound level* ( $L_{eq}$ ) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the day–night average sound levels ( $L_{dn}$ ) and community noise equivalent level (CNEL) scales.
- *Maximum sound level* ( $L_{max}$ ) is the maximum sound level measured during the measurement period.
- *Minimum sound level* ( $L_{min}$ ) is the minimum sound level measured during the measurement period.
- *Percentile-exceeded sound level* ( $L_{xx}$ ) is the sound level exceeded x percent of a specific time period.  $L_{10}$  is the sound level exceeded 10% of the time.
- *Day–night average sound level* ( $L_{dn}$ ) is a single value assessment of the community noise levels. The  $L_{dn}$  is a 24-hour average A-weighted sound level with a 10 dB penalty added to the nighttime hours from 10:00 p.m. to 7:00 a.m. The 10 dB penalty is applied to account for increased noise sensitivity during the nighttime hours. Noise limits are described in terms of  $L_{dn}$  *or* CNEL (see definition below); resulting values from application of  $L_{dn}$  versus CNEL rarely differ by more than 1 dB, and therefore these two methods of describing average noise levels are often considered interchangeable.
- *Community noise equivalent level* (CNEL) describes community noise levels in a similar manner as  $L_{dn}$ . The CNEL is the average equivalent A-weighted sound level during a 24-hour day in the same way  $L_{dn}$  is. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dB to the sound levels in the evening and 10 dB to the sound levels at night. CNEL and  $L_{dn}$  are often considered equivalent descriptors.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## Exterior Noise Distance Attenuation

Noise sources are classified in two forms: (1) point sources, such as stationary equipment or a group of construction vehicles and equipment working within a spatially limited area at a given time, and (2) line sources, such as a roadway with a large number of pass-by sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0 dBA for each doubling of distance from the source to the receptor at acoustically “hard” sites and at a rate of 7.5 dBA for each doubling of distance from source to receptor at acoustically “soft” sites. Sound generated by a line source (i.e., a roadway) typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling distance, for hard and soft sites, respectively. Sound levels can also be attenuated by man-made or natural barriers. For the purpose of sound attenuation discussion, a “hard” or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt or concrete ground surfaces, as well as very hard-packed soils. An acoustically “soft” or absorptive site is characteristic of unpaved loose soil or vegetated ground.

## Structural Noise Attenuation

Sound levels can also be attenuated by man-made or natural barriers. Solid walls or slopes associated with elevation differences typically reduce noise levels by 5 to 10 dBA (U.S. DOT 1980). Structures can also provide noise reduction by insulating interior spaces from outdoor noise. The outside-to-inside noise attenuation provided by typical structures in California ranges between 17 to 30 dBA with open and closed windows, respectively, as shown in Table 1.

**Table 1**  
**Outside-to-Inside Noise Attenuation (dBA)**

Building Type	Open Windows	Closed Windows
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Offices/Hotels	17	25
Theaters	17	25

**Source:** Transportation Research Board, National Research Council, 2000.

<sup>a</sup> As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.

## Fundamentals of Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. The response of humans to vibration is very complex. However, it is generally accepted that human response is best approximated by the vibration velocity level associated with the vibration occurrence.

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

Heavy equipment operation, including stationary equipment that produces substantial oscillation or construction equipment that causes percussive action against the ground surface, may be perceived by building occupants as perceptible vibration. It is also common for ground-borne vibration to cause windows, pictures on walls, or items on shelves to rattle. Although the perceived vibration from such equipment operation can be intrusive to building occupants, the vibration is seldom of sufficient magnitude to cause even minor cosmetic damage to buildings.

When evaluating human response, ground-borne vibration is usually expressed in terms of root mean square (RMS) vibration velocity. RMS is defined as the average of the squared amplitude of the vibration signal. As for sound, it is common to express vibration amplitudes in terms of decibels defined as:

$$L_v = 20 \log \left( \frac{v_{rms}}{v_{ref}} \right)$$

where  $v_{rms}$  is the RMS vibration velocity amplitude in inches/second and  $v_{ref}$  is the decibel reference of  $1 \times 10^{-6}$  inches/second.

To avoid confusion with sound decibels, the abbreviation VdB is used for vibration decibels. The vibration threshold of perception for most people is around 65 VdB. Vibration levels in the 70 to 75 VdB range are often noticeable but generally deemed acceptable, and levels in excess of 80 VdB are often considered unacceptable (FTA 2006).

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## 3 NOISE REGULATION AND MANAGEMENT

### 3.1 Federal

The EPA has set forth guidelines regarding noise levels identified as necessary to protect public health and welfare related to noise in its document entitled “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety”. This document provides 24-hour exposure limits to protect against hearing loss as 70 dB Leq (24), and also specifies that indoor residential activity should not be exposed to greater than  $L_{dn}$  of 45 dBA (EPA 1974).

Table 2 summarizes recommended threshold to define when an increase in noise level is significant based on studies by the Federal Interagency Committee on Noise (FICON). The FICON studies assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The 2000 FICON findings provide some guidance as to the significance of changes in ambient noise levels due to transportation noise sources. The FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a summary measure of the general adverse reaction of people to noise that interferes with speech and conversation, sleep, or the desire for a tranquil environment.

The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of  $L_{dn}$ . The changes in noise exposure relative to existing noise levels, as shown in Table 2, are considered to be changes that are sufficient to cause annoyance and potentially to interfere with normal activities at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis for traffic noise described in terms of  $L_{dn}$ .

As shown in Table 2, an increase in noise from similar sources of 5 dBA or more would be noticeable where the ambient level is less than 60 dBA. Where the ambient level is between 60 and 65 dBA, an increase in noise of 3 dBA or more would be noticeable, and an increase of 1.5 dBA or more would be noticeable where the ambient noise level exceeds 65 dBA  $L_{dn}$ . The rationale for the criteria shown in Table 2 is that, as ambient noise levels increase, a smaller increase in noise resulting from a project would be noticeable.

**Table 2**  
**Significance of Changes in Noise Exposure**

Ambient Noise Level without Project	Increase Required for Significant Impact
< 60 dB	+5.0 dB or more

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

**Table 2**  
**Significance of Changes in Noise Exposure**

Ambient Noise Level without Project	Increase Required for Significant Impact
60-65 dB	+3.0 dB or more
> 65 dB	+1.5 dB or more

Source: (FICON, 2000)

## **Federal Transit Administration and Federal Railroad Administration Standards**

Although the Federal Transit Administration (FTA) standards are intended for federally funded mass transit projects, the impact assessment procedures and criteria included in the FTA Transit Noise and Vibration Impact Assessment Manual (May 2006) are routinely used for projects proposed by local jurisdictions. The FTA and Federal Railroad Administration (FRA) have published guidelines for assessing the impacts of ground-borne vibration associated with rail projects, which have been applied by other jurisdictions to other types of projects. The FTA threshold for architectural damage involving conventional sensitive structures is 0.2 inch/second peak particle velocity (PPV).

## **Federal Highway Administration**

Guidance regarding the determination of a substantial permanent increase in ambient noise levels in the project vicinity above existing levels is provided by the Federal Highway Administration (FHWA) and California Department of Transportation (Caltrans). In Title 23 Part 772 of the Code of Federal Regulations, a substantial noise increase for federally funded transportation projects is defined as a range (to be determined by each state's transportation department) between 5 and 15 dBA above existing ambient levels (FHWA 2010). In the State of California, Caltrans defines a substantial noise increase as 12 dBA or more (Caltrans 2011).

## **3.2 State**

### **California Noise Control Act of 1973**

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

## **California Noise Insulation Standards (CCR Title 24)**

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for hotels, motels, dormitories, and multi-family residential buildings (CCR Title 24, Part 2). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The regulations also specify that acoustical studies must be prepared whenever a multi-family residential building or structure is proposed to be located in an area with CNEL (or  $L_{dn}$ ) of 60 dBA or greater. Such acoustical analysis must demonstrate that the residence has been designed to limit intruding noise to an interior CNEL (or  $L_{dn}$ ) of at least 45 dBA (California's Title 24 Noise Standards, Chap. 2-35).

Typically buildings have an exterior to interior noise reduction of about 25 dB with the windows closed and approximately 15 dB with the windows open. Therefore, rooms exposed to an exterior community noise level greater than 60 dB could result in an interior community noise level greater than 45 dB. The California Building Code requires an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than  $L_{dn}$  60 dBA. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

### **State**

The state has established noise insulation standards for new single family residences, multi-family residential units, hotels, and motels that would be subject to relatively high levels of transportation-related noise. These requirements are collectively known as the California Noise Insulation Standards (Title 24, California Code of Regulations). The noise insulation standards set forth an interior standard of  $L_{dn}$  45 dBA in any habitable room. The California Building Code requires an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than  $L_{dn}$  60 dBA. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

The state of California has published Land Use Compatibility Guidelines to aid local jurisdictions in setting Community Noise Guidelines (OPR 2003). Table 3 shows the Land Use Compatibility Guidelines.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

**Table 3  
Land Use Compatibility for Community Noise Environments**

	Community Noise Exposure (CNEL)			
	<i>Normally Acceptable<sup>1</sup></i>	<i>Conditionally Acceptable<sup>2</sup></i>	<i>Normally Unacceptable<sup>3</sup></i>	<i>Clearly Unacceptable<sup>4</sup></i>
Residential-low density, single-family, duplex, mobile homes	50–60	55–70	70–75	75–85
Residential – multiple-family	50–65	60–70	70–75	70–85
Transit lodging – motel, hotels	50–65	60–70	70–80	80–85
Schools, libraries, churches, hospitals, nursing homes	50–70	60–70	70–80	80–85
Auditoriums, concert halls, amphitheatres	NA	50–70	NA	65–85
Sports arenas, outdoor spectators sports	NA	50–75	NA	70–85
Playgrounds, neighborhood parks	50–70	NA	67.5–77.5	72.5–85
Golf courses, riding stables, water recreation, cemeteries	50–70	NA	70–80	80–85
Office buildings, business commercial and professional	50–70	67.5–77.5	75–85	NA
Industrial, manufacturing, utilities, agriculture	50–75	70–80	75–85	NA

**Source:** OPR 2003

**Notes:** CNEL = community noise equivalent level; NA = not applicable

- <sup>1</sup> Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
- <sup>2</sup> Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features have been included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
- <sup>3</sup> Normally Unacceptable: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise-insulation features must be included in the design.
- <sup>4</sup> Clearly Unacceptable: New construction or development should generally not be undertaken.

### 3.3 Local: Auburn/Bowman Community Plan

The Auburn/Bowman Community Plan contains policies governing noise related to development within the communities of Auburn and Bowman. The Auburn/Bowman Community Plan does not specifically address noise generated during construction activities.

**Goal III.F.2.a.** To protect community plan area residents from the harmful and annoying effects of exposure to excessive noise.

**Goal III.F.2.b.** To preserve the rural noise environment of the community plan area and surrounding areas.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

**Goal III.F.2.c.** To protect the economic base of the community plan area by preventing incompatible land uses from encroaching upon existing or planned noise-producing uses.

**Goal III.F.2.d.** To encourage the application of state of the art land use planning methodologies in areas of potential noise conflicts.

**III.F.3.a** New development of noise-sensitive uses shall not be allowed where the noise level due to non-transportation noise sources will exceed the noise level standards of Table 4 as measured immediately within the property line of new development, unless effective noise mitigation measures have been incorporated into the development design to achieve the standards specified in Table 5.

**Table 4  
Noise Level Performance Standards for New Projects Affected by or Including  
Non-Transportation Sources (Table 14 of the Auburn/Bowman Community Plan)**

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly Leq, dB	50	45
Maximum Level, dB	70	65

**Note:** Each of the noise levels specified above shall be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwelling).

**Source:** Auburn/Bowman Community Plan: Community Development Element

**III.F.3.b** Noise created by new non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of Table 4 as measured immediately within the property line of lands designated for noise-sensitive uses.

**III.F.3.c** Where proposed non-residential land uses are likely to produce noise levels exceeding the performance standards of Table 4 at existing or planned noise-sensitive uses, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design.

**III.F.3.d** The feasibility of proposed projects with respect to existing and future transportation noise levels shall be evaluated by comparison to Table 4.

**III.F.3.e** New development of noise-sensitive land uses will not be permitted in areas exposed to existing or projected levels of noise from transportation noise sources which exceed the levels specified in Table 5, unless the project design includes

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

effective mitigation measures to reduce noise in outdoor activity areas and interior spaces to the level specified in Table 5.

**Table 5**  
**Maximum Allowable Noise Exposure for Transportation**  
**Noise Sources (Table 16 of the Auburn/Bowman Community Plan)**

Land Use	Outdoor Activity Areas <sup>1</sup>	Interior Spaces	Interior Spaces
	( $L_{dn}/CNEL$ , dB)	( $L_{dn}/CNEL$ , dB)	$Leq$ / $dB^2$
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	60 <sup>3</sup>	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

1. 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  $L_{dn}/CNEL$  or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65  $L_{dn}/CNEL$  may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table. For properties affected by transportation noise from I-80 or railroad tracks, this maximum level shall be 70  $L_{dn}/CNEL$ , provided that interior levels are in compliance with this table.

**Source:** Auburn/Bowman Community Plan: Community Development Element

**III.F.3.f** Noise created by new transportation noise sources, including roadway improvement projects, shall be mitigated so as not to exceed the levels as specified in Table 5 at outdoor activity areas or interior spaces of existing noise-sensitive land uses in either the incorporated or unincorporated areas.

**III.F.3.g** Where noise-sensitive land uses are proposed in areas exposed to existing or projected exterior noise levels exceeding the levels specified in Table 4 or the performance standards of Table 6, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design.

**III.F.3.h** Where noise mitigation measures are required to achieve the standards of Tables 4 and 5, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

**Table 6**  
**Requirements for an acoustical analysis (Table 15 in Noise Element)**

An acoustical analysis prepared pursuant to the Noise Element shall:	
1.	Be the responsibility of the applicant
2.	Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics.
3.	Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions and the predominate noise sources.
4.	Estimate existing and projected cumulative (20 years) noise levels in terms of L <sub>dn</sub> or CNEL and/or the standards of Table 14*, and compare those levels to the adopted policies of the Noise Element. Noise prediction methodology must be consistent with the appendix to the Noise Element.
5.	Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element. Where the noise source in question consists of intermittent single events, the report must address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance.
6.	Estimate noise exposure after the prescribed mitigation measures have been implemented.
7.	Describe a post-project assessment program which could be used to evaluate the effective of the prosed mitigation measures.

## 3.4 Local: Placer County General Plan

The Placer County General Plan Noise Element contains goals and policies governing noise related to development within Placer County (Placer County 2013). The maximum allowable noise exposure limits for transportation noise sources are summarized in Table 7, which is Table 9-1 of the Placer County General Plan. General Plan policies applicable to the proposed project are listed below.

**Table 7**  
**Allowable L<sub>dn</sub> Noise Levels Within Specified Zone Districts<sup>1</sup> Applicable to New Projects  
Affected by or Including Non-Transportation Noise Sources**

Zone District of Receptor	Property Line of Receiving Use	Interior Spaces <sup>2</sup>
Residential adjacent to Industrial <sup>3</sup>	60	45
Other Residential <sup>4</sup>	50	45
Office/Professional	70	45
Transient Lodging	65	45
Neighborhood Commercial	70	45
General Commercial	70	45
Heavy Commercial	75	45
Limited Industrial	75	45
Highway Service	75	45
Shopping Center	70	45
Industrial	--	45
Industrial Park	75	45
Industrial Reserve	--	--

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

**Table 7**  
**Allowable  $L_{dn}$  Noise Levels Within Specified Zone Districts<sup>1</sup> Applicable to New Projects**  
**Affected by or Including Non-Transportation Noise Sources**

Zone District of Receptor	Property Line of Receiving Use	Interior Spaces <sup>2</sup>
Airport	--	45
Unclassified	--	--
Farm	(see footnote 6)	--
Agriculture Exclusive	(see footnote 6)	--
Forestry	--	--
Timberland Preserve	--	--
Recreation and Forestry	70	--
Open Space	--	--
Mineral Reserve	--	--

**Source:** Placer County General Plan 2013.

**Notes:**

- Except where noted otherwise, noise exposures will be those which occur at the property line of the receiving use.
- Where existing transportation noise levels exceed the standards of this table, the allowable  $L_{dn}$  shall be raised to the same level as that of the ambient level.
- If the noise source generated by, or affecting, the uses shown above consists primarily of speech or music, or if the noise source is impulsive in nature, the noise standards shown above shall be decreased by 5 dB.
- Where a use permit has established noise level standards for an existing use, those standards shall supersede the levels specified in Table 9-1 and Table 9-3. Similarly, where an existing use which is not subject to a use permit causes noise in excess of the allowable levels in Tables 9-1 and 9-3, said excess noise shall be considered the allowable level. If a new development is proposed which will be affected by noise from such an existing use, it will ordinarily be assumed that the noise levels already existing or those levels allowed by the existing use permit, whichever are greater, are those levels actually produced by the existing use.
- Existing industry located in industrial zones will be given the benefit of the doubt in being allowed to emit increased noise consistent with the state of the art at the time of expansion. In no case will expansion of an existing industrial operation because to decrease allowable noise emission limits. Increased emissions above those normally allowable should be limited to a one-time 5 dB increase at the discretion of the decision making body.
- The noise level standards applicable to land uses containing incidental residential uses, such as caretaker dwellings at industrial facilities and homes on agriculturally zoned land, shall be the standards applicable to the zone district, not those applicable to residential uses.
- Where no noise level standards have been provided for a specific zone district, it is assumed that the interior and/or exterior spaces of these uses are effectively insensitive to noise.

<sup>1</sup> Overriding policy on interpretation of allowable noise levels: Industrial-zoned properties are confined to unique areas of the County, and are irreplaceable. Industries which provide primary wage-earner jobs in the County, if forced to relocate, will likely be forced to leave the County. For this reason, industries operating upon industrial zoned properties must be afforded reasonable opportunity to exercise the rights/privileges conferred upon them by their zoning. Whenever the allowable noise levels herein fall subject to interpretation relative to industrial activities, the benefit of the doubt shall be afforded to the industrial use. Where an industrial use is subject to infrequent and unplanned upset or breakdown of operations resulting in increased noise emissions, where such upsets and breakdowns are reasonable considering the type of industry, and where the industrial use exercises due diligence in preventing as well as correcting such upsets and breakdowns, noise generated during such upsets and breakdowns shall not be included in calculations to determine conformance with allowable noise levels.

<sup>2</sup> Interior spaces are defined as any locations where some degree of noise-sensitivity exists. Examples include all habitable rooms of residences, and areas where communication and speech intelligibility are essential, such as classrooms and offices.

<sup>3</sup> Noise from industrial operations may be difficult to mitigate in a cost-effective manner. In recognition of this fact, the exterior noise standards for residential zone districts immediately adjacent to industrial, limited industrial, industrial park, and industrial reserve zone districts have been increased by 10 dB as compared to residential districts adjacent to other land uses. For purposes of the Noise Element, residential zone districts are defined to include the following zoning classifications: AR, R-1, R-2, R-3, FR, RP, TR-1, TR-2, TR-3, and TR-4.

<sup>4</sup> Where a residential zone district is located within an -SP combining district, the exterior noise level standards are applied at the outer boundary of the -SP district. If an existing industrial operation within an -SP district is expanded or modified, the noise level standards at

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

the outer boundary of the -SP district may be increased as described above in these standards. Where a new residential use is proposed in an -SP zone, an Administrative Review Permit is required, which may require mitigation measures at the residence for noise levels existing and/or allowed by use permit as described under "NOTES," above, in these standards.

<sup>5</sup> State of the art should include the use of modern equipment with lower noise emissions, site design, and plant orientation to mitigate off-site noise impacts, and similar methodology.

<sup>6</sup> Normally, agricultural uses are noise insensitive and will be treated in this way. However, conflicts with agricultural noise emissions can occur where single-family residences exist within agricultural zone districts. Therefore, where effects of agricultural noise upon residences located in these agricultural zones is a concern, an  $L_{dn}$  of 70 dBA will be considered acceptable outdoor exposure at a residence.

**Goal 9.A** To protect County residents from the harmful and annoying effects of exposure to excessive noise.

9.A.1 New development of noise-sensitive uses shall not be permitted where the noise level due to non-transportation noise sources will exceed the noise level standards of Table 9-1 as measured immediately within the property line of the new development, unless effective noise mitigation measures have been incorporated into the development design to achieve the standards specified in Table 9-1.

9.A.2 Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of Table 9-1 as measured immediately within the property line of lands designated for noise-sensitive uses: provided, however, the noise created by occasional events occurring within a stadium on land zoned for university purposes may temporarily exceed these standards as provided in an approved Specific Plan.9.A.4 Impulsive noise produced by blasting should not be subject to the criteria listed in Table 9-1. Single event impulsive noise levels produced by gunshots or blasting shall not exceed a peak linear overpressure of 122 db, or a C-weighted Sound Exposure Level (SEL) of 98 dBC. The cumulative noise level from impulsive sounds such as gunshots and blasting shall not exceed 60 dB LCdn or CNELC on any given day. These standards shall be applied at the property line of a receiving land use.

9.A.5. Where proposed non-residential land uses are likely to produce noise levels exceeding the performance standards of Table 9-1 at existing or planned noise-sensitive uses, the County shall require submission of an acoustical analysis as part of the environmental review process so that noise mitigation may be included in the project design. The requirements for the content of an acoustical analysis are listed in Table 9-2.

## **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

- 9.A.6 The feasibility of proposed projects with respect to existing and future transportation noise levels shall be evaluated by comparison to Figure 9-1.
- 9.A.7 The County shall purchase only new equipment and vehicles which comply with noise level performance standards based upon the best available noise reduction technology.
- 9.A.8 New development of noise-sensitive land uses shall not be permitted in areas exposed to existing or projected levels of noise from transportation noise sources, including airports, which exceed the levels as specified in Table 9-3, unless the project design includes effective mitigation measures to reduce noise in outdoor activity areas and interior spaces to the levels specified in Table 9-3.
- 9.A.9 Noise created by new transportation noise sources, including roadway improvement projects, shall be mitigated so as not to exceed the levels specified in Table 9-3 at outdoor activity areas or interior spaces of existing noise-sensitive land uses.
- 9.A.12 Where noise mitigation measures are required to achieve the standards of Tables 9 1 and 9-3, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall 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.

### **3.5 Local: Placer County Airport Land Use Compatibility Plan**

#### **Placer County Airport Land Use Compatibility Plan**

The project site is located within the jurisdiction of the Placer County Airport Land Use Compatibility Plan (ALUCP), which addresses land uses surrounding airports within Placer County (Mead & Hunt 2014). The Auburn Municipal Airport is located approximately 1.25 miles from the project site. The Auburn Compatibility Map designates the northeastern corner of Placer County Government Center as Zone C2, and the remainder of the project site as Zone D or just outside of it. Within Compatibility Zone D, the density of new residential development is not limited, according to the ALUCP. Within Zone C2 the maximum single-acre intensity of development is 800 persons/acre (Chapter 4 Placer County Airport Land Use Compatibility Plan Feb 26, 2014).

## **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

The ALUCP defines Compatibility Zone C2 as an area routinely overflown by aircraft approaching and departing the Airport, but less frequently or at higher altitudes than the areas within Compatibility Zone C1. Zone C2 contains the north-side traffic pattern plus additional areas on the south-side of the Airport where aircraft fly wide traffic patterns which are within the common arrival and departure corridor to the west. Compatibility Zone C2 also encompasses the outer portions of Handbook Safety Zone 6 and remaining portions of the CNEL 55 dB contour. Annoyance associated with aircraft overflights is the major concern within Compatibility Zone C2 as aircraft typically overfly these areas at an altitude of 1,000 to 1,500 feet above ground level on visual approaches or as low as 601 feet above the airport elevation when utilizing the circle to land procedure. Noise from individual aircraft overflights may adversely affect certain land uses. Safety is a concern only with regard to uses involving high concentrations of people and particularly risk-sensitive uses such as schools and hospitals (Mead & Hunt 2014, p. 4-3).

The ALUCP defines Compatibility Zone D as including areas sometimes overflown by aircraft arriving and departing the Airport. Hazards to flight are the only compatibility concern. The outer limits of the zone coincide with the outer edge of the conical surface defined by FAR Part 77 for the Airport. Except on high terrain, structural height limits are no less than 150 feet within this area (Mead & Hunt 2014, p. 4-3).

### **3.6 Local: Placer County Noise Ordinance**

Section 9.36 of the Placer County Code (Noise Ordinance) establishes sound level standards for noise-sensitive receptors. The language of that section which would be applicable to this project is provided below:

#### **9.36.030 Exemptions.**

- A. Sound or noise emanating from the following sources and activities are exempt from the provisions of this title:
1. Sound sources typically associated with residential uses (e.g., children at play, air conditioners in good working order, etc.);
  2. Sound sources associated with property maintenance (e.g., lawn mowers, edgers, snow blowers, blowers, pool pumps, power tools, etc.) provided such activities take place between the hours of seven a.m. and nine p.m.;
  3. Safety, warning and alarm devices, including house and car alarms, and other warning devices that are designed to protect the health, safety and welfare, provided such devices are not negligently maintained or operated;

## **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

4. The normal operation of public and private schools typically consisting of classes and other school-sponsored activities;
5. Maintenance (e.g., lawn mowers, edgers, aerators, blowers, etc.) of golf courses, provided such activities take place between the hours of five a.m. and nine p.m. May through September, and seven a.m. and six p.m. October through April;
6. Emergencies, involving the execution of the duties of duly authorized governmental personnel and others providing emergency response to the general public, including but not limited to sworn peace officers, emergency personnel, utility personnel, and the operation of emergency response vehicles and equipment;
7. Construction (e.g., construction, alteration or repair activities) between the hours of six a.m. and eight p.m. Monday through Friday, and between the hours of eight a.m. and eight 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;
8. Infrequent repair, rebuilding, reconstruction or dismantling of any motor vehicle between the hours of eight a.m. and eight p.m.;
9. Sound sources associated with agricultural operations on agricultural land, as defined by Placer County Code Article 5.24.040, which are carried out in any manner consistent with the practice and within the standards of the agricultural industry. This includes without limitation all mechanical devices, apparatus or equipment utilized for the protection or salvage of agricultural crops during periods of adverse weather conditions or when the use of mobile sources is necessary for pest control;
10. Sound sources associated with existing legal non-conforming and/or existing permitted commercial, industrial or non-profit operations, which do not significantly change in existing on-site activities, or result in a change in the number of days or daily hours of operation;
11. Gunfire occurring while hunting consistent with all state laws on private property shall be allowed;
12. Animal noise (These noises are handled elsewhere in the code.);
13. Any vehicle, otherwise compliant with state law, being operated upon any public highway, street or right-of-way or driveway for the purpose of exiting or entering property. This exception does not include any amplified sound emanating from the vehicle, vehicle alarms or horn-honking. (Ord. 5294-B, 2004; Ord. 5280-B, 2004)

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## 9.36.060 Sound limits for sensitive receptors

- A. It is unlawful for any person at any location to create any sound, or to allow the creation of any sound, on property owned, leased, occupied or otherwise controlled by such person that:
1. Causes the exterior sound levels when measured at the property line of any affected sensitive receptor to exceed the ambient sound level by five (5) dBA, or
  2. Exceeds the sound level standards as set forth in Table 8, whichever is the greater. B. Each of the sound level standards specified in Table 8 shall be reduced by five (5) dB for simple tone noises, consisting of speech and music. However, in no case shall the sound level standard be lower than the ambient sound level plus five (5) dB. C. If the intruding sound source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient sound level can be measured, the sound level measured while the source is in operation shall be compared directly to the sound level standards of Table 8.

**Table 8**  
**Sound Level Standards (On-site)**

Sound Level Descriptor	Daytime (7 am to 10 pm)	Nighttime (10 pm to 7 am)
Hourly Leq, dB	55	45
Maximum level, (Lmax) dB	70	65

Per Section 9.36.030 of the Placer County Code (Exemptions), sound or noise emanating from construction activities between the hours of 6 AM and 8 PM Monday through Friday, and between the hours of 8 AM and 8 PM Saturday and Sunday provided that all construction equipment shall be fitted with factory installed muffling devices and that all construction equipment shall be maintained in good working order; shall be exempt from Section 9.36.060 of the Placer County Code Noise Ordinance.

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## 4 EXISTING NOISE CONDITIONS

### 4.1 Prior and Existing On-Site Uses

Prior to 1942, the project site was used for livestock pasture and orchards. Small farm buildings were present on site when the land was acquired by the United States War Department in 1943. The central historic core of the PCGC was then developed as the DeWitt General Hospital, which cared for battle casualties during the last two years of World War II (1943–1945). In late 1945, the hospital was deactivated and closed as an Army installation. The State of California acquired the DeWitt Hospital in 1946 and activated it as a California State Hospital in the early summer of 1946. The DeWitt State Hospital provided care for thousands of mental-health patients until the state closed the hospital and transferred the land to Placer County in 1972 (NFA/URS 2002).

The PCGC campus consists primarily of one- and two-story structures, including some of the original World War II–era DeWitt General Hospital barracks-style hospital buildings and more contemporary facilities that have replaced the hospital buildings over the last several decades. While many of the original buildings from the DeWitt General Hospital remain on site, building demolition and construction has occurred over the last 30 years, beginning with construction of the Finance and Administration Building in the late 1980s. The Auburn Main Jail and Juvenile Detention Center were constructed in the early and mid-1990s. In the early 2000s, the County demolished several of the original DeWitt General Hospital buildings to allow for the construction of the Auburn Justice Center and the Community Development Resource Center buildings. Most recently, the County constructed a new animal services center in the western portion of the campus.

The PCGC primarily supports County offices, facilities, warehouse space, and functions, as well as a Home Depot home improvement store located on 10 acres of leased land at the eastern side of the campus. These facilities are a mixture of relatively new buildings that have been built within the last 10 years and old buildings with structures built as early as 1942. The existing buildings are spread over an area composed of approximately 140 acres, and include more than 960,000 square feet of building space. There are a few locations leased to private enterprises and others that are currently vacant.

### 4.2 Ambient Noise Measurements

Dudek visited the proposed project site on November 6, 2017 and November 8, 2017 to measure ambient sound levels in the vicinity. Figure 3 shows the measurement locations marked on a site map.

Short-term (ST#) measurements were conducted with a Rion NL-62 sound level meter placed on a tripod with the microphone positioned approximately 5 feet above the ground. The Rion NL-62

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

is classified as an ANSI Type 1 precision sound level meter. The sound level meter was calibrated before the measurement series in order to ensure accuracy of the measurements. The short-term measurements were 10 minutes long for all locations except ST3. At ST3 a 30 minute measurement was completed in the parking lot of the Home Depot. Table 9 presents the results of the short-term noise measurements with traffic count information.

**Table 9  
Short-Term Sound Level Measurements**

Measurement	Distance to Roadway Edge	Observed Noise Sources	$L_{eq}^1$	Cars	MT/HT <sup>2</sup>	B <sup>3</sup>	MC <sup>4</sup>
ST1	6 feet	Traffic	70	49	1	1	0
ST2	12 feet	Traffic, Parking Lot Activities, Distant Nail gun	63	30	1		
ST3	N/A	Traffic	57	N/A	N/A	N/A	N/A
ST4	12 feet	Traffic, People Walking By	62	36	0	1	0
ST5	10 feet	Traffic, Aircraft	67	108	0	0	0
ST6	5 feet	Traffic, Birds	60	46	0	1	0

**Notes:**

- <sup>1</sup> Equivalent Continuous Sound Level (Time-Average Sound Level)
- <sup>2</sup> Medium Trucks or Heavy Trucks depending on the road segment count
- <sup>3</sup> Buses
- <sup>4</sup> Motorcycles
- \* Environmental Weather Conditions: Temperature: 46° Fahrenheit, overcast/cloudy, 4 miles-per-hour light/gusty southeast wind

The long-term measurements were completed using four SoftDB Model Piccolo sound level meters. The Piccolo sound level meters meet the ANSI standard for a Type 2 general-purpose sound level meter. The meters collected hourly sound level data from November 6, 2017 to November 8, 2017. The Piccolo sound level meters were each calibrated before the multi-day measurements to ensure accuracy of the measurements. The recorded hourly equivalent levels ( $L_{eq}$ ) were averaged together to produce the results presented in Table 10. Averages for the daytime and nighttime are presented as a reference of existing noise levels in the vicinity.

**Table 10  
Long-Term Sound Level Measurements**

Site/ Instrument #	Location Description	(dBA)			
		Daytime Average Noise Levels 7a.m.-10p.m. $L_{eq}$	Nighttime Average Noise Levels 10p.m.- 7a.m. $L_{eq}$	CNEL	$L_{dn}$
LT1	Atwood	67	58	68	67
LT2	Corp Yard Area	56	58	63	63
LT3	Richardson	53	47	57	56

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

**Table 10**  
**Long-Term Sound Level Measurements**

Site/ Instrument #	Location Description	(dBA)			
		Daytime Average Noise Levels 7a.m.-10p.m. <i>L<sub>eq</sub></i>	Nighttime Average Noise Levels 10p.m.- 7a.m. <i>L<sub>eq</sub></i>	CNEL	<i>L<sub>dn</sub></i>
LT4	Northern Substation	57	51	59	59

Measurement results show Community Noise Exposure Levels range from 57 dBA to 68 dBA. The higher levels are expected in close proximity to the major roads. LT2, located in the Corp Yard area, has high measured noise levels during nighttime hours that contribute to a higher CNEL of 63 dBA.

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

-  Plan Area Boundary
-  Long-term Noise Measurement Location
  - LT1 - Future Residential
  - LT2 - Corporate Yard
  - LT3 - Richardson Dr
  - LT4 - 1st St
-  Short-term Noise Measurement Location
  - ST1 - Atwood Rd
  - ST2 - Willow Creek
  - ST3 - Home Depot Parking Lot
  - ST4 - 1st St
  - ST5 - Bell Rd
  - ST6 - Sheriff



SOURCE: Bing Maps 2018; Placer County 2016

**FIGURE 3**  
**Noise Measurement Locations**  
 Placer County Government Center Master Plan Update

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## 4.3 Modeled Existing Transportation Noise

Vehicular traffic along vicinity roadways is typically a primary contributor to the overall noise environment in any urban neighborhood. Using current average daily traffic data and CadnaA, noise modeling software, Dudek modeled the CNEL associated with the local roadway network. Figure 4 shows modeled receiver locations. Table 11 below shows the Average Daily Traffic data that was used for the traffic noise impact modeling. Results for the existing traffic noise are shown in this section, while future results for the multifamily residential project, the Health and Human Services project, and the Build out of the master plan are presented in later sections.

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

**Table 11  
Traffic Data for Vicinity Roadways**

Roadway	Segment	Existing Conditions	Existing Plus MFR	Existing Plus HHS	Existing Plus MP Buildout	Cumulative No Project	Cumulative Plus MFR	Cumulative Plus HHS	Cumulative Plus MP Buildout	
		ADT	ADT	ADT	ADT	ADT	ADT	ADT	ADT	Lanes
Atwood Road	West of SR 49	9,750	9,800	10,100	12,100	11,900	12,000	12,200	14,300	2
Bell Road	West of SR 49	15,300	15,700	15,900	21,300	19,400	19,800	20,000	23,600	4
SR 49	Luther Rd. to New Airport Rd.	42,000	42,300	42,500	47,800	47,700	48,000	48,200	52,700	6
SR 49	New Airport Rd. to Atwood Rd.	40,000	40,300	40,500	45,900	45,200	45,500	45,700	50,200	6
SR 49	Atwood Rd. to Willow Creek Dr.	40,500	40,800	40,700	44,100	45,100	45,400	45,300	47,400	6
SR 49	Willow Creek Dr. to Bell Rd.	37,700	37,800	37,700	39,500	44,900	45,000	44,900	46,600	6
SR 49	North of Bell Rd.	34,700	34,900	35,000	37,000	35,000	35,200	35,300	37,100	5

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

Table 12 presents the results of the noise modeling for all existing traffic on selected area roadways. Figure 4 shows the modeling locations marked on a site map.

**Table 12**  
**Existing CNEL for Vicinity Roadways**

Receiver Name	Existing CNEL (dBA)
M01 – Women’s Shelter (Building 504)	41
M02 – Children’s Emergency Shelter	41
M03 - Juvenile hall (Building 530)	43
M04 - Main Jail (Building 520)	45
M05 - Homeless Shelter (Building 303)	45
M06 - Health and Human Services Department	43
M07 - Lighthouse Baptist Church	44
M08 - Theater	45
M09 - Placer County Medical Clinic	45
M10 - Foothill Community Church	46
M11 - Auburn Grace Community Church	45
<b>M12 - Residential neighborhoods on Bell</b>	65
M13 - Residential neighborhood on Wilson	58
M14 - Oakwood Assisted Living	48
M15 - Solstice Senior Living on Blue Oak	49
<b>M16 - Medical offices located north of Bell</b>	60
M17 - Rock Creek School	54
M18 - Medical offices on Professional D	49
M19 - Sierra Council on Alcoholism Treatment Center	51
M20 - Residences on Cottage Drive	47
M21 - St. Joseph’s Catholic School	51
<b>M22 - Residential neighborhoods on Atwood</b>	60
M23 - Auburn Elementary School	42
M24 - Bell’s Preschool and Daycare	52
M25 - Residence	50
M26 - Atwood Rd North Residence	58

Existing CNEL levels associated with the vicinity road network are generally compatible with the established uses. The noise levels for existing traffic are above 65 dBA CNEL at one location, M12- Residence along Bell Road. Two locations have current traffic noise levels above 60 dBA CNEL: M16- Medical Offices and M22- Residences on Atwood Road. All other receivers have current traffic noise levels below the acceptable CNEL limits for residential land uses.

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

-  Plan Area Boundary
-  Noise Modeling Location (General Plan)
  - M01 - Womens' Shelter
  - M02 - Childrens' Emergency Shelter
  - M03 - Juvenile Hall
  - M04 - Main Jail
  - M05 - Homeless Shelter
  - M06 - Health & Human Services Department
  - M07 - Lighthouse Baptist Church
  - M08 - Theater
  - M09 - Placer County Medical Clinic
  - M10 - Foothill Community Church
  - M11 - Auburn Grace Community Church (formerly Sunrise Church)
  - M12 - Residential Neighborhood on Bell Road
  - M13 - Residential Neighborhood on Wilson Drive
  - M14 - Oakwood Assisted Living
  - M15 - Solstice Senior Living on Blue Oaks Drive
  - M16 - Medical Offices Located north of Bell Road
  - M17 - Rock Creek School
  - M18 - Professional Dr Medical Offices
  - M19 - Sierra Council on Alcoholism Treatment Center
  - M20 - Cottage Drive Residences
  - M21 - St. Joseph's Catholic School
  - M22 - Residential Neighborhood on Atwood Road
  - M23 - Auburn Elementary School
  - M24 - Bell's Preschool & Daycare
  - M25 - Residence
  - M26 - Atwood Road North Residence
-  Noise Modeling Location (Project Specific)
  - M-HHS1 - South Corner
  - M-HHS2 - West Corner
  - M-HHS3 - North Corner
  - M-HHS4 - East Corner
  - M-MFR01 - Building Facade
  - M-MFR02 - Northwest Corner Parking Lot
  - M-MFR04 - Middle Parking Lot
  - M-MFR03 - Middle Building



SOURCE: Bing Maps 2018; Placer County 2016

**Noise Assessment Technical Report for the  
Placer County Government Center Master Plan Update**

---

INTENTIONALLY LEFT BLANK

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

## **5 THRESHOLDS OF SIGNIFICANCE**

The significance criteria used to evaluate the project impacts related to noise are based on Appendix G of the CEQA Guidelines. According to Appendix G of the CEQA Guidelines, a significant impact related to noise would occur if the project would:

1. Result in the 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.
2. Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
3. Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
4. Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
5. Be 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, and if so, the project would expose people residing or working in the project area to excessive noise levels.
6. Be within the vicinity of a private airstrip, and if so, the project would expose people residing or working in the project area to excessive noise levels.

### **5.1 Noise Significance Criteria**

Based on the regulations outlined in a General Plan Noise Element and Noise Ordinance, the proposed project would have a significant impact on noise if the following thresholds are exceeded.

Regarding 1, a significant impact would occur if new residences could be exposed to traffic noise exposure greater than 60 dBA CNEL based on the Auburn/Bowman Community Plan and the Placer County General Plan. A significant impact could also occur if proposed uses were to generate noise levels exceeding 50 dBA hourly Leq during the day or 45 dBA hourly Leq overnight from non-transportation sources.

Some locations have existing traffic noise levels exceeding 60 dBA CNEL. For these locations, 3 dBA CNEL increases due to the project are used as the threshold of significance. This threshold is based on the FICON recommendations.

If proposed residential areas could have future interior noise levels above 45 dBA CNEL/L<sub>dn</sub>, that would constitute a potentially significant impact. Outdoor living areas of noise sensitive uses

## **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

that are subject to noise levels in excess of 65 dBA CNEL would generally be presumed to be significantly impacted by ambient noise.

For the Health and Human Services project, land uses include office space and an outdoor play area. Based on Table 5 from the Auburn/Bowman Community Plan, office buildings have a maximum allowable exterior use area noise exposure from transportation noise sources of 60 dBA CNEL.

Regarding 2, a significant impact would occur if the project generates construction related vibration which exceeds 0.2 inches/second PPV at existing residences in the project vicinity. There are no operational concerns related to vibration or groundbourne noise because no large impact or rotating equipment is planned for the site. Construction activities within 200 feet and pile driving within 600 feet would be potentially disruptive to vibration-sensitive operations (Caltrans 2002).

Regarding 3, a significant noise impact would occur if project generated trip additions to the area roadway network were to cause a 3 dBA CNEL or greater increase over ambient traffic noise levels.

Regarding 4, a significant temporary construction noise impact would occur if construction were to occur outside of the allowable daily schedule between 6:00 a.m. and 8:00 p.m. on weekdays and between 8:00 a.m. and 8:00 p.m. on weekends and the construction efforts were expected to produce levels greater than 5 dBA over ambient at noise sensitive receptors. No substantial periodic noise increases are expected due to the project.

Regarding 5 and 6, the project location is approximately 1.25 miles from a small regional airport and would not be anticipated to be affected by noise from airport operations. The regional airport is discussed in more detail in the following section, Impacts Determined to be Less than Significant.

### **Impacts Determined to be Less than Significant**

***Exposure of People Residing or Working in the Project to Excessive Noise Levels Related to Airport/Airstrip Activities.*** The project site is located approximately 1.25 miles from the Auburn Municipal Airport, outside the 55 dB CNEL contour, but within the “Airport Influence Area” as designated on Exhibit 7D in the Airport Land Use Compatibility Plan (Placer County Airport Land Use Commission 2014). The State of California (California Code of Regulations Title 21) and the FAA (Part 150 Regulation) consider sound levels less than 65 dB CNEL to be compatible with all land uses. Therefore, the project would not expose people residing or working in the project site to excessive noise levels from Auburn Municipal Airport. There are no private airstrips in the vicinity of the project site; therefore, the impact is considered less than significant and is not further discussed.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## 6 IMPACTS AND MITIGATION

### 6.1 Transportation Noise Exposure

#### Roadway Noise

The primary noise-related effect that most non-industrial projects produce is a potential for on-site and off-site increases in traffic, which is the main source of noise in most urban areas. Acoustical calculations were performed for existing traffic levels (presented in *Section 4.2*) as traffic is often a major contributor to the ambient or community noise level, and it is helpful therefore to quantify existing traffic related noise levels.

#### 6.1.1 Traffic Noise Generation Impact Analysis Master Plan

The Master Plan includes two currently proposed projects: the Multifamily residential project and the Health and Human Services Building Project. As such, the traffic analysis of the impacts of the master plan would include trip generation and roadway volumes that would occur based on those individual projects. Consequently, if no significant impacts are identified based on the Master Plan build out, then the individual projects (The Multifamily Residential and Health and Human Services) would not produce significant impacts individually.

Table 13 shows the results of the traffic noise modeling for the Existing and Existing with Master Plan Buildout traffic. The Existing with Master Plan Buildout traffic scenario is a theoretical scenario that takes the current traffic volumes and adds the impact of the Master Plan Buildout. This scenario simulates if the project(s) were immediately completed, while in reality the projects would actually be built over time. The scenario is used to assess potential impacts from the master plan buildout by itself, without the effects of background growth and contributions from cumulative projects in the region.

**Table 13**  
**Existing Traffic Noise Modeling Results at Representative Receivers**

Receiver Location/Description	Traffic Noise CNEL (dBA)		Increase	Significant Impact?
	Existing	Existing Plus Master Plan Build Out		
M01 – Women’s Shelter (Building 504)	41	42	1	No
M02 – Children’s Emergency Shelter	41	42	1.1	No
M03 - Juvenile hall (Building 530)	43	44	0.9	No
M04 - Main Jail (Building 520)	45	46	0.9	No
M05 - Homeless Shelter (Building 303)	45	46	0.9	No

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

**Table 13**  
**Existing Traffic Noise Modeling Results at Representative Receivers**

Receiver Location/Description	Traffic Noise CNEL (dBA)		Increase	Significant Impact?
	Existing	Existing Plus Master Plan Build Out		
M06 - Health and Human Services Department	43	44	0.9	No
M07 - Lighthouse Baptist Church	44	45	0.7	No
M08 - Theater	45	46	0.7	No
M09 - Placer County Medical Clinic	45	46	1	No
M10 - Foothill Community Church	46	47	1	No
M11 - Auburn Grace Community Church	45	46	1.3	No
M12 - Residential neighborhoods on Bell	65	67	2	No
M13 - Residential neighborhood on Wilson	58	59	1.3	No
M14 - Oakwood Assisted Living	48	50	1.3	No
M15 - Solstice Senior Living on Blue Oak	49	50	1.3	No
M16 - Medical offices located north of Bell	60	62	1.4	No
M17 - Rock Creek School	54	56	1.2	No
M18 - Medical offices on Professional D	49	50	1.2	No
M19 - Sierra Council on Alcoholism Treatment Center	51	52	0.6	No
M20 - Residences on Cottage Drive	47	48	0.6	No
M21 - St. Joseph's Catholic School	51	52	0.9	No
M22 - Residential neighborhoods on Atwood	60	61	1	No
M23 - Auburn Elementary School	42	42	0.7	No
M24 - Bell's Preschool and Daycare	52	53	0.9	No
M25 - Residence	50	51	0.9	No
M26 - Atwood Rd North Residence	58	59	0.8	No

No noise levels at modelled receiver locations would go from below 60 dBA CNEL to greater than 60 dBA CNEL due to the project. Additionally the increases due to the Master Plan Buildout are all less than 2 dB. Thus, no significant traffic noise impacts are expected from the Master Plan Buildout.

With no significant impacts due to the Master Plan Buildout, the Health and Human Services Building Project and the Multifamily Project are also expected to have a less than significant impact due to project-generated traffic noise.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

## Cumulative Impacts

Table 14 shows the results of the traffic noise modeling for the Future and Future with Master Plan Building out traffic.

**Table 14**  
**Cumulative Traffic Noise Model Results at Representative Receivers**

Receiver Location/Description	Traffic Noise CNEL (dBA)		Increase	Significant Impact?
	Cumulative	Cumulative Plus Master Plan Build Out		
M01 – Women’s Shelter (Building 504)	42	43	0.7	No
M02 – Children’s Emergency Shelter	42	43	0.7	No
M03 - Juvenile hall (Building 530)	44	44	0.7	No
M04 - Main Jail (Building 520)	46	47	0.8	No
M05 - Homeless Shelter (Building 303)	46	46	0.7	No
M06 - Health and Human Services Department	44	45	0.6	No
M07 - Lighthouse Baptist Church	45	45	0.5	No
M08 - Theater	46	46	0.4	No
M09 - Placer County Medical Clinic	46	47	0.7	No
M10 - Foothill Community Church	46	47	0.7	No
M11 - Auburn Grace Community Church	46	46	0.7	No
M12 - Residential neighborhoods on Bell	66	67	0.9	No
M13 - Residential neighborhood on Wilson	59	60	0.9	No
M14 - Oakwood Assisted Living	49	50	0.8	No
M15 - Solstice Senior Living on Blue Oak	50	51	0.7	No
M16 - Medical offices located north of Bell	61	62	0.9	No
M17 - Rock Creek School	55	56	0.7	No
M18 - Medical offices on Professional D	50	50	0.6	No
M19 - Sierra Council on Alcoholism Treatment Center	52	52	0.3	No
M20 - Residences on Cottage Drive	48	48	0.4	No
M21 - St. Joseph's Catholic School	51	52	0.8	No
M22 - Residential neighborhoods on Atwood	61	62	0.8	No
M23 - Auburn Elementary School	42	43	0.6	No
M24 - Bell's Preschool and Daycare	53	54	0.8	No
M25 - Residence	51	52	0.8	No
M26 - Atwood Rd North Residence	59	60	0.7	No

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

No noise levels at modeled receivers would go from below 60 dBA CNEL to greater than 60 dBA CNEL due to the project in the cumulative traffic scenarios. Additionally, the increases due to the Master Plan Buildout are all less than 1 dB in the cumulative traffic scenario. Thus, no significant cumulative traffic noise impacts are expected from the Master Plan Buildout, when compared to traffic noise levels from cumulative projects in the region absent the Master Plan.

With no cumulative significant impacts due to the Master Plan Buildout, the Health and Human Services Building Project and the Multifamily Project are also expected to have a less than significant traffic-related noise impact when viewed in the context of noise levels from cumulative projects traffic in the region.

### 6.1.2 Traffic Noise Exposure Impact Analysis Multifamily Residential

As a residential development, the multifamily project is considered a noise sensitive receptor. Thus, the potential exists for exposure of future residents to traffic noise levels that exceed allowable limits in the Noise Element, thereby constituting a potentially significant noise impact. The cumulative plus master plan build out traffic scenario provides the most distant horizon year traffic data that can be used to assess the potential for on-site traffic noise impacts.

Table 15 shows the results of the traffic noise modeling for the multifamily residential project site.

**Table 15**  
**Cumulative Traffic Noise Model Results at Representative Receivers**

Receiver	Cumulative Plus Master Plan Build Out
<i>Name</i>	<i>CNEL dBA</i>
M-MFR01 - Building Facade	51
M-MFR02 - Northwest Corner Parking Lot	51
M-MFR03 - Middle Building	47
M-MFR04 - Middle Parking Lot	48

Modeled traffic noise from the future with Master Plan Buildout scenario at the Multifamily Residential Project site is expected to be less than 60 dBA as shown in Table 15. Thus, no significant traffic noise exposure impact is expected for the proposed multifamily residential use.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## 6.1.3 Traffic Noise Exposure Impact Analysis Health and Human Services Building

The proposed new HHS building would allow the County to consolidate the six HHS divisions (i.e., Administration, Adult System of Care, Children’s System of Care, Environmental Health, Human Services, and Public Health) in a single location. Building space would include a main lobby, conference and team rooms, open and private office areas, training and interview rooms, storage and work rooms, break rooms, central storage, and a receiving area. Outdoor spaces for the facility would include patios, a play area, a garden, and a service/loading dock.

With an outdoor play area and garden part of this project, some project areas would be considered noise sensitive. Thus, the project site could experience potentially significant traffic noise exposure impacts from vicinity roadways. The cumulative plus master plan build out traffic scenario provides the most distant horizon year traffic data that can be used to assess the potential for on-site traffic noise exposure impacts.

Table 16 shows the results of the traffic noise modeling for the Health and Human Services project site.

**Table 16**  
**Cumulative Traffic Noise Model Results at Representative Receivers**

Receiver	Cumulative Plus Master Plan Build Out
<i>Name</i>	<i>CNEL dBA</i>
MHHS1 - South Corner	45
MHHS2 - West Corner	44
MHHS3 - North Corner	45
MHHS4 - East Corner	45

Modeled traffic noise from the future with Master Plan Buildout traffic scenario at the Health and Human Services Project site is expected to be less than 60 dBA as shown in Table 16. Thus, no significant traffic noise exposure impact is expected for the Health and Human Services project land use.

### Construction Roadway Noise

During construction, workers and equipment will utilize the roadway network to access the project sites. However, the number of worker vehicles and delivery trucks associated with the construction are not anticipated to represent more than a small percentage of the total daily trips related to normal operations in the area. The project construction would therefore result in less than significant traffic noise impacts.

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

## **6.1.4 Mitigation Measures**

Implementation of the PCGC Master Plan Update would not result in a significant traffic noise impact; therefore, no mitigation is required.

### **Significance After Mitigation**

Mitigation is not required because impacts would be less than significant without mitigation.

## **6.2 General Operations Noise**

### **6.2.1 Impact Analysis**

Implementation of the project would also result in changes to existing noise levels on the project site by developing new stationary sources of noise. These sources may affect noise-sensitive vicinity land uses off the project site. The following analysis evaluates noise from exterior mechanical equipment.

The Placer County Noise Ordinance exempts sound sources typically associated with residential uses. This sound sources include children at play and air conditioners in good working order. Furthermore, sound sources associated with property maintenance such as lawn care tools and pool pumps are also exempt between 7:00 a.m. and 9:00 p.m.

Detailed mechanical plans for the Multifamily Residential Project, the Health and Human Service Project, and other projects anticipated under the Master Plan Update are not yet available. The new mechanical equipment associated with these projects has the potential to increase vicinity ambient sound levels depending on the location, size, type, and use of the mechanical equipment. However, the Placer County Noise Ordinance allows for the operation of these noise sources including an exemption from the noise level limits. Thus, noise impacts from mechanical equipment operations associated with the proposed project would be less than significant.

### **6.2.2 Mitigation Measures**

Implementation of the PCGC Master Plan Update would not result in a significant operational noise impact; therefore, no mitigation is required.

### **Significance After Mitigation**

Mitigation is not required because impacts would be less than significant without mitigation.

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

## **6.3 Construction Noise Analysis**

Construction of the development allowed under the proposed PCGC Master Plan Update would generate noise that could expose nearby receptors to elevated noise levels that may disrupt communication and routine activities. The magnitude of the impact would depend on the type of construction activity, equipment, duration of the construction, distance between the noise source and receiver, and intervening structures. This section of the report discusses the noise levels calculated to result from construction of the project, at nearby sensitive receptors (i.e., residences).

Construction noise is a temporary phenomenon. Construction noise levels will vary from hour to hour and day to day, depending on the equipment in use, the operations being performed, and the distance between the source and receptor.

Development that could result from the implementation of the Plan would result in construction of buildings, as well as the demolition or retrofitting of existing buildings and structures in the Placer Government Center. Such demolition and construction activities could be located near existing or future residential or other noise-sensitive land uses. Increased ambient noise levels from construction would be short-term (based on a specific project's schedule) and intermittent.

The Federal Highway Administration (FHWA) has developed the Roadway Construction Noise Model (RCNM) (FHWA 2008) software, which can be used to evaluate construction noise from any major construction proposal. RCNM contains a large database of construction equipment, including noise generation level and load factor (percentage of time each piece of equipment is active on a typical construction site).

Construction noise is difficult to quantify because of the many variables involved, including the specific equipment types, size of equipment used, percentage of time in use, condition of each piece of equipment, and number of pieces of equipment that will actually operate on site. The construction vehicle assemblage would include standard equipment such as dozers, tractors, loaders, backhoes, excavators, graders, scrapers, trenchers, lifts, paving equipment, rollers, compressors, and miscellaneous trucks. Specified and measured noise level ranges for various pieces of construction equipment at a distance of 50 feet are presented in Table 17. The noise values presented are used as reference noise data for respective equipment in RCNM. The construction equipment is expected to be spread out over the entire site, with some equipment operating along the perimeter of the site while the rest of the equipment may be located several hundred feet farther away from the noise sensitive receptors.

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

**Table 17**  
**Typical Construction Equipment Noise Levels**

Equipment Description	Acoustical Use Factor (%)	Measured L <sub>max</sub> @50ft (dBA, slow)
All Other Equipment > 5 HP (spec)	50	85
Auger Drill Rig	20	84
Backhoe	40	78
Compactor (ground)	20	83
Compressor (air)	40	78
Concrete Saw	20	90
Crane	16	81
Dozer	40	82
Dump Truck	40	76
Excavator	40	81
Flat Bed Truck	40	74
Front End Loader	40	79
Generator	50	81
Generator (<25KVA, VMS signs)	50	73
Gradall	40	83
Grader *(spec)	40	85
Man Lift	20	75
Paver	50	77
Pickup Truck	40	75
Pneumatic Tools	50	85
Pumps	50	81
Roller	20	80
Scraper	40	84
Tractor *(spec)	40	84
Warning Horn	5	83
Welder / Torch	40	74

\* (spec) indicates that the L<sub>max</sub> is based on common specifications for this equipment, not measured data.

**Source:** DOT 2006.

As an example, the piece of equipment with the highest noise level shown in Table 17 is the concrete saw with a maximum level of 90 dBA at 50 feet. At 100 feet, the expected maximum noise level would drop to 84 dBA.

As stated in significance threshold #4, a significant temporary construction noise impact would occur if construction were to occur outside of the allowable daily schedule (when construction is exempt from the noise ordinance) between 6:00 a.m. and 8:00 p.m. on weekdays and between 8:00 a.m. and 8:00 p.m. on weekends and the construction efforts were expected to produce levels greater than 5 dBA over ambient community noise levels at noise sensitive receptors.

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

Construction is generally expected to occur only during the allowable hours and would therefore be exempt from the sound level standards as detailed in Section 9.36.030 of the Placer County Code. Therefore, construction noise impacts associated with the Master Plan overall are anticipated to be less than significant. However, project specific analysis should be performed as individual components or projects reach a design level with enough detail to perform construction noise modelling. Duked has performed construction noise modelling for Phase 1, discussed below.

### 6.3.1 Construction Analysis Health and Human Services Building and Multifamily Residential Projects

Construction of the Health and Human Services Building and the Multifamily Residential Buildings is expected to include demolition, site preparation, grading, paving, building construction, and architectural coating. Construction equipment with substantially higher noise-generation characteristics (such as pile drivers, rock drills, blasting equipment) would not be necessary.

Table 18 shows the expected equipment use by phase for the construction of the project. The Building Construction and Architectural Coatings phases are split for the multifamily residential development and the Health and Human Services Building.

**Table 18  
Typical Construction Equipment Noise Levels**

Construction Phase Name	Equipment	Number of pieces of Equipment
Demolition	Concrete/Industrial Saws	1
Demolition	Excavators	3
Demolition	Rubber Tired Dozers	2
Site Preparation	Rubber Tired Dozers	3
Site Preparation	Tractors/Loaders/Backhoes	4
Grading	Excavators	2
Grading	Graders	1
Grading	Rubber Tired Dozers	1
Grading	Scrapers	2
Grading	Tractors/Loaders/Backhoes	2
Paving	Pavers	2
Paving	Paving Equipment	2
Paving	Rollers	2
Building Construction - HHS	Cranes	1
Building Construction - HHS	Forklifts	3
Building Construction - HHS	Generator Sets	1
Building Construction - HHS	Tractors/Loaders/Backhoes	3

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

**Table 18  
Typical Construction Equipment Noise Levels**

Construction Phase Name	Equipment	Number of pieces of Equipment
Building Construction - HHS	Trenchers	1
Building Construction - HHS	Welders	1
Architectural Coating - HHS	Air Compressors	1
Building Construction – MFR	Cranes	1
Building Construction – MFR	Forklifts	3
Building Construction – MFR	Generator Sets	1
Building Construction – MFR	Tractors/Loaders/Backhoes	3
Building Construction – MFR	Trenchers	1
Building Construction – MFR	Welders	1
Architectural Coating – MFR	Air Compressors	1

The magnitude of the impact would depend on the type of construction activity, equipment, duration of the construction phase, distance between the noise source and receiver, and any intervening structures. The typical operating cycles for construction equipment involve one or two minutes of full power operation followed by three or four minutes at lower power settings. Noise from construction equipment generally exhibits point source acoustical characteristics. A point source sound is attenuated (is reduced) at a rate of 6 decibels per doubling of distance from the source for “hard site” conditions and at 7.5 decibels per doubling of distance for “soft site” conditions. A hard site is characterized by ground surface covered by pavement, or hard compacted soils; a soft site is characterized by ground covered with vegetation, or loose soil with a rough surface. These rules apply to the propagation of sound waves with no obstacles between source and receivers, such as topography (ridges or berms) or structures.

Table 19 shows the calculated noise levels at nearby noise-sensitive receptors during construction phases for this project, employing the RCNM software and based on construction equipment listed in Table 18. The noise levels shown in Table 19 take into account operation of multiple pieces of construction equipment simultaneously for the  $L_{eq}$  results. More details from the RCNM analysis can be found in Appendix C. Because of stringent air quality emissions standards, newer, cleaner, and quieter heavy equipment is used on most construction projects in California. Thus, construction phase noise levels indicated in Table 19 represent worst-case conditions.

Worst-case conditions occur when construction is happening near the project boundary closest to the noise sensitive receptors (such as the “Nearest Receiver” column). The closest receiver is the office buildings directly east of the multifamily residential project which would be about 150 feet from the closest construction activities. Typical conditions

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

represent noise levels if construction were being conducted near the center of the project site. Residences across Bell road and medical facilities are the “Typical Receivers”.

**Table 19**  
**Construction Noise Modeling Summary Results**

Construction Phase	Leq (dBA)		
	MFR Nearest Receiver 150'	MFR Typical Receiver 230'	HHS Typical 1000'
Demolition	75	73	60
Site Preparation	74	72	60
Grading	76	75	62
Paving	76	73	60
Building Construction	74	72	59
Architectural Coating	64	60	48

As the table shows, the highest noise levels are expected to occur during the Grading and Paving Phases. Construction-related noise levels could reach up to 76 dBA  $L_{eq}$  at the office when multifamily residential construction is happening close to the site boundary. Table 9 shows the  $L_{eq}$  in close proximity to Bell Road at ST5. Measured traffic noise at this location was 60 dBA. LT4 on Table 10 shows average daytime hourly  $L_{eq}$ s in the vicinity of the MFR are 57 dBA. Thus, construction noise levels could be approximately 15 dBA above ambient noise levels at the closest sensitive receptor in the worst case situations. Typically, construction noise levels will be less than the worst-case. Typical construction noise levels would be 1 to 4 dB lower for the different phases of construction of the MFR.

With the construction operations limited to the hours between 7:00 a.m. and 6:00 p.m. during weekdays, significant noise impacts would be avoided during evening relaxing, and nighttime sleeping, hours.

For the Health and Human Services building, considerably greater distances exist between the project site and noise sensitive receptors. Construction noise levels would be highest during the grading phase with levels up to 62 dBA  $L_{eq}$  for residences to the south. Because of this further distance between the construction zone and closest residences, construction of the Health and Human Services project would result in construction noise levels not much greater than ambient levels, and consequently would have a less than significant construction noise impact.

# **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

## **6.3.2 Construction Noise Analysis - Master Plan Level**

Based upon the results of the specific construction noise analysis performed for Phase 1 of the Master Plan, and assuming major construction work does not happen within 150 feet of sensitive receptors, construction noise impacts associated with implementation of the Master Plan would remain at less than significant levels. Typically, noise sensitive receptors would be greater than 150 feet from construction operations for future development projects allowed under the Master Plan.

Average noise levels from construction activities may be annoying at times, but restricting construction activities to the daytime period will avoid disruption of evening time relaxation and overnight sleep periods.

As stated in significance threshold #4, a significant temporary construction noise impact would occur if construction were to occur outside of the allowable daily schedule (when construction is exempt from the noise ordinance) between 6:00 a.m. and 8:00 p.m. on weekdays and between 8:00 a.m. and 8:00 p.m. on weekends and the construction efforts were expected to produce levels greater than 5 dBA over ambient at noise sensitive receptors.

Construction is expected to occur during the allowable hours and would therefore be exempt from the sound level standards as detailed in Section 9.36.030 of the Placer County Code. Therefore, construction noise impacts from the master plan are considered less than significant.

## **6.3.3 Mitigation Measures**

Implementation of the proposed PCGC Master Plan Update would not result in a significant construction noise impact; therefore, no mitigation is required.

### **Significance After Mitigation**

Mitigation is not required because impacts would be less than significant without mitigation.

## **6.4 Ground-borne Vibration**

### **6.4.1 Impact Analysis**

Operation of development included in the Master Plan Update does not include any heavy rotating equipment or impact equipment. Thus, significant groundborne vibration is not expected from general operations of the Master Plan Update development projects. The primary sources of groundborne vibration for the Master Plan Update are demolition and construction activity.

## Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

The main concern associated with ground-borne vibration is annoyance; however, in extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. Some common sources of ground-borne vibration are trains, and construction activities such as blasting, pile-driving, and heavy earth-moving equipment. The primary source of ground-borne vibration occurring as part of the project is construction activity.

According to Caltrans, the highest measured vibration level during highway construction was 2.88 inches/second PPV at 10 feet from a pavement breaker. Other typical construction activities and equipment, such as D-8 and D-9 Caterpillars, earthmovers, and trucks have not exceeded 0.10 inches/second PPV at 10 feet. Vibration sensitive instruments and operations may require special consideration during construction. Vibration criteria for sensitive equipment and operations are not defined and are often case-specific. As a guide, major construction activity within 200 feet and pile driving within 600 feet may be potentially disruptive to sensitive operations (Caltrans 2002). No pile driving is anticipated to be necessary for project development.

The heavier pieces of construction equipment used at this site would include dozers, graders, and pavers. Ground-borne vibration information related to construction activities has been collected by the California Department of Transportation (Caltrans) (Caltrans 2004). Based on published vibration data, the anticipated construction equipment would generate a peak particle velocity of approximately 0.09 inch/second or less at a distance of 25 feet (FTA 2006).

Information from Caltrans indicates that continuous vibrations with a peak particle velocity of approximately 0.1 inch/second begin to annoy people. Ground-borne vibration is typically attenuated over short distances.

Table 20 shows a construction vibration impact summary for the project based on the FTA's 2006 Noise and Vibration Manual data and methodology. The equipment is shown along with the reference data (PPVref) from the Manual. Calculations were conducted to assess the vibration PPV at 150ft. The 150 foot distance specifically addresses construction vibration that maybe produced during the multifamily residential project. Typical vibration levels are expected to be intermittent and usually less than the PPV shown in the table due to additional distance separating construction efforts and sensitive receptors.

**Table 20**  
**Construction Vibration PPV**

<i>Equipment</i>	PPVref (in/s)	PPV (in/s)	PPV (in/s)
	<i>at 25 ft</i>	<i>at 50 ft</i>	<i>at 150 ft</i>
Vibratory Roller	0.21	0.10	0.01
Large Bulldozer	0.89	0.42	0.06

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

**Table 20**  
**Construction Vibration PPV**

<i>Equipment</i>	PPVref (in/s) <i>at 25 ft</i>	PPV (in/s) <i>at 50 ft</i>	PPV (in/s) <i>at 150 ft</i>
Loaded Trucks	0.76	0.35	0.05
Small Bulldozer	0.003	0.00	0.00

The calculated PPV at 150 feet is below the 0.2 in/s threshold established by Caltrans. Based on the FTA vibration analysis, the construction vibration impact on the commercial buildings nearby to the multifamily residential project would be less than significant. At greater distances between construction activity and typical sensitive receptors, PPV would be further reduced.

For the Health and Human Services building, the specific work is planned near the center of the PCGC project site. Noise sensitive receivers adjacent to the Placer County Government Center site would be located over 1,000 feet from construction activities. At this farther distance, vibration PPV would be substantially reduced. Thus, the Health and Human Services project would have a less than significant vibration impact during construction.

The same analysis applies to the master plan, assuming major construction work does not happen within 150 feet of vibration sensitive receptors. Typically, vibration sensitive receptors would be greater than 150 feet from construction operations. At greater than 150 feet from construction activities, vibration impacts are expected to be less than significant.

## **6.4.2 Mitigation Measures**

Implementation of the PCGC Master Plan Update would not result in a significant ground-borne vibration impact; therefore, no mitigation is required.

### **Significance After Mitigation**

Mitigation is not required because impacts would be less than significant without mitigation.

# Noise Assessment Technical Report for the Placer County Government Center Master Plan Update

---

## 7 REFERENCES

- 24 CCR Part 2. 2013 California Building Code. Sacramento, California: California Building Standards Commission. July 2013. ISBN 978-1-60983-457-9.
- Auburn Municipal Airport Land Use Compatibility Plan. February 26, 2014.
- Caltrans (California Department of Transportation). 1980. *Fundamentals and Abatement of Highway Traffic Noise*. September 1980.
- Caltrans. 1987. *California Vehicle Noise Emission Levels*. Report No. FHWA/CA/TL-87/03. January 1987. <http://www.dot.ca.gov/hq/env/noise/pub/CA%20Vehicle%20Noise%20Emission%20Levels.pdf>.
- Caltrans. 1998. *Technical Noise Supplement – A Technical Supplement to the Traffic Noise Analysis Protocol*. California Department of Transportation; Environmental Program; Environmental Engineering; Noise, Air Quality, and Hazardous Waste Management Office. October 1998. <http://www.dot.ca.gov/hq/env/noise/pub/Technical%20Noise%20Supplement.pdf>.
- Caltrans. 2002. *Transportation-Related Earthborne Vibrations*. Report No. TAV-02-01-R9201. California Department of Transportation; Environmental Program; Environmental Engineering; Noise, Air Quality, and Hazardous Waste Management Office. February 20, 2002. <http://www.dot.ca.gov/hq/env/noise/pub/TRANSPORTATION%20RELATED%20EARTHBORNE%20VIBRATIONS.pdf>.
- Caltrans (California Department of Transportation). 2011. *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects*. May 2011. Accessed May 2018.
- County of Placer. 2016. *Health and Human Services Facility Programming Report*. Prepared by Dreyfuss + Blackford. July 29, 2016.
- DOT (U.S. Department of Transportation). 2006. *FHWA Highway Construction Noise Handbook*. Final Report. FHWA-HEP-06-015. DOT-VNTSC-FHWA-06-02. Cambridge, Massachusetts: DOT, Research and Innovative Technology Administration. August 2006.
- FHWA (Federal Highway Administration). 2004. *Traffic Noise Model (TNM)*. Version 2.5.
- FHWA. 2008. *Roadway Construction Noise Model (RCNM)*.

## **Noise Assessment Technical Report for the Placer County Government Center Master Plan Update**

---

FHWA. 2010. 23 CFR Part 772: Procedures for Abatement of Highway Traffic Noise and Construction Noise – Final Rule. Federal Register, Vol. 75, Number 133. July 13, 2010.

FTA (Federal Transit Administration). 2006. *Transit Noise and Vibration Impact Assessment*. July 1, 2006.

EPA (Environmental Protection Agency). 1971. *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances*. Prepared by Bolt, Beranek & Newman, Boston, Massachusetts. Washington, D.C.: EPA.

EPA. 1973.

EPA (U.S. Environmental Protection Agency). 1974. “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.”

FHWA (Federal Highway Administration). 2006.

FHWA, Roadway Construction Noise Model (RCNM) (2008).

FICON (Federal Interagency Committee on Noise). 2000. Discussion of Methodologies of Measuring Noise Impacts. October 22, 2000.

FTA (Federal Transit Administration). 2006. *Transit Noise & Vibration Impact Assessment*. Federal Transit Administration, Office of Planning and Environment. May 2006.

NFA/URS (North Fork Associates/URS Corporation). 2002. *DeWitt Center Existing Conditions Report*. August 2002.

Transportation Research Board. 2000.

OPR (Governor’s Office of Planning and Research). 2003. *State of California General Plan Guidelines*. October 2003.

**APPENDIX A**  
*FHWA Traffic Model*  
*Noise Results*



Receiver Name	ID	Receiver Name	Existing CNEL	EPMFR CNEL	EPHHS CNEL	Existing CNEL	MPBuildOut CNEL	CumNoProj CNEL	CumPMFR CNEL	CumPHHS CNEL	CumNoProj CNEL	CumMPBui CNEL	
			0 dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	
M01 - Womens' Shelter (Building 504)	M1	M01 - Womens' Shelter (Buildin	41.2	41.3	41	41	42	1	42.1	42.1	42.2	42	43
M02 - Childrens' Emergency Shelter (Bui	M2	M02 - Childrens' Emergency She	40.9	41	41	41	42	1.1	41.8	41.9	41.9	42	43
M03 - Juvenile hall (Building 530)	M3	M03 - Juvenile hall (Building 530	42.9	42.9	43	43	44	0.9	43.7	43.7	43.8	44	44
M04 - Main jail (Building 520)	M4	M04 - Main jail (Building 520)	45.4	45.4	46	45	46	0.9	46.2	46.3	46.3	46	47
M05 - Homeless shelter (Building 303)	M5	M05 - Homeless shelter (Buildin	44.7	44.8	45	45	46	0.9	45.5	45.6	45.6	46	46
M06 - Health and Human Services Departm	M6	M06 - Health and Human Servic	43.2	43.3	43	43	44	0.9	44	44.1	44.1	44	45
M07 - Lighthouse Baptist Church (Curren	M7	M07 - Lighthouse Baptist Churcl	44.1	44.1	44	44	45	0.7	44.8	44.8	44.9	45	45
M08 - Theater (Currently Vacant; Buildi	M8	M08 - Theater (Currently Vacan	44.9	44.9	45	45	46	0.7	45.6	45.6	45.6	46	46
M09 - Placer County Medical Clinic (Bui	M9	M09 - Placer County Medical Cli	45.2	45.3	45	45	46	1	46	46.1	46.1	46	47
M10 - Foothill Community Church (Buildi	M10	M10 - Foothill Community Chur	45.5	45.6	46	46	47	1	46.3	46.4	46.4	46	47
M11 - Auburn Grace Community Church (fo	M11	M11 - Auburn Grace Communit'	44.5	44.6	45	45	46	1.3	45.5	45.5	45.6	46	46
M12 - Residential neighborhoods on Bell	M12	M12 - Residential neighborhoo	64.7	64.8	65	65	67	2	66.3	66.4	66.5	66	67
M13 - Residential neighborhood on Wilso	M13	M13 - Residential neighborhoo	58	58.1	58	58	59	1.3	58.9	59	59.1	59	60
M14 - Oakwood Assisted Living, located	M14	M14 - Oakwood Assisted Living,	48.4	48.5	49	48	50	1.3	49.3	49.4	49.4	49	50
M15 - Solstice Senior Living on Blue Oa	M15	M15 - Solstice Senior Living on E	48.8	48.9	49	49	50	1.3	49.8	49.8	49.9	50	51
M16 - Medical offices located north of	M16	M16 - Medical offices located n	60.1	60.2	60	60	62	1.4	61.1	61.2	61.2	61	62
M17 - Rock Creek School	M17	M17 - Rock Creek School	54.4	54.5	55	54	56	1.2	55.3	55.4	55.4	55	56
M18 - Medical offices on Professional D	M18	M18 - Medical offices on Profes	48.8	48.9	49	49	50	1.2	49.8	49.8	49.9	50	50
M19 - Sierra Council on Alcoholism Trea	M19	M19 - Sierra Council on Alcoholi	50.9	51	51	51	52	0.6	51.7	51.7	51.7	52	52
M20 - Residences on Cottage Dr	M20	M20 - Residences on Cottage Dr	47.3	47.3	47	47	48	0.6	48	48	48	48	48
M21 - St. Joseph's Catholic School	M21	M21 - St. Joseph's Catholic Scho	50.6	50.6	51	51	52	0.9	51.4	51.5	51.5	51	52
M22 - Residential neighborhoods on Atwo	M22	M22 - Residential neighborhoo	59.9	59.9	60	60	61	1	60.8	60.8	60.9	61	62
M23 - Auburn Elementary School	M23	M23 - Auburn Elementary Scho	41.7	41.7	42	42	42	0.7	42.4	42.4	42.5	42	43
M24 - Bell's Preschool and Daycare	M24	M24 - Bell's Preschool and Dayc	52.4	52.4	53	52	53	0.9	53.2	53.2	53.3	53	54
M25	M25	M25	49.9	49.9	50	50	51	0.9	50.7	50.8	50.8	51	52
M26 - Atwood Rd north residence	M26	M26 - Atwood Rd north residen	58.2	58.2	58	58	59	0.8	59	59	59.1	59	60
MFRModelPOINTS	M1_BuildingNWCorner	MFRModelPOINTS	52.9	53	53.1	52.9	54.3	1.4	53.9	54	54	53.9	54.7
MFRModelPOINTS	M2_NWCornerParkingLot	MFRModelPOINTS	52.5	52.6	52.6	52.5	53.8	1.3	53.5	53.5	53.6	53.5	54.3
MFRModelPOINTS	M3_Middle_Building	MFRModelPOINTS	46.6	46.7	46.8	46.6	47.7	1.1	47.5	47.6	47.6	47.5	48.2
MFRModelPOINTS	M4_Middle_ParkingLot	MFRModelPOINTS	47.2	47.3	47.3	47.2	48.3	1.1	48.1	48.1	48.2	48.1	48.7
M-MFR01 - Building facade	M-MFR1	M-MFR01 - Building facade	48.8	48.9	49	48.8	50.1	1.3	49.8	49.9	49.9	49.8	51
M-MFR02 - Northwest corner parking lot	M-MFR2	M-MFR02 - Northwest corner p	49.3	49.4	49.4	49.3	50.5	1.2	50.2	50.3	50.3	50.2	51
M-MFR03 - Middle building	M-MFR3	M-MFR03 - Middle building	46	46.1	46.1	46	47	1	46.8	46.9	46.9	46.8	47
M-MFR04 - Middle parking lot	M-MFR4	M-MFR04 - Middle parking lot	46.1	46.2	46.2	46.1	47.1	1	46.9	47	47	46.9	48
MODELPOINTS	ST1L Atwood Rd	MODELPOINTS	66.8	66.8	67	66.8	68.6	1.8	68.6	68.6	68.7	68.6	69.3
MODELPOINTS	ST2_Willow Creek	MODELPOINTS	47.9	48	48	47.9	48.4	0.5	48.6	48.6	48.7	48.6	48.9
MODELPOINTS	ST3 Home Dep Parking Lo	MODELPOINTS	50.9	51	51	50.9	51.4	0.5	51.7	51.7	51.7	51.7	52
MODELPOINTS	ST4 1st St	MODELPOINTS	45	45.1	45.1	45	45.9	0.9	45.8	45.8	45.8	45.8	46.3
MODELPOINTS	ST5 Bell Road	MODELPOINTS	60.4	60.6	60.7	60.4	61.8	1.4	61.4	61.5	61.5	61.4	62.2
MODELPOINTS	ST6 Sheriff	MODELPOINTS	43.7	43.7	43.8	43.7	44.6	0.9	44.5	44.6	44.6	44.5	45.2
MODELPOINTS	LT1_Future Residential	MODELPOINTS	48.1	48.2	48.3	48.1	49.1	1	49	49.1	49.1	49	49.8
MODELPOINTS	LT2_Corp Yard	MODELPOINTS	46.7	46.7	46.8	46.7	47.6	0.9	47.5	47.6	47.6	47.5	48.2
MODELPOINTS	LT3_Richardson Dr	MODELPOINTS	42.5	42.6	42.6	42.5	43.5	1	43.3	43.4	43.4	43.3	44
MODELPOINTS	LT4_1st St.	MODELPOINTS	48.1	48.2	48.2	48.1	49.3	1.2	49	49.1	49.1	49	49.7

Receiver Name	ID	Receiver Name	Existing CNEL 0 dBA	EPMFR CNEL dBA	EPHHS CNEL dBA	Existing CNEL dBA	MPBuildOut CNEL dBA	CumNoProj CNEL dBA	CumPMFR CNEL dBA	CumPHHS CNEL dBA	CumNoProj CNEL dBA	CumMPBui CNEL dBA	
OFFSITERECEPTORS	M17_Senior housing *	OFFSITERECEPTORS	48.8	48.9	48.9	48.8	50	1.2	49.7	49.8	49.8	49.7	50.5
OFFSITERECEPTORS	M18_Medical offices*	OFFSITERECEPTORS	59.9	60	60.1	59.9	61.2	1.3	60.8	60.9	61	60.8	61.7
OFFSITERECEPTORS	M19_Rock Creek Scho*	OFFSITERECEPTORS	54.3	54.4	54.5	54.3	55.5	1.2	55.2	55.3	55.3	55.2	55.9
OFFSITERECEPTORS	M20_Auburn Elementa*	OFFSITERECEPTORS	41.7	41.7	41.8	41.7	42.4	0.7	42.4	42.4	42.5	42.4	43
OFFSITERECEPTORS	M21_Convalescent ho*	OFFSITERECEPTORS	48.3	48.4	48.5	48.3	49.6	1.3	49.3	49.4	49.4	49.3	50.1
OFFSITERECEPTORS	M22_Sonrise Church *	OFFSITERECEPTORS	44.5	44.6	44.6	44.5	45.8	1.3	45.5	45.5	45.6	45.5	46.3
OFFSITERECEPTORS	M23_Residential nei*	OFFSITERECEPTORS	64.1	64.3	64.3	64.1	66.1	2	65.7	65.8	65.8	65.7	66.6
OFFSITERECEPTORS	M24_Residential nei*	OFFSITERECEPTORS	60.2	60.3	60.4	60.2	61.2	1	61.2	61.2	61.3	61.2	61.9
OFFSITERECEPTORS	M25_Residential nei*	OFFSITERECEPTORS	58.2	58.3	58.4	58.2	59.6	1.4	59.1	59.2	59.3	59.1	60
OFFSITERECEPTORS	M26_St Joseph's Cat*	OFFSITERECEPTORS	50.7	50.7	50.8	50.7	51.5	0.8	51.5	51.5	51.6	51.5	52.2
OFFSITERECEPTORS	M27_Residence On Co*	OFFSITERECEPTORS	56.7	56.7	56.9	56.7	57.5	0.8	57.4	57.5	57.6	57.4	58.2

# **APPENDIX B**

## *Ambient Noise Measurement Data*



### Field Noise Measurement Data

Record: 851

Project Name	PCGC
Project #	9635
Observer(s)	Christopher Barnobi
Date	2017-11-08

#### Meteorological Conditions

Temp (F)	52
Humidity % (R.H.)	50
Wind	Calm
Wind Speed (MPH)	2
Sky	Overcast

#### Instrument and Calibrator Information

Instrument Name List	(AUB) NL-62
Instrument Name	(AUB) NL-62
Instrument Name Lookup Key	(AUB) NL-62
Manufacturer	Rion
Model	NL-62
Serial Number	350815
Calibration Date	5/17/2017
Calibrator Name	(SAC) Rion NC-74
Calibrator Name	(SAC) Rion NC-74
Calibrator Name Lookup Key	(SAC) Rion NC-74
Calibrator Manufacturer	Rion
Calibrator Model	NC-74
Calibrator Serial #	34167529

#### Recordings

Record #	1
Site ID	ST1: Atwood
Site Location Lat/Long	
Begin (Time)	07:46:00
End (Time)	07:56:00
Leq	70
Lmax	85
Lmin	44.7
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

## Source Info and Traffic Counts

Number of Lanes	2
Lane Width (feet)	10
Roadway Width (feet)	20
Roadway Width (m)	6
Distance to Roadway (feet)	6
Distance to Roadway (m)	6
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Roadway Type	Hard paved
Estimated Vehicle Speed (MPH)	35
Count Duration (Min)	10
Speeds Estimated by:	Driving the Pace
Posted Speed Limit Sign (MPH)	35

## Traffic Counts

Vehicle Count Summary	Autos 49, MT 1, HT 0, Buses 2, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	10
Vehicle Count Tally	
Select Method for Vehicle Counts	Use Counter (+/-)

## Recordings

Record #	2
Site ID	ST2: Willow Creek
Site Location Lat/Long	
Begin (Time)	08:03:00
End (Time)	08:13:00
Leq	63
Lmax	74.5
Lmin	46.5
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Gardener / Landscape Noise, Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

## Source Info and Traffic Counts

Number of Lanes	3
Lane Width (feet)	10
Roadway Width (feet)	30
Roadway Width (m)	9
Distance to Roadway (feet)	12
Distance to Roadway (m)	12
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Roadway Type	Hard paved
Estimated Vehicle Speed (MPH)	35
Count Duration (Min)	10
Posted Speed Limit Sign (MPH)	35

## Traffic Counts

Vehicle Count Summary	Autos 30, MT 1, HT 0, Buses 0, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	10
Vehicle Count Tally	
Select Method for Vehicle Counts	Use Counter (+/-)

## Recordings

Record #	3
Site ID	ST3: Commercial parking lot
Site Location Lat/Long	
Begin (Time)	08:20:00
End (Time)	08:50:00
Leq	57
Lmax	78.5
Lmin	48.5
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

## Recordings

Record #	4
Site ID	ST4: First Street
Site Location Lat/Long	
Begin (Time)	09:02:00
End (Time)	09:12:00
Leq	62
Lmax	76.8
Lmin	47.4
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Birds, Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

## Source Info and Traffic Counts

Number of Lanes	2
Lane Width (feet)	10
Roadway Width (feet)	20
Roadway Width (m)	6
Distance to Roadway (feet)	12
Distance to Roadway (m)	12
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Roadway Type	Hard paved
Estimated Vehicle Speed (MPH)	20
Count Duration (Min)	10
Speeds Estimated by:	Driving the Pace
Posted Speed Limit Sign (MPH)	20

**Traffic Counts**

Vehicle Count Summary	Autos 36, MT 0, HT 0, Buses 1, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	10
Vehicle Count Tally	
Select Method for Vehicle Counts	Use Counter (+/-)

**Recordings**

Record #	5
Site ID	ST5: Bell Road
Site Location Lat/Long	
Begin (Time)	09:28:00
End (Time)	09:38:00
Leq	67
Lmax	78.8
Lmin	49.9
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Aircraft, Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

**Source Info and Traffic Counts**

Number of Lanes	5
Lane Width (feet)	10
Roadway Width (feet)	50
Roadway Width (m)	15
Distance to Roadway (feet)	10
Distance to Roadway (m)	10
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Roadway Type	Hard paved
Estimated Vehicle Speed (MPH)	40
Count Duration (Min)	10
Posted Speed Limit Sign (MPH)	40

**Traffic Counts**

Vehicle Count Summary	Autos 108, MT 0, HT 0, Buses 0, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	10
Vehicle Count Tally	
Select Method for Vehicle Counts	Use Counter (+/-)

**Recordings**

Record #	6
Site ID	ST6: Richardson
Site Location Lat/Long	
Begin (Time)	09:52:00
End (Time)	10:02:00
Leq	60
Lmax	72.2
Lmin	45.2
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Birds, Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

**Source Info and Traffic Counts**

Number of Lanes	2
Lane Width (feet)	10
Roadway Width (feet)	20
Roadway Width (m)	6
Distance to Roadway (feet)	5
Distance to Roadway (m)	5
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Roadway Type	Hard paved
Estimated Vehicle Speed (MPH)	20
Count Duration (Min)	10
Speeds Estimated by:	Driving the Pace
Posted Speed Limit Sign (MPH)	20

**Traffic Counts**

Vehicle Count Summary	Autos 46, MT 0, HT 0, Buses 1, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	10
Vehicle Count Tally	
Select Method for Vehicle Counts	Use Counter (+/-)



# **APPENDIX C**

*Roadway Noise Construction Model (RNCM)*

*Input and Results*

*Data Sheets*



Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/7/2018  
 Case Description: PCGC\_Architectural Coating - HHS

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Receiver 150'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	150	0

Results

Equipment	Calculated (dBA)	Noise Limits (dBA)					
		Day		Evening		Night	
	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compressor (air)	68.1	64.1	N/A	N/A	N/A	N/A	N/A
Total	68.1	64.1	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Typical Receiver 230'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	230	0

Results

Equipment	Calculated (dBA)	Noise Limits (dBA)					
		Day		Evening		Night	
	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compressor (air)	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Total	64.4	60.4	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/7/2018  
 Case Description: PCGC\_Architectural Coating - Res

---- Receptor #1 ----

Description  
Nearest Receiver 150'

Land Use  
Residential

Baselines (dBA)		
Daytime	Evening	Night
65	60	55

Description  
Compressor (air)

Equipment		Spec	Actual	Receptor	Estimated
Impact	Usage(%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
No	40		77.7	150	0

Results

Equipment  
Compressor (air)

Total

Calculated (dBA)		Noise Limits (dBA)					
		Day		Evening		Night	
*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
68.1	64.1	N/A	N/A	N/A	N/A	N/A	N/A
68.1	64.1	N/A	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description  
Typical Receiver 230'

Land Use  
Residential

Baselines (dBA)		
Daytime	Evening	Night
65	60	55

Description  
Compressor (air)

Equipment		Spec	Actual	Receptor	Estimated
Impact	Usage(%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
No	40		77.7	230	0

Results

Equipment  
Compressor (air)

Total

Calculated (dBA)		Noise Limits (dBA)					
		Day		Evening		Night	
*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
64.4	60.4	N/A	N/A	N/A	N/A	N/A	N/A
64.4	60.4	N/A	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 8/7/2018  
Case Description: PCGC\_Building Construction- HHS

---- Receptor #1 ----

Description

Land Use

Baselines (dBA)		
Daytime	Evening	Night

Nearest Receiver 150' Residential 65 60 55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	150	0
Man Lift	No	20		74.7	150	0
Man Lift	No	20		74.7	150	0
Man Lift	No	20		74.7	175	0
Generator	No	50		80.6	175	0
Backhoe	No	40		77.6	175	0
Front End Loader	No	40		79.1	200	0
Tractor	No	40	84		200	0
Slurry Trenching Machine	No	50		80.4	200	0
Welder / Torch	No	40		74	225	0

Equipment	Calculated (dBA)		Results Noise Limits (dBA)				
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax
Crane	71		63	N/A	N/A	N/A	N/A
Man Lift	65.2		58.2	N/A	N/A	N/A	N/A
Man Lift	65.2		58.2	N/A	N/A	N/A	N/A
Man Lift	63.8		56.8	N/A	N/A	N/A	N/A
Generator	69.7		66.7	N/A	N/A	N/A	N/A
Backhoe	66.7		62.7	N/A	N/A	N/A	N/A
Front End Loader	67.1		63.1	N/A	N/A	N/A	N/A
Tractor	72		68	N/A	N/A	N/A	N/A
Slurry Trenching Machine	68.3		65.3	N/A	N/A	N/A	N/A
Welder / Torch	60.9		57	N/A	N/A	N/A	N/A
Total	72		73.5	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Typical Receiver 230'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	230	0
Man Lift	No	20		74.7	230	0
Man Lift	No	20		74.7	230	0
Man Lift	No	20		74.7	230	0

Generator	No	50	80.6	230	0
Backhoe	No	40	77.6	230	0
Front End Loader	No	40	79.1	230	0
Tractor	No	40	84	230	0
Slurry Trenching Machine	No	50	80.4	230	0
Welder / Torch	No	40	74	230	0

Results

Equipment	Calculated (dBA)		Noise Limits (dBA)				
	*Lmax	Leq	Day		Evening		Night
			Lmax	Leq	Lmax	Leq	Lmax
Crane	67.3	59.3	N/A	N/A	N/A	N/A	N/A
Man Lift	61.4	54.5	N/A	N/A	N/A	N/A	N/A
Man Lift	61.4	54.5	N/A	N/A	N/A	N/A	N/A
Man Lift	61.4	54.5	N/A	N/A	N/A	N/A	N/A
Generator	67.4	64.4	N/A	N/A	N/A	N/A	N/A
Backhoe	64.3	60.3	N/A	N/A	N/A	N/A	N/A
Front End Loader	65.9	61.9	N/A	N/A	N/A	N/A	N/A
Tractor	70.7	66.8	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machine	67.1	64.1	N/A	N/A	N/A	N/A	N/A
Welder / Torch	60.7	56.8	N/A	N/A	N/A	N/A	N/A
Total	70.7	71.7	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 8/7/2018  
Case Description: PCGC\_Building Construction- Res

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Receiver 150'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
			Man Lift	No	20	74.7
Man Lift	No	20	74.7	150	0	
Man Lift	No	20	74.7	150	0	
Generator	No	50	80.6	175	0	
Backhoe	No	40	77.6	175	0	
Front End Loader	No	40	79.1	175	0	
Tractor	No	40	84	200	0	
Slurry Trenching Machine	No	50	80.4	200	0	
Welder / Torch	No	40	74	200	0	

Equipment	Calculated (dBA)		Results				
	*Lmax	Leq	Day		Evening		Night
			Lmax	Leq	Lmax	Leq	Lmax
Man Lift	71	63	N/A	N/A	N/A	N/A	N/A
Man Lift	65.2	58.2	N/A	N/A	N/A	N/A	N/A
Man Lift	65.2	58.2	N/A	N/A	N/A	N/A	N/A
Generator	63.8	56.8	N/A	N/A	N/A	N/A	N/A
Backhoe	69.7	66.7	N/A	N/A	N/A	N/A	N/A
Front End Loader	66.7	62.7	N/A	N/A	N/A	N/A	N/A
Tractor	67.1	63.1	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machine	72	68	N/A	N/A	N/A	N/A	N/A
Welder / Torch	68.3	65.3	N/A	N/A	N/A	N/A	N/A
Total	72	73.5	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Typical Receiver 230'	Residential	65	60	55

Description	Device	Impact	Equipment				
			Usage(%)	Spec	Actual	Receptor	Estimated
				Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Man Lift	No	20		74.7	230	0	
Man Lift	No	20		74.7	230	0	
Man Lift	No	20		74.7	230	0	
Generator	No	50		80.6	230	0	
Backhoe	No	40		77.6	230	0	
Front End Loader	No	40		79.1	230	0	
Tractor	No	40	84		230	0	
Slurry Trenching Machine	No	50		80.4	230	0	
Welder / Torch	No	40		74	230	0	

Equipment	Calculated (dBA)		Results				
	*Lmax	Leq	Day		Evening		Night
			Lmax	Leq	Lmax	Leq	Lmax
Man Lift	61.4	54.5	N/A	N/A	N/A	N/A	N/A
Man Lift	61.4	54.5	N/A	N/A	N/A	N/A	N/A
Man Lift	61.4	54.5	N/A	N/A	N/A	N/A	N/A
Generator	67.4	64.4	N/A	N/A	N/A	N/A	N/A
Backhoe	64.3	60.3	N/A	N/A	N/A	N/A	N/A
Front End Loader	65.9	61.9	N/A	N/A	N/A	N/A	N/A
Tractor	70.7	66.8	N/A	N/A	N/A	N/A	N/A

Slurry Trenching Machine	67.1	64.1	N/A	N/A	N/A	N/A	N/A
Welder / Torch	60.7	56.8	N/A	N/A	N/A	N/A	N/A
Total	70.7	71.5	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 8/7/2018  
Case Description: PCGC\_Demolition

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Receiver 150'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	150	0
Excavator	No	40		80.7	150	0
Excavator	No	40		80.7	175	0
Dozer	No	40		81.7	175	0
Dozer	No	40		81.7	200	0
Concrete Saw	No	20		89.6	200	0

Results

Equipment	Calculated (dBA)		Noise Limits (dBA)				
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax
Excavator	71.2	67.2	N/A	N/A	N/A	N/A	N/A
Excavator	71.2	67.2	N/A	N/A	N/A	N/A	N/A
Excavator	69.8	65.8	N/A	N/A	N/A	N/A	N/A
Dozer	70.8	66.8	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A
Total	77.5	75.3	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Typical Receiver 230'	Residential	65	60	55

Equipment			
Spec	Actual	Receptor	Estimated

Description	Impact Device	Usage(%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Excavator	No	40		80.7	230	0
Excavator	No	40		80.7	230	0
Excavator	No	40		80.7	230	0
Dozer	No	40		81.7	230	0
Dozer	No	40		81.7	230	0
Concrete Saw	No	20		89.6	230	0

Equipment	Results						
	Calculated (dBA)			Noise Limits (dBA)			
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax
Excavator	67.5	63.5	N/A	N/A	N/A	N/A	N/A
Excavator	67.5	63.5	N/A	N/A	N/A	N/A	N/A
Excavator	67.5	63.5	N/A	N/A	N/A	N/A	N/A
Dozer	68.4	64.4	N/A	N/A	N/A	N/A	N/A
Dozer	68.4	64.4	N/A	N/A	N/A	N/A	N/A
Concrete Saw	76.3	69.3	N/A	N/A	N/A	N/A	N/A
Total	76.3	73.2	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

#### Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 8/7/2018  
Case Description: PCGC\_Grading

#### ---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Receiver 150'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
			Excavator	No	40	
Excavator	No	40		80.7	150	0
Grader	No	40	85		175	0
Dozer	No	40		81.7	175	0
Scraper	No	40		83.6	200	0
Scraper	No	40		83.6	200	0
Front End Loader	No	40		79.1	225	0
Tractor	No	40	84		225	0

Results	
Calculated (dBA)	Noise Limits (dBA)

Equipment	*Lmax	Leq	Day		Evening		Night
			Lmax	Leq	Lmax	Leq	Lmax
Excavator	71.2	67.2	N/A	N/A	N/A	N/A	N/A
Excavator	71.2	67.2	N/A	N/A	N/A	N/A	N/A
Grader	74.1	70.1	N/A	N/A	N/A	N/A	N/A
Dozer	70.8	66.8	N/A	N/A	N/A	N/A	N/A
Scraper	71.5	67.6	N/A	N/A	N/A	N/A	N/A
Scraper	71.5	67.6	N/A	N/A	N/A	N/A	N/A
Front End Loader	66	62.1	N/A	N/A	N/A	N/A	N/A
Tractor	70.9	67	N/A	N/A	N/A	N/A	N/A
Total	74.1	76.4	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Typical Receiver 230'	Residential	65	60	55

Description	Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	230	0
Excavator	No	40		80.7	230	0
Grader	No	40	85		230	0
Dozer	No	40		81.7	230	0
Scraper	No	40		83.6	230	0
Scraper	No	40		83.6	230	0
Front End Loader	No	40		79.1	230	0
Tractor	No	40	84		230	0

Results

Equipment	*Lmax	Leq	Calculated (dBA)		Noise Limits (dBA)		
			Day Lmax	Leq	Day Lmax	Leq	Night Lmax
Excavator	67.5	63.5	N/A	N/A	N/A	N/A	N/A
Excavator	67.5	63.5	N/A	N/A	N/A	N/A	N/A
Grader	71.7	67.8	N/A	N/A	N/A	N/A	N/A
Dozer	68.4	64.4	N/A	N/A	N/A	N/A	N/A
Scraper	70.3	66.3	N/A	N/A	N/A	N/A	N/A
Scraper	70.3	66.3	N/A	N/A	N/A	N/A	N/A
Front End Loader	65.9	61.9	N/A	N/A	N/A	N/A	N/A
Tractor	70.7	66.8	N/A	N/A	N/A	N/A	N/A
Total	71.7	74.5	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

Report date: 8/7/2018

Case Description: PCGC\_Paving

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Receiver 150'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	150	0
Paver	No	50		77.2	150	0
All Other Equipment > 5 HP	No	50	85		175	0
All Other Equipment > 5 HP	No	50	85		175	0
Roller	No	20		80	200	0
Roller	No	20		80	200	0

Results

Equipment	Calculated (dBA)		Noise Limits (dBA)				
	*Lmax	Leq	Day		Evening		Night
			Lmax	Leq	Lmax	Leq	Lmax
Paver	71.2	67.2	N/A	N/A	N/A	N/A	N/A
Paver	71.2	67.2	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	74.1	70.1	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	70.8	66.8	N/A	N/A	N/A	N/A	N/A
Roller	71.5	67.6	N/A	N/A	N/A	N/A	N/A
Roller	71.5	67.6	N/A	N/A	N/A	N/A	N/A
Total	74.1	76.4	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Typical Receiver 230'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	230	0
Paver	No	50		77.2	230	0
All Other Equipment > 5 HP	No	50	85		230	0
All Other Equipment > 5 HP	No	50	85		230	0
Roller	No	20		80	230	0



Tractor		70.9	67	N/A	N/A	N/A	N/A	N/A
	Total	70.9	74	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Typical Receiver 230'	Residential	65	60	55

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Backhoe	No	40		77.6	230	0
Backhoe	No	40		77.6	230	0
Dozer	No	40		81.7	230	0
Dozer	No	40		81.7	230	0
Dozer	No	40		81.7	230	0
Front End Loader	No	40		79.1	230	0
Tractor	No	40	84		230	0

Results

Equipment	Calculated (dBA)		Noise Limits (dBA)					
	*Lmax	Leq	Day	Evening		Night		
			Lmax	Leq	Lmax	Leq	Lmax	
Backhoe	64.3	60.3	N/A	N/A	N/A	N/A	N/A	
Backhoe	64.3	60.3	N/A	N/A	N/A	N/A	N/A	
Dozer	68.4	64.4	N/A	N/A	N/A	N/A	N/A	
Dozer	68.4	64.4	N/A	N/A	N/A	N/A	N/A	
Dozer	68.4	64.4	N/A	N/A	N/A	N/A	N/A	
Front End Loader	65.9	61.9	N/A	N/A	N/A	N/A	N/A	
Tractor	70.7	66.8	N/A	N/A	N/A	N/A	N/A	
	Total	70.7	72.2	N/A	N/A	N/A	N/A	N/A

\*Calculated Lmax is the Loudest value.

