4.11 NOISE

This section analyzes project-related noise source impacts to on- and off-site land uses. Mitigation measures are recommended to avoid or reduce the project's noise impacts. Information in this section was obtained from the Nevada County General Plan (General Plan), Nevada County General Plan Environmental Impact Report (General Plan EIR), and the Nevada County Land Use Development Code. For the purposes of mobile source noise modeling and contour distribution, traffic information contained in Appendix L (Traffic Data) was utilized. The noise modeling data can be found in Appendix I of this EIR.

4.11.1 ENVIRONMENTAL SETTING

ACOUSTICAL TERMINOLOGY

Noise Scales and Definitions

Sound is described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by differentiating among frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound ten dBA higher than another is perceived to be twice as loud and 20 dBA higher is perceived to be four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud); refer to Figure 4.11-1, *Sound Levels and Human Response*.

Many methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time
- The influence of periodic individual loud events
- The community response to changes in the community noise environment

Table 4.11-1, *Noise Descriptors*, provides a listing of methods to measure sound over a period of time.

Table 4.11-1
Noise Descriptors

Term	Definition
Decibel (dB)	The unit for measuring the volume of sound equal to 10 times the logarithm (base 10) of the ratio of the pressure of a measured sound to a reference pressure (20 micropascals).
A-Weighted Decibel (dBA)	A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).

Table 4.11-1, continued

Term	Definition
Equivalent Sound Level (L_{eq})	The sound level containing the same total energy as a time varying signal over a given time period. The L_{eq} is the value that expresses the time averaged total energy of a fluctuating sound level.
Maximum Sound Level (L_{max})	The highest individual sound level (dBA) occurring over a given time period.
Minimum Sound Level (L_{min})	The lowest individual sound level (dBA) occurring over a given time period.
Community Noise Equivalent Level (CNEL)	A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments are +5 dBA for the evening, 7:00 PM to 10:00 PM, and +10 dBA for the night, 10:00 PM to 7:00 AM.
Day/Night Average (L_{dn})	The L_{dn} is a measure of the 24-hour average noise level at a given location. It was adopted by the U.S. Environmental Protection Agency (EPA) for developing criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the L_{eq}. The L_{dn} is calculated by averaging the L_{eq}'s for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 PM to 7:00 AM), by 10 dBA to account for the increased sensitivity of people to noises that occur at night.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.

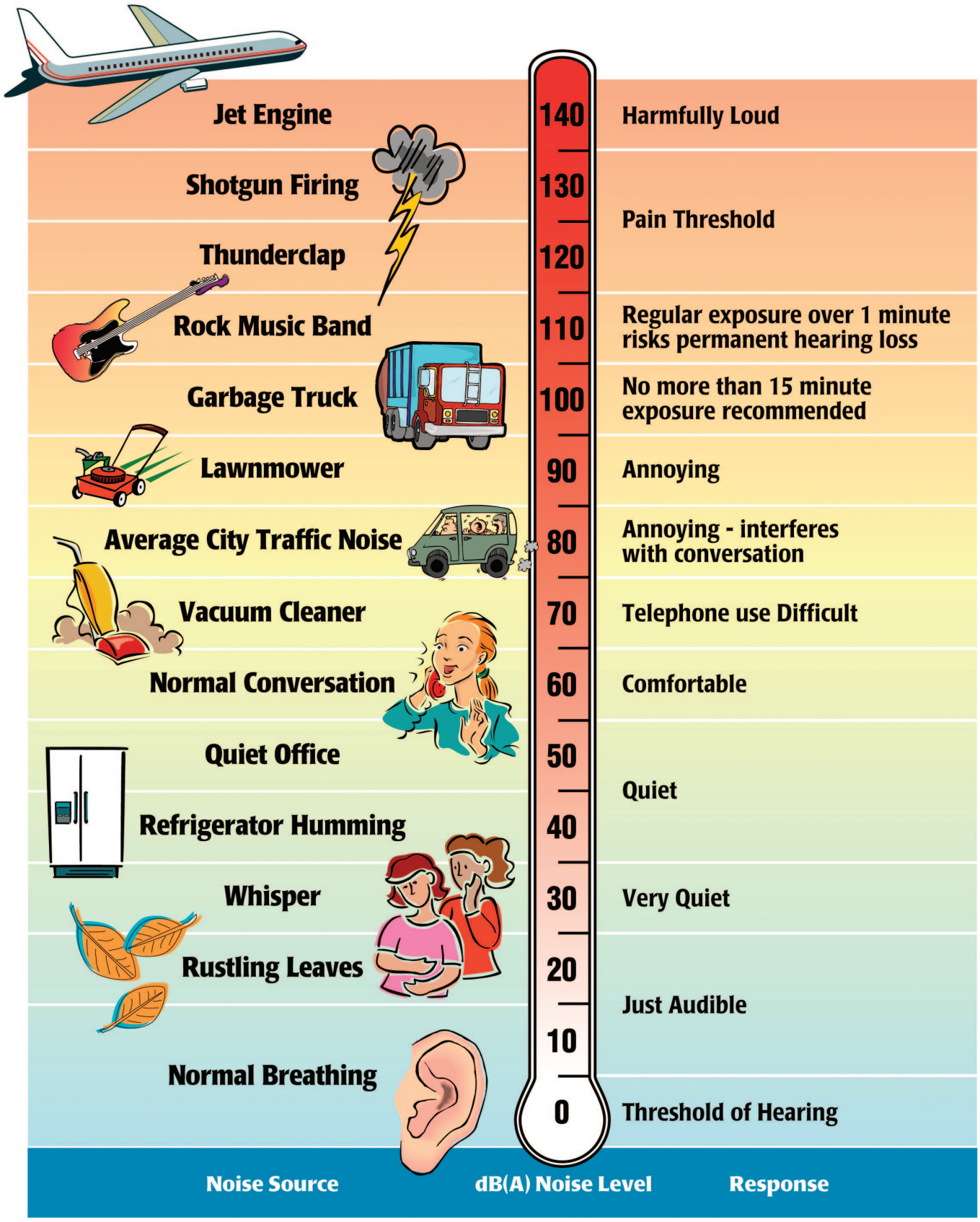
Source: Cyril M. Harris, *Handbook of Noise Control*, 1979

HEALTH EFFECTS OF NOISE

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise generally increases with the environmental sound level. However, many factors also influence people's response to noise. The factors can include the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as the person's opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence people's response. As such, response to noise varies widely from one person to another and with any particular noise, individual responses range from "not annoyed" to "highly annoyed."

When the noise level of an activity rises above 70 dBA, the chance of receiving a complaint is possible, and as the noise level rises, dissatisfaction among the public steadily increases. The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on the community can be organized into six broad categories:

- Noise-Induced Hearing Loss
- Interference with Communication
- Effects of Noise on Sleep
- Effects on Performance and Behavior
- Extra-Auditory Health Effects
- Annoyance



Source:

Melville C. Branch and R. Dale Beland, *Outdoor Noise in the Metropolitan Environment*, 1970.

Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004)*, March 1974.

ALBRIGHT WAY DEVELOPMENT PROJECT
ACOUSTICAL ASSESSMENT

Common Environmental Noise Levels

RBF CONSULTING

1/26/11 JN 40-100419-17193 MAS

Figure 4.11-1

Although it often causes discomfort and sometimes pain, noise-induced hearing loss usually takes years to develop. Noise-induced hearing loss can impair the quality of life through a reduction in the ability to hear important sounds and to communicate with family and friends. Hearing loss is one of the most obvious and easily quantified effects of excessive exposure to noise. While the loss may be temporary at first, it could become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly caused by the environment is difficult to quantify. Although the major cause of noise-induced hearing loss is occupational, substantial damage can be caused by non-occupational sources.

According to the U.S. Public Health Service, nearly ten million of the estimated 21 million Americans with hearing impairments owe their losses to noise exposure. Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and television in the home. It can also disrupt effective communication between teachers and pupils in schools, and can cause fatigue and vocal strain in those who need to communicate in spite of the noise.

Interference with communication has proved to be one of the most important components of noise-related annoyance. Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern, or level of sleep. It can produce short-term adverse effects on mood changes and job performance, with the possibility of more serious effects on health if it continues over long periods. Noise can cause adverse effects on task performance and behavior at work, and non-occupational and social settings. These effects are the subject of some controversy since the presence and degree of effects depends on a variety of intervening variables. Most research in this area has focused mainly on occupational settings, where noise levels must be sufficiently high and the task sufficiently complex for effects on performance to occur.

Recent research implicates that more moderate noise levels can produce disruptive after-effects, commonly manifested as a reduced tolerance for frustration, increased anxiety, decreased incidence of "helping" behavior and increased incidence of "hostile" behavior. Noise has been implicated in the development or exacerbation of a variety of health problems, ranging from hypertension to psychosis. As with other categories, quantifying these effects is difficult due to the amount of variables that need to be considered in each situation. As a biological stressor, noise can influence the entire physiological system. Most effects seem to be transitory, but with continued exposure some effects have been shown to be chronic in laboratory animals.

Annoyance can be viewed as the expression of negative feelings resulting from interference with activities, as well as the disruption of one's peace of mind and the enjoyment of one's environment. Field evaluations of community annoyance are useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above. In a study conducted by the United States Department of Transportation, the effects of annoyance to the community were quantified. In areas where noise levels were consistently above 60 dBA community noise equivalent level (CNEL), approximately nine percent of the community is highly annoyed. When levels exceed 65 dBA CNEL, that percentage rises to 15 percent. Although evidence for the various effects of noise

have differing levels of certainty, it is clear that noise can affect human health. Most of the effects are, to a varying degree, stress related.

GROUND-BORNE VIBRATION

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity or acceleration. The peak particle velocity or the root mean square velocity is usually used to describe vibration amplitudes. The peak particle velocity is defined as the maximum instantaneous peak or vibration signal, while the root mean square velocity is defined as the square root of the average of the squared amplitude of the signal. The peak particle velocity is typically used for evaluating potential building damage, whereas the root mean square velocity is typically more suitable for evaluating human response. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of vibration. Man-made vibration issues are, therefore, usually confined to short distances (i.e., 500 feet or less) from the source.

Both construction and operation of development projects can generate ground-borne vibration. In general, demolition of structures preceding construction generates the highest vibrations. Construction equipment, such as vibratory compactors or rollers, pile drivers, and pavement breakers, can generate perceptible vibration during construction activities. Heavy trucks can also generate ground-borne vibrations that vary depending on vehicle type, weight, and pavement conditions.

SENSITIVE RECEPTORS

Human response to noise varies widely depending on the type of noise, time of day, and sensitivity of the receptor. Certain land uses are particularly sensitive to noise, including schools, hospitals, rest homes, long-term medical and mental care facilities, and parks and recreation areas. Residential areas are also considered noise sensitive, especially during the nighttime hours. The candidate sites are located within three general areas of unincorporated Nevada County including the Grass Valley Sphere of Influence, Penn Valley, and the Lake of the Pines Area. Nearby noise-sensitive land uses generally consist of residential uses, commercial uses, and open space.

MOBILE NOISE SOURCES

Roadway Noise

Roadway noise levels throughout the project area were projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108), together with several roadway and site parameters. These parameters determine the projected impact of vehicular traffic noise and include the roadway cross-section (i.e., number of lanes), the roadway width, the average daily traffic (ADT), and the vehicle travel speed. The model does not account for ambient noise levels (i.e., noise from adjacent land uses) or topographical differences between the roadways and adjacent land uses. Vehicle speeds were assumed based on empirical observations and posted maximum speeds. Noise projections are based on vehicular traffic as derived from the traffic data contained within the project's Traffic Impact Assessment. Existing noise contours were calculated for the primary and major arterials in the vicinity of the project area; refer to Table 4.11-2, *Existing Roadway Traffic Noise Levels*. In addition, a number of secondary and commuter streets and collectors were modeled. Noise generation

for each roadway link was calculated, and the distance to the 60 dBA, 65 dBA, and 70 dBA contours was determined.

Table 4.11-2
Existing Roadway Traffic Noise Levels

Roadway Segment	Existing Conditions				
	ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)		
			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour
Nevada City Highway					
Dorsey Drive to Brunswick Road	9,945	61.6	171	54	17
North of Brunswick Road	13,707	63.0	236	75	24
SR-20					
SB On-Ramp	19,620	64.6	338	107	34
Brunswick Road					
SR-20 to Sutton Way	21,618	64.8	372	118	37
Sutton Way to Old Tunnel Road	12,654	59.4	111	52	24
Old Tunnel Road to Idaho Maryland Road	10,107	58.4	96	44	21
South of Idaho Maryland Road	12,240	59.2	109	50	23
Sutton Way					
North of Brunswick Road	6,561	59.7	113	36	11
South of Brunswick Road	12,249	62.4	211	67	21
Idaho Maryland Road					
West of Brunswick Road	3,465	54.1	47	22	10
East of Brunswick Road	1,737	51.1	30	14	6
McCourtney Road					
South of Personeni Road	6,003	56.5	68	31	15
McKnight Way					
East of SR-49	11,196	62.0	193	61	19
SR-49 SB Ramps to SR-49 NB Ramps	12,159	62.3	209	66	21
SR-49 Ramps to Auburn Street	10,980	61.9	189	60	19
Auburn Street					
North of McKnight Way	5,436	55.9	63	29	14
La Barr Meadows Road					
South of McKnight Way	8,442	57.8	85	39	18
SR-20					
West of Pleasant Valley Road	7,641	62.3	164	76	35
Pleasant Valley Road to Rough and Ready Hwy	11,160	63.9	212	98	46
East of Rough and Ready Highway	13,140	64.6	236	110	51
Pleasant Valley Road					
North of SR-20	9,495	61.0	136	63	29
Penn Valley Drive					
Pleasant Valley Road to Horton Street	7,290	59.9	114	53	25

Table 4.11-2, continued

Roadway Segment	Existing Conditions				
	ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)		
			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour
Horton Street to Broken Oak Court	2,790	55.7	60	28	13
Broken Oak Court to Spenceville Road	3,519	56.7	70	33	15
Rough and Ready Highway					
North of SR-20	2,853	55.9	61	28	13
South of SR-20	5,463	58.7	94	43	20
Spenceville Road					
South of Penn Valley Drive	3,843	56.2	62	29	13
SR-49					
Cameo Drive to Combie Road	19,600	66.2	308	143	66
Combie Road to Woodridge Drive	25,672	67.4	369	171	79
Combie Road					
West of SR-49	4,750	55.5	58	27	12
East of SR-49	14,370	60.3	121	56	26
West of Rosewood Drive	13,680	60.1	117	54	25
Rosewood Drive to Hacienda Drive	13,310	59.9	115	53	25
South of Magnolia Road	5,510	56.1	64	30	14
Magnolia Road					
East of Hacienda Drive	11,465	59.3	104	48	22
Hacienda Drive					
North of Combie Road	2,600	53.0	39	18	8

Source: Traffic noise modeling is based on traffic data provided by RBF Consulting, January 2013.

AIRCRAFT NOISE

The Nevada County Airport is located approximately one mile to the southeast of the candidate sites within the Grass Valley Sphere of Influence, which contributes to the noise environment. The candidate sites are located outside of the 65 dBA CNEL noise contour boundaries.[1]

STATIONARY NOISE SOURCES

The project area consists of a mix of open grassland, water features, and forested land. The primary sources of stationary noise in the project vicinity are the few commercial and industrial activities in the vicinity of each of the candidate sites. The noise associated with these sources may represent a single-event noise occurrence, short-term or long-term/continuous noise.

Commercial and industrial land uses located near residential areas currently generate occasional noise impacts. The primary noise sources associated with these facilities are caused by delivery trucks, heavy machinery, air compressors, generators, outdoor loudspeakers, and gas venting. Other significant stationary noise sources in the area include noise from construction activities, street sweepers, and gas-powered leaf blowers.

[1] Nevada County Airport Land Use Commission, *Nevada County Airport Land Use Compatibility Plan*, July 2011.

Commercial

Commercial development covers a broad spectrum of uses including retail, office, and service commercial. Commercial uses are generally located to the west of the Grass Valley area sites, to the north of the Penn Valley area sites, and to the west of the Lake of the Pines area sites. A variety of stationary noise sources associated with commercial activities exists within the vicinity of the project area. Commercial noise sources may include mechanical equipment and power tools. These noise sources have the potential to temporarily disrupt the quietness of an area.

Industrial

Industrial development is located to the north of the Penn Valley area sites. These industrial uses include light industrial welding. Industrial businesses can have a varying degree of impact on adjacent uses. Industrial operations often involve use of generators, motors, pumps, fans, mechanical equipment, and vehicles that contribute to noise levels at industrial sites, particularly for outdoor activities.

4.11.2 REGULATORY SETTING

It is difficult to specify noise levels that are generally acceptable to everyone. What is annoying to one person may be unnoticed by another. Standards may be based on documented complaint activity in response to documented noise levels, or based on studies on the ability of people to sleep, talk, or work under various noise conditions. However, such studies recognize that individual responses vary considerably. Standards usually address the needs of most of the general population.

This section describes the laws, ordinances, regulations, and standards that are applicable to the proposed project. Regulatory requirements related to environmental noise are typically promulgated at the local level. However, federal and state agencies provide standards and guidelines for local jurisdictions.

STATE FRAMEWORK

California Government Code

California Government Code Section 65302(f) mandates that the legislative body of each county and city adopt a noise element as part of their comprehensive general plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of "normally acceptable," "conditionally acceptable," and "clearly unacceptable" noise levels for various land use types. Single-family homes are "normally acceptable" in exterior noise environments up to 60 CNEL and "conditionally acceptable" up to 70 CNEL. Multiple-family residential uses are "normally acceptable" up to 65 CNEL and "conditionally acceptable" up to 70 CNEL. Schools, libraries and churches are "normally acceptable" up to 70 CNEL, as are office buildings and business, commercial and professional uses.

LOCAL FRAMEWORK

Local agencies may regulate noise levels of most sources not regulated by the federal government; provide standards for insulation of noise receivers, either within the structure

or by placement of noise barriers such as walls; and, through land use decisions, reduce noise impacts by separating noise generators from noise sensitive uses.

Nevada County General Plan and Noise Ordinance

The Noise Element of the Nevada County General Plan (1996) establishes maximum allowable exterior noise levels for various land use categories in terms of the average-hourly (L_{eq}) and maximum intermittent (L_{max}) noise descriptors. Maximum allowable noise standards are identified for daytime (7:00 AM to 7:00 PM), evening (7:00 PM to 10:00 PM), and nighttime (10:00 PM to 7:00 AM) periods. The County's noise standards, which are typically applied to non-transportation noise sources, are summarized in Table 4.11-3, *County of Nevada Exterior Noise Limits*. These noise standards are also identified in the Nevada County Land Use Development Code, Chapter II, Zoning Regulations (Section L-II, 4.1.7, Noise). Construction activities are exempt from the County's noise standards.

Table 4.11-3
County of Nevada Exterior Noise Limits

Land Use Category	Zoning District	Time Period	Noise Level	
			L_{eq}	L_{max}
Rural	AG, TPZ, AE, OS, FR, IDR	7 am - 7 pm	55	75
		7 pm - 10 pm	50	65
		10 pm -7 am	40	55
Residential and Public	RA, R1, R2, R3, P	7 am - 7 pm	55	75
		7 pm - 10 pm	50	65
		10 pm - 7 am	45	60
Commercial and Recreation	C1, C2, C3, CH, CS, OP, REC	7 am - 7 pm	70	90
		7 pm - 7 am	65	75
Business Park	BP	7 am - 7 pm	65	85
		7 pm - 7 am	60	70
Industrial	M1, M2	Any time	80	90

Notes:

- Compliance with the above standards shall be determined by measuring the noise level based on the mean average of not less than three (3) 20-minute measurements for any given time period. Additional noise measurements may be necessary to ensure that the ambient noise level is adequately determined.
- Where two different zoning districts abut, the standard applicable to the lower or more restrictive district plus 5 dBA shall apply.
- The above standards shall be measured only on property containing a noise-sensitive land use as defined in General Plan Policy 9.8 and may be measured anywhere on the property containing said land use.
- If the measured ambient level exceeds that permitted, the allowable noise exposure standard shall be set at 5 dBA above the ambient.
- Because of the unique nature of sound, the County reserves the right to provide for a more restrictive standard than shown in the Exterior Noise Limits table contained in this policy. The maximum adjustment shall be limited to be not less than the current ambient noise levels and shall not exceed the standards of this policy or as they may be further adjusted by General Plan Policy 9.1b. Imposition of a noise level adjustment shall only be considered if one or more of the following conditions are found to exist:
    a. Unique characteristics of the noise source:
        - The noise contains a very high or low frequency, is of a pure tone (a steady, audible tone such as a whine, screech, or hum), or contains a wide divergence in frequency spectra between the noise source and ambient level.
        - The noise is impulsive in nature (such as hammering, riveting, or explosions), or contains music or speech.
        - The noise source is of a long duration.
    b. Unique characteristics of the noise receptor when the ambient noise level is determined to be 5 dBA or more below the Policy 9.1 standard for those projects requiring a General Plan amendment, rezoning, and/or conditional use permit. In such instances, the new standard shall not exceed 10 dBA above the ambient or General Plan Policy 9.1 standard, whichever is more restrictive.

  The above standards shall not apply to those activities associated with the actual construction of a project or to

Table 4.11-3, continued

those projects associated with the provision of emergency services or functions.

Source: Nevada County, *Nevada County Land Use Development Code, Chapter II, Zoning Regulations*, 2010.

For transportation noise sources, the County uses the average-daily noise descriptor (i.e., CNEL or $L_{dn)}$ for determination of land use compatibility. The County's General Plan Noise Element identifies noise criteria to be used for determination of land use compatibility within exterior noise environments, as summarized in Table 4.11-4, *Nevada County Land Use Compatibility Noise Guidelines*.

Table 4.11-4
Nevada County Land Use Compatibility Noise Guidelines

Land Use Category	(L_{dn}, or CNEL, dBA)				
	Clearly Acceptable	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density, Single-Family, Duplex, Mobile Homes	45 – 55	55 – 60	55 – 65	60 – 70	70 – 80
Residential - Multiple Family	45 – 55	55 – 60	60 – 70	65 – 70	70 – 80
Transient Lodging - Motel, Hotels	45 – 55	55 – 60	60 – 70	65 – 75	75 – 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	45 – 55	55 – 60	55 – 65	65 – 70	70 – 80
Auditoriums, Concert Halls, Amphitheaters	45 – 50	50 – 55	50 – 65	60 – 75	75 – 80
Sports Arenas, Outdoor Spectator Sports	45 – 55	55 – 65	55 – 75	65 – 80	75 – 80
Playgrounds, Neighborhood Parks	45 – 55	55 – 65	60 – 70	70 – 80	75 – 80
Golf Courses, Riding Stables, Water Recreation, Cemeteries	45 – 60	60 – 70	65 – 75	70 – 80	NA
Office Buildings, Business Commercial and Professional	45 – 60	55 – 65	60 – 75	70 – 80	NA
Industrial, Manufacturing, Utilities, Agriculture	45 – 65	60 – 75	70 – 80	75 – 80	NA

NA: Not Applicable
Notes:
Clearly Acceptable – The activities associated with the specified land use may be carried out with essentially no interference from the noise exposure.
Normally Acceptable – Noise should be considered in proposed land use projects, but under most circumstances conventional construction without any special noise insulation requirements sis satisfactory.
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 included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
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 included in the design.
Clearly Unacceptable – New construction or development should generally not be undertaken.

Source: Nevada County, *Nevada County General Plan*, 1996.

In addition to the identification of noise standards, the County's General Plan also identifies goals, objectives, and policies to reduce noise-related impacts and land use compatibility conflicts. Applicable goals and policies relative to the proposed project within the noise element are listed below:

Goal 9.1:	Provide for the health, safety, and welfare of the people of Nevada County through a set of policies designed to encourage an environment free of unnecessary and annoying noise.
Objective 9.1:	Determine the existing noise environment and continue to reassess this environment so that a realistic set of noise standards can be developed reflecting the varying nature of different land uses.
Policy 9.1:	The following noise standards, as performance standards and land use compatibility standards, shall apply to all discretionary and ministerial projects excluding permitted residential (including tentative maps) land uses [refer to Table 4.11-4 for the noise standards].
Objective 9.2:	Encourage public awareness of noise and its hazards and means to minimize its existing and future impacts.
Policy 9.5:	Encourage heavy truck traffic to those routes outside residential areas.
Policy 9.6:	Encourage cities within Nevada County to adopt noise control programs compatible with County efforts.
Policy 9.7:	Strongly discourage those General Plan amendments and zone changes that would likely create land use conflicts relative to noise.
Policy 9.8:	Strongly encourage future noise sensitive land uses, including residences, schools, hospitals, nursing homes, churches, and libraries, to those locations of the County where the impact of noise generators is limited so that compliance with standards found in Policy 9.1 will be maintained. This policy shall apply to the approval of all tentative maps for residentially zoned parcels. As an additional guide in evaluating land use compatibility, those standards as found in (General Plan) Figure 1 shall be used.
Policy 9.9:	Limit future noise generating land use to those locations of the County where their impacts on noise sensitive land uses will be minimized, consistent with the standards found in Policy 9.1.
Policy 9.10:	Require the preparation of a comprehensive noise study for all land use projects determined to have a potential to create noise levels inconsistent with those standards found in Policy 9.1, and in accordance with the methodology identified in the Noise Element Manual contained in General Plan Volume 2, Section 3 - Noise Analysis Appendix A.
Policy 9.11:	Provide for adequate design controls to assist in mitigating on-site the significant adverse impacts of future noise generating

	land uses through increased setbacks, landscaping, earthen berms, and solid fencing.
Policy 9.12:	Strictly enforce the noise insulation standards for new construction as required by Title 24 of the California Administrative Code.
Policy 9.13:	Minimize the noise impact from automobiles, trucks, motorcycles, and off-road vehicles by continuing to request enforcement of those sections of the California Vehicle Code relative to vehicle exhaust system maintenance by the County Sheriff and State Highway Patrol.
Policy 9.14:	Where realistically possible, encourage noise sensitive land uses away from railroad operations.
Policy 9.15:	The routing and design of new or expanded transportation facilities by the County shall incorporate feasible measures necessary to mitigate increases in noise levels.
Policy 9.16:	Encourage the minimization of noise emission from all County-controlled activities consistent with Policy 9.1 standards.

City of Grass Valley 2020 General Plan

One of areas where the candidate sites are located includes the Grass Valley Sphere of Influence. The Noise Element of the 2020 General Plan describes the noise environment of the City, identifies major noise sources, and establishes exterior and interior noise limits from transportation sources for various land use categories; refer to Table 4.11-5, *Maximum Allowable Noise Exposure from Transportation Sources*. The Noise Element also establishes noise level performance standards for fixed noise sources. The hourly equivalent sound level (L_{eq}) standard is 55 dBA between 7:00 AM and 10:00 PM (daytime), and 50 dBA between 10:00 PM and 7:00 AM (nighttime). The maximum noise levels allowed by a fixed noise source are 75 dBA during the daytime hours and 65 dBA during the nighttime hours.

Table 4.11-5
Maximum Allowable Noise Exposure from Transportation Sources

Land Use	L_{dn}/CNEL at Outdoor Activity Areas	Interior Spaces	
		L_{dn}/CNEL	L_{eq}
Residential	60 dBA	45 dBA	--
Transient Lodging	60 dBA	45 dBA	--
Hospitals, Nursing Homes	60 dBA	45 dBA	--
Theaters, Auditoriums, Music Halls	--	--	35 dBA
Churches, Meeting Halls	60 dBA	--	40 dBA
Office Buildings	--	--	45 dBA
Schools, Libraries, Museums	--	--	45 dBA
Playgrounds, Neighborhood Parks	70 dBA	--	--

1 - As determined for a typical worst-case hour during periods of use.
2 - Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB Ldn/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.
3 - In the case of hotel/motel facilities or other transient lodging, there may be no designated outdoor activity areas (e.g., pool areas). In such cases, only the interior noise level criterion will apply.

Source: City of Grass Valley, *City of Grass Valley 2020 General Plan Noise Element*, 1999

The Noise Element identifies the following goals, objectives, and policies related to noise:

Goal 1-NG: Protect Grass Valley's relatively quiet environment from unnecessary, annoying and potentially damaging noise.

Objective 1-NO: Coordination of transportation and land use planning to assure acceptable noise levels.

Objective 2-NO: Determination of the existing noise environment and development of realistic noise standards for different land uses.

Objective 3-NO: Establishment of a pattern of land uses that minimizes exposure of community residents to excessive noise.

Policy 1-NP: Develop a policy framework to function as a guide to planning for appropriate land uses in relation to hazardous and annoying noise.

Policy 2-NP: Perform adequate acoustical analyses prior to approval of new development projects or transportation facilities, if warranted.

Policy 3-NP: Utilize noise contour data to determine land uses affected by transportation-related noise sources.

Policy 4-NP: Adopt appropriate noise level standards for existing and future residential areas.

Policy 5-NP: Utilize noise contour data to determine appropriate land use patterns in areas affected by stationary noise sources.

Policy 6-NP: Locate sensitive land uses (residential neighborhoods, medical facilities, senior care facilities and schools) away from high noise areas.

City of Grass Valley Municipal Code

Chapter 8 (Noise) of the Municipal Code sets forth the noise regulations for the City. Section 8.28.060 establishes the ambient noise level standards for uses within the City. Within a residential zone, or within a radius of 500 feet of a residential zone, construction activities are permitted only between 7:00 AM and 7:00 PM. Construction is not allowed on Sundays or legal holidays.

4.11.3 ENVIRONMENTAL ANALYSIS

THRESHOLDS OF SIGNIFICANCE

According to Appendix G of the *CEQA Guidelines*, the proposed project would have a significant noise impact if it would:

- Exposure of persons to, or the generation of, noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels (e.g., blasting)
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels

POTENTIAL IMPACTS AND MITIGATION MEASURES

Short-Term (Construction) Noise

4.11-1 CONSTRUCTION-RELATED ACTIVITIES RESULTING FROM THE PROPOSED PROJECT COULD GENERATE NOISE LEVELS IN EXCESS OF ESTABLISHED STANDARDS.

Level of Significance Before Mitigation: Potentially Significant Impact

Impact Analysis

Construction activities have a short and temporary duration, lasting from a few days to a period of several months. Ground-borne noise and vibration, as well as other types of construction-related noise impacts may occur during the initial site preparation, which can create the highest levels of noise and vibration. Generally, site preparation has the shortest

duration of all construction phases. Activities that occur during this phase include earth-moving and soils compaction. High ground-borne noise levels can occur during this phase by the operation of heavy-duty construction equipment. Construction activities have the potential to expose adjacent sensitive land uses (nearby residential, institutional, and park uses) to noise levels between 70 and 90 decibels at 50 feet from the noise source. The degree of noise impact would be dependent upon the distance between the construction activity and the noise sensitive receptor.

While implementation of Nevada County Housing Element Rezone Program would not directly result in new development within the County, it would facilitate additional development, which would generate noise during construction activities. New development potential within the County would occur within the candidate area sites. It is unlikely the County would experience intensive construction activity with implementation of Housing Element Rezone Program. Construction noise levels have not been modeled at this program level of analysis, as the extent and timing of future construction activities within the County are unknown at this time.

Goals, objectives, and policies in the Nevada County General Plan include actions to limit exposure of noise-sensitive land uses to excessive noise levels from point sources such as construction activities. The County would also require each project to implement strategies and mitigation measures requiring applicants to implement construction best management practices (BMPs) to reduce construction noise levels that address construction-related noise (Mitigation Measures 4.11-1a and 4.11-1b) in order to minimize impacts to surrounding sensitive receptors. Through the environmental review process for individual projects, additional mitigation may also be required to further reduce construction-related noise impacts to a less than significant level.

Compliance and/or adherence to the County's Noise Ordinance, goals, objectives, and policies in the General Plan, and recommended Mitigation Measures 4.11-1a and 4.11-1b, would reduce short-term construction noise impacts to less than significant levels.

Mitigation Measures:

The following mitigation measures apply to all sites:

4.11-1a Project developers shall ensure through contract specifications that construction best management practices (BMPs) be implemented by contractors to reduce construction noise levels. Contract specifications shall be included in construction documents, which shall be reviewed by the County of City prior to issuance of a grading or building permit (whichever is issued first) or as part of the annexation request for Sites 1-9. The construction BMPs shall include the following:

- Ensure that construction equipment is properly muffled according to industry standards and is in good working condition.
- Place noise-generating construction equipment and locate construction staging areas away from sensitive uses, where feasible.
- Implement noise attenuation measures to the extent feasible, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources.
- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.

- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.
- Construction shall be limited to the hours of 7:00 AM to 7:00 PM Monday through Saturday. No construction is permitted on Sundays or legal holidays.
- Construction hours, allowable workdays, and the phone number of the job superintendent shall be clearly posted at all construction entrances to allow for surrounding owners and residents to contact the job superintendent. If the County or the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective action, and report the action taken to the reporting party.

4.11-1b Project developers shall require by contract specifications that heavily loaded trucks used during construction would be routed away from residential streets to the extent feasible. Contract specifications shall be included in construction documents, which shall be reviewed by the County prior to issuance of a grading permit.

Level of Significance After Mitigation: Less Than Significant Impact

Short-Term (Construction) Ground-borne Vibration

4.11-2 CONSTRUCTION-RELATED ACTIVITIES RESULTING FROM THE PROPOSED PROJECT COULD GENERATE OR EXPOSE PERSONS OR STRUCTURES TO EXCESSIVE GROUND-BORNE VIBRATION.

Level of Significance Before Mitigation: Potentially Significant Impact

Impact Analysis

Project construction can generate varying degrees of ground-borne vibration, depending on the construction procedure and equipment used. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of a construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Ground-borne vibrations from construction activities rarely reach levels that damage structures.

The Federal Transit Administration (FTA) has published standard vibration velocities for construction equipment operations. In general, the FTA architectural damage criterion for continuous vibrations (i.e., 0.2 inch/second) appears to be conservative even for sustained pile driving. Pile driving levels often exceed 0.2 inch/second at distances of 50 feet, and 0.5 inch/second at 25 feet without any apparent damage to buildings.

Construction vibration impacts include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Ordinary buildings that are not particularly fragile would not experience any

cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. The typical vibration produced by construction equipment is illustrated in Table 4.11-6, *Typical Vibration Levels for Construction Equipment*.

Table 4.11-6
Typical Vibration Levels for Construction Equipment

Equipment	Reference peak particle velocity at 25 feet (inches/second)[1]	Approximate peak particle velocity at 50 feet (inches/second)[2]
Large bulldozer	0.089	0.031
Loaded trucks	0.076	0.027
Small bulldozer	0.003	0.001
Jackhammer	0.035	0.012
Vibratory compactor/roller	0.210	0.074

Notes:
1. Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Guidelines*, May 2006. Table 12-2.
2. Calculated using the following formula:

$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

where: PPV (equip) = the peak particle velocity in in/sec of the equipment adjusted for the distance
PPV (ref) = the reference vibration level in in/sec from Table 12-2 of the FTA *Transit Noise and Vibration Impact Assessment Guidelines*
D = the distance from the equipment to the receiver

As indicated in Table 4.11-6, based on the FTA data, vibration velocities from typical heavy construction equipment that would be used during project construction range from 0.003 to 0.210 inch-per-second peak particle velocity (PPV) at 25 feet from the source of activity. With regard to the proposed project, ground-borne vibration would be generated during site clearing and grading activities onsite and by off-site haul-truck travel facilitated by implementation of the project.

The nearest sensitive land uses (residential uses) are located approximately 50 feet to the north, south, and east of the candidate sites in Penn Valley (Sites 10 through 13). The closest sensitive receptors to the Grass Valley sites range from 200 to 500 feet away, and the closest sensitive receptors to the Lake of the Pines candidate sites are located 70 to 300 feet away. As demonstrated in Table 4.11-6, the anticipated vibration levels would not exceed the 0.2 inch-per-second PPV significance threshold during construction operations at the nearest receptors. It should be noted that 0.2 inch-per-second PPV is a conservative threshold, as that is the construction vibration damage criteria for non-engineered timber and masonry buildings.[2] Buildings within the project area would be better represented by the 0.5 inch-per-second PPV significance threshold (construction vibration damage criteria for a reinforced concrete, steel, or timber buildings).[3] Therefore, vibration impacts associated with construction are anticipated to be less than significant. Additionally, implementation of Mitigation Measure 4.11-1a would also reduce construction vibration impacts to nearby receptors.

Implementation of Mitigation Measure 4.11-2, requiring a project-specific vibration analysis for construction activities within 25 feet of an occupied structure, and adherence to County and state standards would reduce impacts to a less than significant level.

2 Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Guidelines*, May 2006. Table 12-3.
3 Ibid.

Mitigation Measure:

The following mitigation measure applies to all sites.

4.11-2 Future projects shall require by contract specifications that construction staging areas along with the operation of earth-moving equipment would be located as far away from vibration and noise sensitive sites as feasible. Should construction or grading activities take place within 25 feet of an occupied structure, a project-specific vibration impact analysis shall be conducted, with appropriate recommendations to ensure vibration levels are below the 0.2 inch-per-second PPV significance threshold at sensitive uses. Contract specifications incorporating this measure shall be included in the proposed project construction documents, which shall be reviewed by the County prior to issuance of a grading permit or by the City as part of the annexation request for Sites 1-9.

Level of Significance After Mitigation: Less Than Significant Impact

Long-Term (Operational) Noise

4.11-3 FUTURE NOISE LEVELS ASSOCIATED WITH THE PROPOSED PROJECT COULD CONTRIBUTE TO AN EXCEEDANCE OF THE COUNTY'S NOISE STANDARDS RESULTING IN POTENTIAL NOISE IMPACTS TO SENSITIVE RECEPTORS.

Level of Significance Before Mitigation: Less Than Significant Impact

Impact Analysis

Mobile Noise Sources

An off-site traffic (mobile) noise impact typically occurs when there is a discernible increase in traffic and the resulting noise level exceeds an established noise standard. In community noise considerations, changes in noise levels greater than 3 dB are often identified as substantial, while changes less than 1 dB will not be discernible to local residents. A 5 dB change is generally recognized as a clearly discernible difference. Thus, the project would result in a significant noise impact when a permanent increase in ambient noise levels of 3 dB occurs upon project implementation and the resulting noise level exceeds the applicable exterior standard at a noise sensitive use.

Table 4.11-7, *Future Noise Scenarios*, presents the noise level (dBA at 100 feet from centerline) that would typically be heard 100 feet perpendicular to the roadway centerline. As indicated in Table 4.11-7, under the "Future Without Project" scenario, noise levels at a distance of 100 feet from the centerline would range from approximately 55.3 dBA to 68.8 dBA. The highest noise level under "Future Without Project" conditions would occur along SR 49, between Combie Road and Woodridge Drive. Under the "Future With Project" scenario, noise levels at a distance of 100 feet from the centerline would range from approximately 55.3 dBA to 68.9 dBA. The highest noise level under Future With Project conditions would occur along SR 49, between Combie Road and Woodridge Drive and south of Woodridge Drive.

As depicted in Table 4.11-7, the greatest noise level increase would be 1.2 dBA and would occur along Penn Valley Drive between Broken Oak Court and Spenceville Road. None of the roadway segments would experience a 3 dB increase or more between the No Project and

Plus Project conditions. Thus, implementation of the proposed project would not result in a significant increase in traffic noise levels.

Aircraft Noise

The Nevada County Airport is located approximately one mile to the southeast of the candidate sites within the Grass Valley Sphere of Influence, which contributes to the noise environment. The candidate sites are located outside of the 65 dBA CNEL noise contour boundaries as well as the 60 dBA CNEL and 55 dBA CNEL noise contours.[4] Therefore, the candidate sites, including those located within the Grass Valley Sphere of Influence would not be exposed to excessive noise levels. Impacts would be less than significant in this regard.

Stationary Sources

The Housing Element Rezone Implementation Program anticipates the net development of 2,680 housing units. Future development of these residential units as a result of the Housing Element Rezone Implementation Program would create stationary noise typical of any new residential development. Noise that is typical of residential areas includes children playing, pets, amplified music, pool and spa equipment operation, mechanical equipment, woodworking, car repair, and home repair. Noise from residential stationary sources would primarily occur during the "daytime" activity hours and typically do not substantially increase ambient noise conditions. Further, future residential uses would be required to adhere to Nevada County Land Use Development Code, Chapter II, Zoning Regulations (Section L-II, 4.1.7, Noise), which ensures that future development minimizes unnecessary and annoying noise by establishing maximum noise levels and standards. Stationary noise sources as a result of the Housing Element Rezone Implementation Program are anticipated to result in less than significant impacts.

Mitigation Measures: No mitigation is required.

Level of Significance After Mitigation: Less Than Significant Impact.

[4] Nevada County Airport Land Use Commission, *Nevada County Airport Land Use Compatibility Plan*, July 2011.

Table 4.11-7
Future Noise Scenarios

Roadway Segment	Future Without Project					Future With Project					Difference In dBA @ 100 Feet from Roadway
	ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour	
Nevada City Highway											
Dorsey Drive to Brunswick Road	11,241	62.1	194	61	19	11,304	62.2	195	62	19	0.1
North of Brunswick Road	20,475	64.8	353	112	35	20,682	64.8	357	113	36	0
SR-20											
SB On-Ramp	29,232	66.3	504	159	50	30,438	66.5	525	116	52	0.2
Brunswick Road											
SR-20 to Sutton Way	31,914	66.5	551	174	55	33,183	66.7	572	181	57	0.2
Sutton Way to Old Tunnel Road	21,636	61.7	159	74	34	23,256	62.0	167	77	36	0.3
Old Tunnel Road to Idaho Maryland Road	17,973	60.9	140	65	30	18,729	61.1	144	67	31	0.2
South of Idaho Maryland Road	19,296	61.2	147	68	32	19,746	61.3	150	69	32	0.1
Sutton Way											
North of Brunswick Road	7,857	60.4	136	43	14	8,001	60.5	138	44	14	0.1
South of Brunswick Road	15,084	63.3	260	82	26	16,092	63.6	277	88	28	0.3
Idaho Maryland Road											
West of Brunswick Road	4,653	55.3	57	26	12	4,653	55.3	57	26	12	0
East of Brunswick Road	6,102	56.5	68	32	15	6,408	56.7	71	33	15	0.1
McCourtney Road											
South of Personeni Road	9,333	58.4	91	42	20	9,522	58.5	92	43	20	0.1

Table 4.11-7, continued

Roadway Segment	Future Without Project					Future With Project					Difference In dBA @ 100 Feet from Roadway
	ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour	
McKnight Way											
East of SR-49	15,471	63.4	267	84	27	15,597	63.4	269	85	27	0
SR-49 SB Ramps to SR-49 NB Ramps	16,668	63.7	287	91	29	17,073	63.8	295	93	29	0.1
SR-49 Ramps to Auburn Street	18,504	64.2	319	101	32	19,125	64.3	330	104	33	0.1
Auburn Street											
North of McKnight Way	9,000	58.1	89	41	19	9,198	58.2	90	42	19	0.1
La Barr Meadows Road											
South of McKnight Way	18,090	61.1	141	65	30	18,747	61.2	143	66	31	0.1
SR-20											
West of Pleasant Valley Road	8,289	62.6	174	81	37	8,649	62.8	179	83	38	0.2
Pleasant Valley Rd. to Rough and Ready Hwy	12,078	64.3	223	104	48	12,474	64.4	228	106	49	0.1
East of Rough and Ready Highway	14,634	65.1	254	118	55	16,110	65.5	270	125	58	0.4
Pleasant Valley Road											
North of SR-20	10,404	61.4	144	67	31	10,926	61.6	149	69	32	0.2
Penn Valley Drive											
Pleasant Valley Road to Horton Street	10,350	61.4	144	67	31	11,088	61.7	151	70	32	0.3
Horton Street to Broken Oak Court	3,024	56.1	63	29	14	3,636	56.9	72	33	15	0.8
Broken Oak Court to Spenceville Road	4,275	57.6	80	37	17	5,688	58.8	97	45	21	1.2
Rough and Ready Highway											
North of SR-20	3,717	57.1	73	34	16	4,131	57.5	78	36	17	0.4
South of SR-20	6,300	59.4	104	48	22	7,596	60.2	117	54	25	0.8

Table 4.11-7, continued

Roadway Segment	Future Without Project					Future With Project					Difference In dBA @ 100 Feet from Roadway
	ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour			60 CNEL Noise Contour	65 CNEL Noise Contour	70 CNEL Noise Contour	
Spenceville Road											
South of Penn Valley Drive	4,473	56.8	68	32	15	4,590	56.9	69	32	15	0.1
SR-49											
Cameo Drive to Combie Road	30,290	68.1	412	191	89	31,010	68.2	419	194	90	0.1
Combie Road to Woodridge Drive	35,180	68.8	455	211	98	36,470	68.9	466	216	100	0.1
Combie Road											
West of SR-49	7,330	57.3	77	36	17	7,510	57.4	78	36	17	0.1
East of SR-49	21,000	61.9	156	72	34	22,500	62.2	163	76	35	0.3
West of Rosewood Drive	19,900	61.7	150	70	32	20,410	61.8	153	71	33	0
Rosewood Drive to Hacienda Drive	18,140	61.3	141	66	30	20,170	61.7	152	70	33	0.4
South of Magnolia Road	7,210	57.3	76	35	16	7,730	57.6	80	37	17	0.3
Magnolia Road											
East of Hacienda Drive	11,889	59.4	107	49	23	12,051	59.5	108	50	23	0.1
Hacienda Drive											
North of Combie Road	3,190	53.9	44	21	10	3,260	53.9	45	21	10	0

ADT = average daily trips; dBA = A-weighted decibels; CNEL = community noise equivalent level

Source: Traffic noise modeling is based on traffic data provided by RBF Consulting, January 2013.

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