Appendix H Noise Impact Assessment

Appendices

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Noise Impact Assessment
for the
Amador County Unified School District Project

Amador County, California

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LIST OF ACRONYMS AND ABBREVIATIONS

ACUSD	Amador County Unified School District
ANSI	American National Standards Institute
CA	Conditionally Acceptable
CalEEMod	California Emission Estimator Model
Caltrans	California Department of Transportation
CNEL	Community Noise Equivalent Level
County	Amador County
CU	Clearly Unacceptable
dB	Decibel
dBA	Decibel is A-weighted
FHWA	Federal Highway Administration
FICON	Federal Interagency Commission on Noise
FTA	Federal Transit Administration
Hz	Hertz
L_{dn}	Day-night average sound level
L_{eq}	Measure of ambient noise
L_{max}	The maximum A-weighted noise level during the measurement period.
L_{min}	The minimum A-weighted noise level during the measurement period.
NA	Normally Acceptable
NIOSH	National Institute for Occupational Safety and Health
NU	Normally Unacceptable
OPR	Office of Planning and Research
OSHA	Federal Occupational Safety and Health Administration
PPV	Peak particle velocity
Project	Amador County Unified School District Project
RCNM	Roadway Construction Noise Model
RMS	Root mean square
RV	Recreational Vehicle
STC	Sound Transmission Class
VdB	Vibration Velocity Level

1.0 INTRODUCTION

This report documents the results of a Noise Impact Assessment completed for the Amador County Unified School District Project (Project), which proposes the consolidation of eight schools, spanning three cities, onto six Amador County Unified School District (ACUSD) campuses. This report was prepared as a comparison of predicted Project noise levels to noise standards promulgated by the Sutter Creek General Plan, Sutter Creek Municipal Code, Jackson General Plan, Jackson Municipal Code, Ione General Plan, and Ione Municipal Code. The purpose of this report is to estimate Project-generated noise and to determine the level of impact the Project would have on the environment.

1.1 Project Location and Description

The Proposed Project would affect eight of ACUSD's school campuses: Amador High School, Argonaut High School, Ione Junior High School, Jackson Junior High School, Ione Elementary School, Jackson Elementary School, and Sutter Creek Elementary School. ACUSD is proposing to consolidate eight schools onto six current ACUSD campuses. This would require physical site improvements at three campuses: Argonaut High School, Ione Junior High School, and Sutter Creek Elementary School; the closure of Ione Elementary School and the creation of a county preschool. The proposed campus changes are presented in detail in Table 1-1.

Table 1-1. Proposed Campus Changes

	Existing	Proposed
Amador High School *Proposed Action: Amador High School relocates to Argonaut High School Campus; Ione Junior High School and Jackson Junior High Schools both relocate and combine at Amador High School Campus*		
Enrollment	702 students; Grades 9-12	603 students; Grades 7-8
Capacity	875 students; Grades 9-12	875 students; Grades 7-8
Teaching Stations	35	35
Site Improvements	-	None
Location	-	Sutter Creek
Argonaut High School *Proposed Action: Amador High School and Argonaut High Schools combine at Argonaut High School Campus*		
Enrollment	536 students; Grades 9-12	1,263 students; Grades 9-12
Capacity	925 students; Grades 9-12	1,325 students; Grades 9-12
Teaching Stations	37	53

Table 1-1. Proposed Campus Changes		
	Existing	**Proposed**
Site Improvements		New 10 classroom 2-story building (with 4 science labs and 6 standard classrooms), -Addition of 5 portable classrooms relocated from Jackson Junior High School. -Convert 2 preschool classrooms to regular classrooms. -Convert classroom for counseling office Kitchen renovation and expansion. -Renovate and expand gymnasium locker rooms. -New parent drop off -New access road connecting to Stony Creek Road. -Accessibility Compliance throughout campus.
Location	-	Jackson
Ione Junior High School *Proposed Action: Ione Elementary School Relocates to Ione Junior High School Campus; reconfigured into new Preschool and Transitional Kindergarten - Sixth Grade Students Educational Campus*		
Enrollment	393 students; Grades 6-8	649 students; Preschool, grades transitional kindergarten -6
Capacity	755 students; Grades 6-8	801 students; Preschool, grades transitional kindergarten -6
Teaching Stations	31	33
Site Improvements	-	-New 2 classroom buildings and playground for preschool, transitional kindergarten and Extended Learning. -Convert science labs into kindergarten classrooms. -Convert restrooms to kindergarten restrooms. -Kitchen expansion. -Expanded parent drop off/pick up areas. -Expanded kindergarten drop off/pick up areas. -New play structure and hard-court areas. -3,000 square feet of new lawn area

Table 1-1. Proposed Campus Changes		
	Existing	**Proposed**
Location	-	Ione
Jackson Junior High School *Proposed Action: Jackson Junior High School relocates to Amador High School Campus; reconfigured into new County Preschool Center*		
Enrollment	346 students; Grades 6-8	41 students; Preschool
Capacity	475 students; Grades 6-8	195 students; Preschool, transitional kindergarten
Teaching Stations	19	15
Site Improvements	-	-Convert restrooms and fountains with age-appropriate fixtures
Location	-	Jackson
Jackson Elementary School *Proposed Action: Jackson Elementary School adds back Sixth Grade Students*		
Enrollment	500 students; Grades TK-5	528 students; Grades transitional kindergarten -6
Capacity	575 students; Grades TK-5	575 students; Grades transitional kindergarten -5
Teaching Stations	23	23
Site Improvements	-	None
Location	-	Jackson
Sutter Creek Elementary School *Proposed Action: Sutter Creek Elementary School expands to create Transitional Kindergarten - Sixth Grade Campus*		
Enrollment	204 students; Grades TK-2	388 students; Grades transitional kindergarten -2
Capacity	325 students; Grades TK-2	625 students; Grades transitional kindergarten -6
Teaching Stations	13	25
Site Improvements	-	-New 12 classroom building include lunch shelter.
Location		Sutter Creek

Construction at the three campuses where site improvements are proposed would generally overlap allowing staff and students to move to the new schools in August for the 2025-2026 school year.

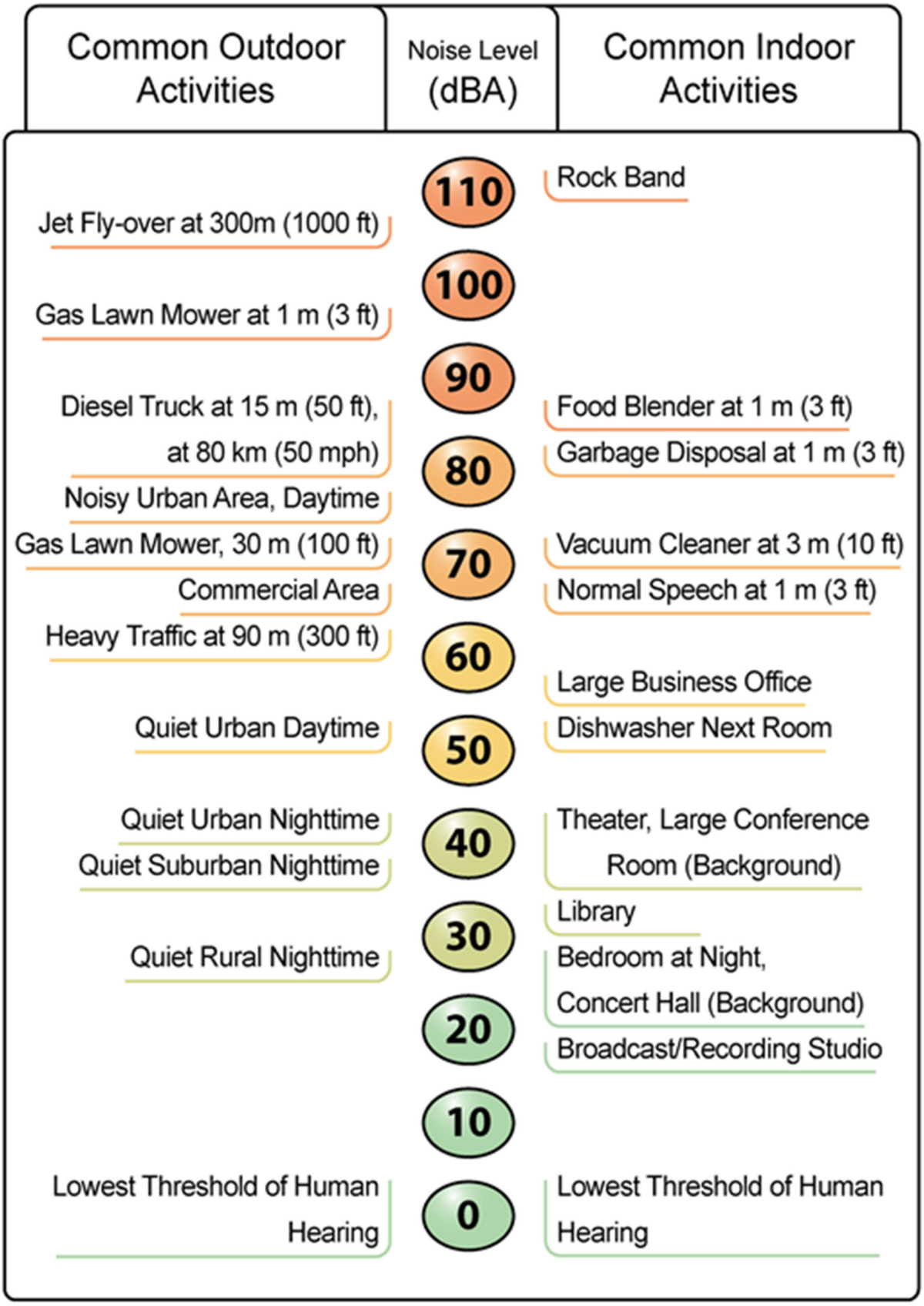
2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS

2.1 Fundamentals of Noise and Environmental Sound

2.1.1 Addition of Decibels

The decibel (dB) scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted (dBA), an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be three dB higher than one source under the same conditions (Federal Transit Administration [FTA] 2018). For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by three dB). Under the decibel scale, three sources of equal loudness together would produce an increase of five dB.

Typical noise levels associated with common noise sources are depicted in Figure 2-1. Common Noise Levels.



Source: California Department of Transportation (Caltrans) 2020a

Figure 2-1. Common Noise Levels

2.1.2 Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB (dBA) for each doubling of distance from a stationary or point source (FHWA 2017). Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dBA for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2017). No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dBA per doubling of distance is normally assumed. For line sources, an overall attenuation rate of three dB per doubling of distance is assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures; generally, a single row of detached buildings between the receptor and the noise source reduces the noise level by about five dBA (FHWA 2006), while a solid wall or berm generally reduces noise levels by 10 to 20 dBA (FHWA 2011). However, noise barriers or enclosures specifically designed to reduce site-specific construction noise can provide a sound reduction of 35 dBA or greater (Western Electro-Acoustic Laboratory, Inc. 2000). To achieve the most potent noise-reducing effect, a noise enclosure/barrier must physically fit in the available space, must completely break the "line of sight" between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers must be sizable enough to cover the entire noise source and extend lengthwise and vertically as far as feasibly possible to be most effective. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. In general, barriers contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver.

The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002). The exterior-to-interior reduction of newer residential units is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. 2006). Generally, in exterior noise environments ranging from 60 dBA Community Noise Equivalent Level (CNEL) to 65 dBA CNEL, interior noise levels can typically be maintained below 45 dBA, a typical residential interior noise standard, with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. (STC is an integer rating of how well a building partition attenuates airborne sound. In the U.S., it is widely used to rate interior partitions, ceilings, floors, doors, windows, and exterior wall configurations). In exterior noise environments of 65 dBA CNEL or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA CNEL with proper wall construction techniques following California Building Code methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

2.1.3 Noise Descriptors

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise include the average hourly noise level (in L_{eq}) and the average daily noise levels/community noise equivalent level (in L_{dn}/CNEL). The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL are measures of community noise. Each is applicable to this analysis and defined as follows:

- **Equivalent Noise Level (L_{eq})** is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
- **Day-Night Average (L_{dn})** is a 24-hour average L_{eq} with a 10-dBA "weighting" added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
- **Community Noise Equivalent Level (CNEL)** is a 24-hour average L_{eq} with a 5-dBA weighting during the hours of 7:00 pm to 10:00 pm and a 10-dBA weighting added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the evening and nighttime, respectively.

Table 2-1 provides a list of other common acoustical descriptors.

Table 2-1. Common Acoustical Descriptors

Descriptor	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	A 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level, CNEL	A 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.

The A-weighted decibel sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about ±1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source. Close to the noise source, the models are accurate to within about ±1 to 2 dBA.

2.1.4 Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL or L_{dn} is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels (dBA), the following relationships should be noted in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

2.1.5 Effects of Noise on People

2.1.5.1 Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

2.1.5.2 Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources.

2.2 Fundamentals of Environmental Groundborne Vibration

2.2.1 Vibration Sources and Characteristics

Sources of earthborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or manmade causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude). Because the average particle velocity over time is zero, the RMS amplitude is typically used to assess human response. The RMS value is the average of the amplitude squared over time, typically a 1- sec. period (FTA 2018).

Table 2-2 displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high-noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. For instance, heavy-duty trucks generally generate groundborne vibration velocity levels of 0.006 PPV at 50 feet under typical circumstances, which as identified in Table 2-2 is considered very unlikely to cause damage to buildings of any type. Common sources for groundborne vibration are planes, trains, and construction activities such as earth-moving which requires the use of heavy-duty earth moving equipment.

Table 2-2. Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels

Peak Particle Velocity (inches/second)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006–0.019	64–74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Threshold at which there is a risk of architectural damage to extremely fragile historic buildings, ruins, ancient monuments
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Threshold at which there is a risk of architectural damage to fragile buildings. Virtually no risk of architectural damage to normal buildings
0.25	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to historic and some old buildings
0.3	96	Vibrations may begin to feel severe to people in buildings	Threshold at which there is a risk of architectural damage to older residential structures
0.5	103	Vibrations considered unpleasant by people subjected to continuous vibrations	Threshold at which there is a risk of architectural damage to new residential structures and Modern industrial/commercial buildings

Source: Caltrans 2020b

3.0 EXISTING ENVIRONMENTAL NOISE SETTING

3.1 Noise Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as hospitals, historic sites, cemeteries, and certain recreation areas are considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

As previously described, the Project proposes the consolidation of eight schools, spanning three cities, onto six ACUSD campuses. The nearest off-site noise sensitive receptors to each campus are identified below:

- **Amador High School**: residences located east, south, and west of campus and Sutter Creek Elementary School located north.
- **Argonaut Hight School**: residences located north and south of campus.
- **Ione Junior High School**: residences located north of campus.
- **Jackson Junior High School**: residence located east and south of campus.
- **Jackson Elementary School**: residences east, south, and west of campus.
- **Sutter Creek Elementary School**: residences located north and east of campus and Amador High School located south.

3.1.1 Existing Ambient Noise Environment

The three campuses proposed for improvement span three cities located in Amador County. The most common and significant source of noise in Amador County as well as in the three cities where the campuses are located is mobile noise generated by transportation-related sources. Other sources of noise are the various land uses (i.e., residential, commercial, and industrial) that generate stationary-source noise. The Project Sites are all existing school campuses located in developed areas that are surrounded mainly by residential land uses.

The American National Standards Institute (ANSI) Standard 12.9-2013/Part 3 "Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-Term Measurements with an Observer Present" provides a table of approximate background sound levels in CNEL/L_{dn}, daytime L_{eq}, and nighttime L_{eq}, based on land use and population density. The ANSI standard estimation divides land uses into six distinct categories. Descriptions of these land use categories, along with the typical daytime and nighttime levels, are provided in Table 3-1. At times, one could reasonably expect the occurrence of periods that are both louder and quieter than the levels listed in the table. ANSI notes, "*95% prediction interval [confidence interval] is on the order of +/- 10 dB*." As previously described, the Project Sites are all existing

school campuses located in developed areas that are surrounded mainly by residential land uses. Thus, the Project Sites would generally be considered ambient noise Category 3 and generally experiences noise levels of 57 dBA CNEL/L_{dn}.

Table 3-1. ANSI Standard 12.9-2013/Part 3 A-weighted Sound Levels Corresponding to Land Use and Population Density

Category	Land Use	Description	People per Square Mile	Typical CNEL/L_{dn}	Daytime L_{eq}	Nighttime L_{eq}
1	Noisy Commercial & Industrial Areas and Very Noisy Residential Areas	Very heavy traffic conditions, such as in busy, downtown commercial areas; at intersections for mass transportation or for other vehicles, including elevated trains, heavy motor trucks, and other heavy traffic; and at street corners where many motor buses and heavy trucks accelerate.	63,840	67 dBA	66 dBA	58 dBA
2	Moderate Commercial & Industrial Areas and Noisy Residential Areas	Heavy traffic areas with conditions similar to Category 1, but with somewhat less traffic; routes of relatively heavy or fast automobile traffic, but where heavy truck traffic is not extremely dense.	20,000	62 dBA	61 dBA	54 dBA
3	Quiet Commercial, Industrial Areas and Normal Urban & Noisy Suburban Residential Areas	Light traffic conditions where no mass transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at moderate speeds; residential areas and commercial streets, and intersections, with little traffic compose this category.	6,384	57 dBA	55 dBA	49 dBA
4	Quiet Urban & Normal Suburban Residential Areas	These areas are similar to Category 3, but for this group, the background is either distant traffic or is unidentifiable; typically, the population density is one-third the density of Category 3.	2,000	52 dBA	50 dBA	44 dBA
5	Quiet Residential Areas	These areas are isolated, far from significant sources of sound, and may be situated in shielded areas, such as a small wooded valley.	638	47 dBA	45 dBA	39 dBA
6	Very Quiet Sparse Suburban or rural Residential Areas	These areas are similar to Category 4 but are usually in sparse suburban or rural areas; and, for this group, there are few if any nearby sources of sound.	200	42 dBA	40 dBA	34 dBA

Source: The American National Standards Institute (ANSI) 2013

3.1.2 Existing Roadway Noise Levels

Existing roadway noise levels were calculated for the roadway segments in the vicinity of the existing campuses. This task was accomplished using the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108) (see Attachment A) and traffic volumes from the Project's Traffic Impact Analysis (PlaceWorks, Inc. 2023). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by the California Department of Transportations (Caltrans). The Caltrans data shows that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. The average daily noise levels along these roadway segments are presented in Table 3-2.

Table 3-2. Existing (Baseline) Traffic Noise Levels		
Roadway Segment	**Surrounding Uses**	**L_{dn} 100 feet from Center of Road**
State Route 88		
West of Argonaut Lane	Residential & Commercial	65.9
Between Argonaut Lane and Hoffman Street	Residential	66.0
South of Hoffman Street	Residential & Commercial	66.5
Argonaut Lane		
Between CA 88 and Westview Drive	Residential	53.0
Between Westview Dive and Stony Creek Road	Residential & Educational	54.4
Hoffman Street/ Stony Creek Road		
West of Argonaut Lane	Residential & Educational	52.2
Between Argonaut Lane and CA 88	Residential	51.2
Church Street		
North of Market Street	Residential	60.2
Between Market Street and Relihan Drive	Residential	60.2
South of Relihan Drive	Residential	60.6
Market Street		
West of Church Street	Residential	51.0
East of Church Street	Residential	53.8
Relihan Drive		
West of Church Street	Residential	45.9
Marlette Street		
West of Mills Street	Residential	53.0
Between Mills Street and Sacramento Street	Residential	54.4
East of Church Street	Residential	50.2
Mills Street		
North of Marlett Street	Residential	41.7
South of Marlette Street	Residential	47.0
Sacramento Street		
North of Marlett Street	Residential	51.1
South of Marlette Street	Residential	46.1

Source: Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the trip generation rate identified by PlaceWorks, Inc. (2023). Refer to Attachment A for traffic noise modeling assumptions and results.

As shown, the existing traffic-generated noise level on Project-vicinity roadways currently ranges from 41.7 to 66.5 dBA L_{dn} at a distance of 100 feet from the centerline. As previously described, L_{dn} is a 24-hour average L_{eq} with a 10-dBA "weighting" added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the nighttime.

4.0 REGULATORY FRAMEWORK

4.1 Federal

4.1.1 Occupational Safety and Health Act of 1970

OSHA regulates onsite noise levels and protects workers from occupational noise exposure. To protect hearing, worker noise exposure is limited to 90 decibels with A-weighting (dBA) over an eight-hour work shift (29 Code of Regulations 1910.95). Employers are required to develop a hearing conservation program when employees are exposed to noise levels exceeding 85 dBA. These programs include provision of hearing protection devices and testing employees for hearing loss on a periodic basis.

4.1.2 National Institute of Occupational Safety and Health

A division of the US Department of Health and Human Services, the National Institute for Occupational Safety and Health (NIOSH) has established a construction-related noise level threshold as identified in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998. NIOSH identifies a noise level threshold based on the duration of exposure to the source. The NIOSH construction-related noise level threshold starts at 85 dBA for 8 hours or more per day; for every 3-dBA increase, the exposure time is cut in half. This reduction results in noise level thresholds of 88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. The intention of these thresholds is to protect people from hearing losses resulting from occupational noise exposure.

4.1.3 Federal Interagency Commission on Noise

The 2000 Federal Interagency Commission on Noise (FICON) findings provide guidance as to the significance of changes in ambient noise levels due to transportation noise sources. FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA L_{dn} and the Project creates a readily perceptible 5 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels range from 60 to 65 dBA L_{dn} and the Project creates a barely perceptible 3 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA L_{dn}, and the Project creates a community noise level increase of greater than 1.5 dBA L_{dn}.

4.2 State

4.2.1 State of California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The State of California General Plan Guidelines (State of California 2003), published by the Governor's Office of Planning and Research (OPR), also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

4.2.2 State Office of Planning and Research Noise Element Guidelines

The State OPR *Noise Element Guidelines* include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a Land Use Compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL.

4.2.3 California Department of Transportation

In 2020, the California Department of Transportation (Caltrans) published the Transportation and Construction Vibration Manual (Caltrans 2020b). The manual provides general guidance on vibration issues associated with the construction and operation of projects concerning human perception and structural damage. Table 2-2 above presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

4.3 Local

4.3.1 Sutter Creek General Plan

The existing Amador High School campus and Sutter Creek Elementary School campus are located in the City of Sutter Creek. The Noise Element of the Sutter Creek General Plan identifies and appraises noise problems in the community. The Noise Element contains goals, objectives, policies and implementation measures to protect noise sensitive land uses within the community. Those applicable to the Project are presented below:

Goal N-1: Prevent exposure of Sutter Creek citizens to unacceptable noise levels.

Goal N-2: Alleviate noise exposure problems where feasible.

Objective N-1.1: The prevention and mitigation of exposure to unacceptable noise levels.

Policy N-1.1.2: The outdoor noise standard for residential developments shall apply only to back yards of single-family residences and recreation areas of multifamily developments. The outdoor noise standard shall also not apply to residentially-designated properties or existing noise sensitive land uses within the current 60+ dB contour shown on Volume III Figure 6-2.

Policy N-1.1.4: The City shall protect existing (ambient) noise levels of existing residential neighborhoods and other existing noise sensitive land uses. If a developed area is currently below an adopted noise standard, an increase in noise up to the standard should not necessarily be allowed.

Policy N-1.1.6: Large trucks should be discouraged on Old Highway 49 (except possibly for deliveries or when large trucks operate from a base located in the City).

4.3.2 Sutter Creek Municipal Code

The City of Sutter Creek's regulations with respect to noise are also included in Title 10, Public Peace, Safety and Morals, of the City's Municipal Code. Specifically, Chapter 10.50, Noise Regulations, presents exterior acceptable noise levels based on community environment classifications for a variety of land uses and are presented in Table 4-1.

Table 4-1. Sutter Creek Exterior Noise Limits

Zone	Time	Community Environment Classification (dBA)		
		Very Quiet (Rural)	Quiet (Suburban)	Slightly Noisy (Urban)
One Family Dwelling and Two-Family Dwelling	10:00 p.m. to 7:00 a.m.	35	40	45
One Family Dwelling and Two-Family Dwelling	7:00 a.m. to 10:00 p.m.	40	45	50

Source: Sutter Creek Municipal Code 2022

Additionally, Section 10.50.120 states that construction is prohibited between the hours of 7:00 p.m. of and 7:00 a.m.

4.3.3 Jackson General Plan

The existing Argonaut High School campus, Jackson Junior High School campus and Jackson Elementary School campus are located in the City of Jackson. At the time of the preparation of this Report, the City of Jackson is updating the City General Plan.

City of Jackson General Plan Update 2040 Noise Element

At the time of the preparation of this Report, the City of Jackson is updating the currently City General Plan. The City of Jackson General Plan Update 2040 contains the goals and policies that will guide future decisions

within the City and identifies action items (implementation measures) to ensure the vision and goals of the General Plan are carried out. The Noise Element of General Plan Update 2040 appraises noise problems in the community and identifies policies and implementation measures to minimize the scale of nuisance. Those General Plan Update 2040 policy provisions applicable to the Project are as follows:

- **Policy N 1.1:** Consider the noise compatibility of existing and future development when making land use planning decisions.

- **Policy N 1.2:** Require development projects and changes to existing uses to be consistent with the standards indicated in Table N-1 [Table 4-2 in this Report] to ensure acceptable noise levels for existing and future development.

Table 4-2. Land Use Compatibility for Community Noise Environments - Jackson General Plan 2040

Land Use Category	Exterior Noise Exposure (L_{dn})			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Single-Family Residential Duplex	0 – 60	60 – 70	70 – 75	> 75
Multi-Family Residential	0 – 65	65 – 70	70 – 75	> 75
Hotels and Motels	0 – 65	65 – 70	70 – 80	> 80
Schools, Libraries, Churches, Hospitals, Personal Care	0 – 65	65 – 70	70 – 80	> 80
Auditoriums, Concert Halls, Amphitheaters	0 – 65	65 – 70	N/A	> 70
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	0 – 65	65 – 75	N/A	> 75
Office Buildings, Business, Commercial, Professional	0 – 70	70 – 75	> 75	N/A
Industrial, Manufacturing, Utilities, Agriculture	0 – 75	75 – 80	> 80	N/A

Source: City of Jackson General Plan 2023a
Notes:
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.
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.
Normally Unacceptable = New construction or development should generally 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.

- **Policy N 1.3:** Require new development to reduce excessive noise to the standards indicated in Tables N-1 and N-2 [Tables 4-2 and 4-3 of this Report] through best practices, including building location and orientation, building design features, placement of noise-generating equipment away from sensitive receptors, shielding of noise-generating equipment, placement of noise-tolerant features between noise sources and sensitive receptors, and use of noise-minimizing materials.

Table 4-3. Stationary (Non-Transportation) Noise Source Standards - Jackson General Plan Update 2040

Land Use Receiving the Noise	Hourly Noise Level Descriptor	Exterior Noise-Level Standard (dBA)	
		Daytime (7:00 am – 10:00 pm)	Nighttime (10:00 pm – 7:00 am)
Residential	L_{eq}	55	45
	L_{max}	70	65

Source: City of Jackson General Plan 2023a

Notes:

a) The residential standards apply to all properties that are zoned for residential use. The exterior noise level standard is to be applied at the property line of the receiving land use or at a designated outdoor activity area. For multi-family and mixed-use projects, the exterior noise level standard may be waived (at the discretion of the decision-making body) if the residential portion of the project does not include a designated activity area and mitigation of noise at the property line is not practical.

b) Each of the noise levels specified above shall be lowered by 5 dBA for tonal noises characterized by a whine, screech, or hum, noises consisting primarily of speech or music, or recurring impulsive noises. In no case shall mitigation be required to a level that is less than existing ambient noise levels, as determined through measurements conducted during the same operational period as the subject noise source.

c) In situations where the existing noise level exceeds the noise levels indicated in the above table, any new noise source must include mitigation that reduces the noise level of the noise source to the existing level plus 3 dBA.

- **Policy N 1.6**: For projects that are required to prepare an acoustical study, the following stationary and transportation noise source criteria shall be used to determine the significance of those impacts:

    - A significant impact will occur if the project results in an exceedance of the noise level standards contained in this element, or for instances where the ambient noise level is already above the standards contained in this element, the project will result in an increase in ambient noise levels by more than 3 dBA, whichever is greater.
    - This does not apply to construction activities which are conducted according to the best practices outlined in Action N-1b. Compliance with these requirements shall be sufficient to reduce temporary construction-related noise impacts to a less than significant level.
    - Where existing traffic noise levels are 60 dBA L_{dn} or less at the outdoor activity areas of noise-sensitive uses, a +5 dBA L_{dn} increase in roadway noise levels will be considered significant;
    - Where existing traffic noise levels are greater than 60 dBA L_{dn} and up to 65 dBA L_{dn} at the outdoor activity areas of noise-sensitive uses, a +3 dBA L_{dn} increase in roadway noise levels will be considered significant; and

  - Where existing traffic noise levels are greater than 65 dBA L_{dn} at the outdoor activity areas of noise-sensitive uses, a +1.5 dBA L_{dn} increase in roadway noise levels will be considered significant.

- **Action N-1a:** Require new discretionary development projects to be reviewed for compliance with the noise requirements established in this element, including the standards established in Tables N-1 and N-2 [Tables 4-2 and 4-3 of this Report], and where necessary, require mitigation measures to achieve the noise standards. As applicable the City should:

  - Require acoustical studies for new discretionary development projects which have the potential to generate noise impacts which exceed the standards identified in this element. The studies shall include representative noise measurements, estimates of existing and projected noise levels, and mitigation measures necessary to ensure compliance with the noise standards included in this element;
  - Require developers to prepare a construction management/noise mitigation plan that defines best management practices to reduce construction noise, and includes proposed truck routes as part of the entitlement process; and
  - Provide for additional scrutiny of potential noise impacts when considering approval of new "late-night activities" (land use activities operating from 11:00 p.m. to 6:00 a.m., not including the lawful, reasonable, and customary use of residential uses or professional offices that do not interfere with the reasonable use and enjoyment of other properties).

City of Jackson 1987 General Plan Noise Element

The 1987 General Plan Noise Element appraises noise problems in the community and identifies policies and implementation measures to minimize the scale of nuisance. Those applicable to the Project are as follows:

- **Policy 1:** Establish standards for ambient community noise.

Implementation 1.1: The City of Jackson has previously adopted the Land Use Compatibility for Community Noise Environments chart from the Office of Noise Control's Noise Environment Guidelines. That chart continues to be a valid guideline from determination of noise compatible land uses and is presented as Table 4-4.

Table 4-4. Land Use Compatibility - Jackson General Plan 1987

Land Use Category	Exterior Noise Exposure (L_{dn})			
	Normally Acceptable	**Conditionally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Residential- Low Density Single Family, Duplex, Mobile Homes	0 – 60	55 – 70	70 – 75	> 75
Residential- Multi Family	0 – 65	60 – 70	70 – 75	> 75
Transient Lodging- Motels, Hotels	0 – 65	60 – 70	70 – 80	> 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	0 – 70	60 – 70	70 – 80	> 80
Auditoriums, Concert Halls, Amphitheaters	N/A	0 – 75	> 65	N/A
Sports Arena, Outdoor Spectator Sports	N/A	0 – 75	> 70	N/A
Playgrounds, Neighborhood parks	0 – 70	68 – 75	> 72	N/A
Golf Courses, Riding Stables, Water Recreation, Cemeteries	0 – 75	N/A	70 – 80	> 80
Office Building, Business, Commercial and Professional	0 – 70	68 – 77	N/A	> 75
Industrial, Manufacturing, Utilities and Agriculture	0 – 75	70 – 80	N/A	> 75

Source: City of Jackson General Plan Noise Element 1987

Notes:

Normally Acceptable = Specific land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

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 generally 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.

4.3.4 Jackson Municipal Code

The City of Jackson's regulations with respect to noise are also included in Title 9, Chapter 9.48, of the City's Municipal Code. Specifically, Title 9.48.070, prohibits construction between the hours of 8:00 p.m. to 7:00 a.m. on weekdays which are not holidays, between 7:00 p.m. and 8:00 a.m. on Saturdays, and between 5:00 p.m. to 9:00 a.m. on Sundays.

4.3.5 Ione General Plan

The existing Ione Junior High School campus is located in the City of Ione. The Noise and Safety Element of the City of Ione General Plan was designed to promote a safe and high-quality community. The Noise and Safety Element contains goals and policies that identify the standards that the City will use during planning and development to ensure the safety of residents and to provide an environment free of excessive noise disturbances. Those applicable to the Proposed Project are as follows:

Goal NS-1: New development will reduce unnecessary noise disturbances.

Policy NS-1.1: Establish the Noise Level Performance Standards in [Table 4-5] and [Table 4-6] to govern maximum allowable sound levels in all new development.

Table 4-5. City of Ione Exterior Noise Level Performance Standards for Non-Transportation Noise

Land Use Type	Maximum Noise Exposure Level (dBA)	
	7:00 a.m. – 10:00 p.m.	10:00 p.m. – 7:00 a.m.
Single Family Homes	55	45
Multi-Family Residential	60	45

Source: City of Ione 2009
Notes: The City may impose noise level standards which are more or less restrictive than those specified above based upon determination of existing low or high ambient noise levels.

Table 4-6. City of Ione Noise Level Performance Standards for All Noise Sources, Including Transportation Noise

Noise-Sensitive Land Use Type	Maximum Noise Exposure Level (dBA)	
	Outdoor Activity Areas[1]	Interior Spaces
Residential	60[2]	45
Churches	60[2]	45
Playgrounds, Neighborhood Parks	70	--
Schools, Libraries, Museums	--	45
Nursing Homes/ Hospitals	60[2]	45

Source: City of Ione 2009

Notes: [1]Outdoor activity areas are property locations where an individual spends the most outdoor time or where people are likely to congregate. Where the outdoor activity area is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use. Where it is not practical to mitigate exterior noise levels at patio or balconies of apartment complexes, a common area such as a pool or recreation area may be designated as the outdoor activity area.

[2]Where it is not possible to reduce noise in outdoor activity areas to 60 dBA or less using a practical application of the best available noise reduction measures, an exterior noise level of up to 65 dBA may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table. The City may impose noise level standards which are more or less restrictive than those specified above based upon determination of existing low or high ambient noise levels.

Policy NS-1.2: Ensure the outdoor and indoor areas of new projects will be located, constructed and/or shielded from noise sources in compliance with the City's noise standards.

Policy NS-1.3: Ensure that proposed development likely to exceed the City's standards do not create noise disturbance in existing noise-sensitive areas.

Policy NS-1.4: Mitigate noise created by proposed non-transportation noise sources to comply with the City's noise standards to the maximum extent feasible.

Policy NS-1.5: Mitigate noise created by the construction of new transportation noise sources to the maximum extent feasible to comply with the City's standards.

4.3.6 Ione Municipal Code

The standards for noise are displayed in Title 9, Public Peace, Morals and Welfare, in the City of Ione's Municipal Code. Specifically, Section 9.16.040 prohibits construction between the hours of 9:00 p.m. through 7:00 a.m. Monday through Thursday, and 10:00 p.m. through 7:00 a.m. Friday through Sunday, or any time on Federal or State Holidays.

5.0 Impact Assessment

5.1 Thresholds of Significance

The impact analysis provided below is based on the following California Environmental Quality Act Guidelines Appendix G thresholds of significance. The Project would result in a significant noise-related impact if it would result in the:

1) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

2) Generation of excessive groundborne vibration or groundborne noise levels.

3) For a project located within the vicinity of a private airstrip or 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 the purposes of this analysis, Project construction noise is analyzed for the three campuses where physical site improvements are being proposed. Construction noise is compared to the allowable hours of construction mandated by each jurisdiction as well as the NIOSH standard of 85 dBA for more than 8 hours per day, since construction work for the Proposed Project is anticipated to span a typical workday of 8 hours daily. The City of Sutter Creek, Jackson and Ione do not regulate vibrations associated with construction or operations. However, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, Project groundborne vibration is evaluated against the Caltrans (2020b) recommended standard of 0.3 inches per second PPV with respect to the prevention of structural damage for older residential buildings is used as a threshold. This is also the level at which vibrations may begin to annoy people in buildings. Once the Project is complete, the campuses would not be a source of groundborne vibration during operations.

Noise generated as each campus as a result of the Project are compared against the standards set forth by the appropriate jurisdiction and are described in detail below. Noise generated by the Project's offsite transportation noise is compared to the FICON thresholds of significance in the evaluation of increased traffic noise. It is noted that the FICON thresholds of significance are the same as the City of Jackson's transportation-related noise thresholds of significance, as proposed by Jackson General Plan Update 2040 Policy N 1.6. Neither the City of Sutter Creek General Plan, City of Jackson 1987 General Plan Noise Element, or City of Ion General specifically promulgate transportation-related noise standards.

5.2 Methodology

This analysis of the existing and future noise environments is based on empirical observations and noise prediction modeling. Predicted construction noise levels were calculated utilizing the FHWA's Roadway Construction Noise Model (2006). Groundborne vibration levels associated with construction-related activities for the Project have been evaluated utilizing typical groundborne vibration levels associated with construction equipment. Potential groundborne vibration impacts related to structural damage and human

annoyance were evaluated, taking into account the distance from construction activities to nearby structures and typically applied criteria for structural damage and human annoyance.

Onsite stationary source noise levels associated with the Project have been calculated with the SoundPLAN 3D noise model, which predicts noise propagation from a noise source based on the location, noise level, and frequency spectra of the noise sources as well as the geometry and reflective properties of the local terrain, buildings and barriers. Transportation-source noise levels associated with the Project have been calculated from trip information provided by PlaceWorks, Inc. (2023) and the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108).

5.3 Impact Analysis

5.3.1 Would the Project Result in Short-Term Construction-Generated Noise in Excess of City Standards?

Onsite Construction Noise

Construction noise associated with the Proposed Project would be temporary and would vary depending on the specific nature of the activities being performed. Noise generated would primarily be associated with the operation of off-road equipment for onsite construction activities as well as construction vehicle traffic on area roadways. Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., site preparation, excavation, paving). Noise generated by construction equipment, including earth movers, pile drivers, and portable generators, can reach high levels. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance would be random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). During construction, exterior noise levels could negatively affect sensitive land uses in the vicinity of the construction site.

As previously described, the Project would require physical site improvements at three campuses: Argonaut High School, Ione Junior High School, and Sutter Creek Elementary School. The campuses are located in The City of Jackson, the City of Ione, and the City of Sutter Creek respectively. All jurisdictions have times that construction can take place but do not promulgate numeric thresholds pertaining to the noise associated with construction. This is due to the fact that construction noise is temporary, short term, intermittent in nature, and would cease on completion of the Project. It is noted that the proposed improvements at Jackson Junior High School include the conversion of restrooms and fountains with age-appropriate fixtures, however these improvements were not analyzed in this analysis as they would mainly occur inside existing buildings and would primarily employ the use of hand tools which generate significantly lower noise levels.

To estimate the worst-case onsite construction noise levels that may occur at the nearest noise-sensitive receptors and in order to evaluate the potential health-related effects (physical damage to the ear) from construction noise, the construction equipment noise levels were calculated using the Federal Highway Administration's Roadway Noise Construction Model and compared against the construction-related noise

level threshold established in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998 by NIOSH. A division of the U.S. Department of Health and Human Services, NIOSH identifies a noise level threshold based on the duration of exposure to the source. The NIOSH construction-related noise level threshold starts at 85 dBA for more than 8 hours per day; for every 3-dBA increase, the exposure time is cut in half. This reduction results in noise level thresholds of 88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. For the purposes of this analysis, the lowest, more conservative threshold of 85 dBA L_{eq} is used as an acceptable threshold for construction noise at the nearby sensitive receptors. It is acknowledged that the majority of construction equipment is not situated at any one location during construction activities, but rather spread throughout the Project Site and at various distances from sensitive receptors. Therefore, this analysis employs FTA guidance for calculating construction noise, which recommends measuring construction noise produced by all construction equipment simultaneously from the center of the Project Site (FTA 2018). The distance to the nearest sensitive receptor, measured from the center of the respective construction site, as well as the anticipated short-term construction noise levels generated for the necessary equipment for each phase of construction is presented below. It is acknowledged that the school campuses are considered noise-sensitive receptors however, only off-site noise-sensitive receptors were accounted for in this analysis.

Future Combined Argonaut and Amador High Schools (Existing Argonaut High School Campus)

Argonaut High School is located in the City of Jackson and is mainly surrounded by residential land uses and open space. The main noise producing improvements include the construction of a 10 classroom 2-story building, new parent drop-off location, and a new access road connecting the campus to Stony Creek Road. Per the City's Municipal Code Title 4.48.070, construction is prohibited between the hours of 8:00 p.m. to 7:00 a.m. on weekdays that are not holidays, between 7:00 p.m. and 8:00 a.m. on Saturdays, and between 5:00 p.m. to 9:00 a.m. on Sundays. The Project is required to adhere to these construction timing limitations. The nearest off-site noise-sensitive receptors to the proposed improvements are residences located north of the Project Site fronting Westview Drive, with the closest being 400 feet from the Project Site center. The anticipated short-term construction noise levels generated for the necessary equipment for each phase of construction at Argonaut High School are presented in Table 5-1.

Table 5-1. Construction Average (dBA) Noise Levels at Nearest Receptors - Future Combined Argonaut and Amador High Schools (Existing Argonaut High School)

Construction Phase	Estimated Exterior Construction Noise Level @ Closest Noise Sensitive Receptor (dBA L_{eq})	Construction Noise Standard (dBA L_{eq})	Exceeds Standard?
Demolition	69.3	*85*	**No**
Site Preparation	66.5	*85*	**No**
Grading	67.8	*85*	**No**
Building Construction, Paving & Architectural Coating	69.1	*85*	**No**

Source: Construction noise levels were calculated by ECORP Consulting using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Attachment B for Model Data Outputs.

Notes: Construction equipment used during construction provided by the California Emissions Estimator Model (CalEEMod 2022.1.1.13). CalEEMod is designed to calculate air pollutant emissions from construction activity and contains default construction equipment and usage parameters for typical construction projects based on several construction surveys conducted in order to identify such parameters. Consistent with FTA recommendations for calculating construction noise, construction noise was measured from the center of the Project Site (FTA 2018), which is 400 feet from the nearest sensitive receptor.

L_{eq} = The equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

As shown in Table 5-1, construction activities would not exceed the applicable noise standards. It is noted that construction noise was modeled on a worst-case basis. It is very unlikely that all pieces of construction equipment would be operating at the same time for the various phases of Project construction as well as at the point closest to residences.

Future Ione Elementary School (Existing Ione Junior High School Campus)

The existing Ione Junior High School is located in the City of Ione and is mainly surrounded by residential land uses. The main noise producing improvements at this campus include the construction of two new classroom buildings, an expanded parent drop-off, and new play structures and hard-court areas. Per the City's Municipal Code Section 9.16.040, construction is prohibited between the hours of 9:00 p.m. and 7:00 a.m. Monday through Thursday, and 10:00 p.m. and 7:00 a.m. Friday through Sunday, or any time on Federal or State Holidays. The Project is required to adhere to these construction timing limitations. The nearest off-site noise-sensitive receptors to the proposed improvements are residences located north of the Project Site fronting Mills Street, with the closest being 300 feet from the Project Site center. The anticipated short-term construction noise levels generated for the necessary equipment for each phase of construction at the existing Ione Junior High School are presented in Table 5-2.

Table 5-2. Construction Average (dBA) Noise Levels at Nearest Receptors - Future Ione Elementary School (Existing Ione Junior High School)

Construction Phase	Estimated Exterior Construction Noise Level @ Closest Noise Sensitive Receptor (dBA L_{eq})	Construction Noise Standard (dBA L_{eq})	Exceeds Standard?
Demolition	70.9	*85*	**No**
Site Preparation	72.1	*85*	**No**
Grading	71.7	*85*	**No**
Building Construction, Paving & Architectural Coating	73.6	*85*	**No**

Source: Construction noise levels were calculated by ECORP Consulting using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Attachment B for Model Data Outputs.

Notes: Construction equipment used during construction provided by CalEEMod (2022.1.1.13). CalEEMod is designed to calculate air pollutant emissions from construction activity and contains default construction equipment and usage parameters for typical construction projects based on several construction surveys conducted in order to identify such parameters. Consistent with FTA recommendations for calculating construction noise, construction noise was measured from the center of the Project Site (FTA 2018), which is 300 feet from the nearest sensitive receptor.

L_{eq} = The equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

As shown in Table 5-2, construction activities would not exceed the applicable noise standards. It is noted that construction noise was modeled on a worst-case basis. It is very unlikely that all pieces of construction equipment would be operating at the same time for the various phases of Project construction as well as at the point closest to residences.

Future Expanded Sutter Creek Elementary School (Existing Sutter Creek Elementary School Campus)

Sutter Creek Elementary School is located in the City of Sutter Creek and is mainly surrounded by residential land uses as well as Amador High School. The main noise producing improvements at this campus include the construction of a new classroom building and lunch shelter. Per the City's Municipal Code Section 10.50.120, construction is prohibited between the hours of 7:00 p.m. of and 7:00 a.m. The Project is required to adhere to these construction timing limitations. The nearest off-site noise-sensitive receptors to the proposed improvements are residences located north of the Project Site fronting Sutter Ione Road, with the closest being 290 feet from the Project Site center. It is noted that Amador High School was not analyzed as a noise sensitive receptor as it a ACUSD campus. The anticipated short-term construction noise levels generated for the necessary equipment for each phase of construction at Sutter Creek Elementary School are presented in Table 5-3.

Table 5-3. Construction Average (dBA) Noise Levels at Nearest Receptors - Future Expanded Sutter Creek Elementary School (Existing Sutter Creek Elementary School)

Construction Phase	Estimated Exterior Construction Noise Level @ Closest Noise Sensitive Receptor (dBA L_{eq})	Construction Noise Standard (dBA L_{eq})	Exceeds Standard?
Demolition	71.2	*85*	**No**
Site Preparation	68.3	*85*	**No**
Grading	69.3	*85*	**No**
Building Construction, Paving & Architectural Coating	70.4	*85*	**No**

Source: Construction noise levels were calculated by ECORP Consulting using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Attachment B for Model Data Outputs.

Notes: Construction equipment used during construction provided by CalEEMod (2022.1.1.13). CalEEMod is designed to calculate air pollutant emissions from construction activity and contains default construction equipment and usage parameters for typical construction projects based on several construction surveys conducted in order to identify such parameters. Consistent with FTA recommendations for calculating construction noise, construction noise was measured from the center of the Project Site (FTA 2018), which is 290 feet from the nearest sensitive receptor.

L_{eq} = The equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

As shown in Table 5-3, construction activities would not exceed the applicable noise standards. It is noted that construction noise was modeled on a worst-case basis. It is very unlikely that all pieces of construction equipment would be operating at the same time for the various phases of Project construction as well as at the point closest to residences.

5.3.2 Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of City Standards During Operations?

As previously described, noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise-sensitive and may warrant unique measures for protection from intruding noise.

Operational Onsite Noise

The Project is proposing the consolidation of eight schools, spanning three cities, onto six ACUSD campuses. The Project Sites are currently existing schools however, they would require physical improvements that would reconfigure certain campus features as well as an alteration in noise producing activity due to the transition of school grades (e.g., elementary school children create a different regiment of noise compared with junior high students). On-site noise associated with school activity has been calculated using the

SoundPLAN 3D noise model for each campus. Table 5-4 through Table 5-9 shows the predicted Project noise levels at the nearest noise-sensitive receptors in the areas surrounding the six ACUSD campuses. Additionally, a noise contour graphic for each campus (see Figure 5-1 through Figure 5-6) has been prepared to provide a visual depiction of the predicted noise levels in the Project vicinity from Project operations. The improvements/ alterations proposed at each campus as well as the noise producing sources accounted for are described in detail below. Activity was only accounted for during normal school (daytime) hours. It is noted that noise producing activity occurring on the exiting sports courts/ athletic fields for afterschool activities was not accounted for in the modeling as they would remain similar to current conditions.

Future Combined Ione and Jackson Junior High Schools (Existing Amador High School Campus)

The existing Amador High School campus location is proposed to accommodate the consolidation of two junior high schools, Ione Junior High School and Jackson Junior High School. No site improvements are being proposed. On-site noise has been calculated using the SoundPLAN 3D noise model. The modeling scenario accounts for the major noise producing activity on the Project Site such as school drop-off/ pick up and lunch/ recess. School drop-off/ pick up was modeled as area sources encompassing the parking lot fronting Spanish Street and school lunch/ recess the large open space areas within the campus (see Figure 5-1). It is noted that these noise producing events were modeled in SoundPLAN as occurring at the same time due to an overlap in assumed activity areas. As such, the modeled noise levels are expected to be less than what is presented. Receivers were placed in the back yards of the residences surrounding Project Site consistent with Policy N-1.1.2 of the City's General Plan. Table 5-4 presents the predicted Project noise levels at the nearest noise-sensitive receptors in the area surrounding the existing campus, as predicted by SoundPLAN, and compared to the City of Sutter Creek exterior noise limits presented in the City's General Plan (see Table 4-1 of this Report). Additionally, a noise contour graphic (see Figure 5-1) has been prepared to provide a visual depiction of the predicted noise levels in the campus vicinity from proposed operations.

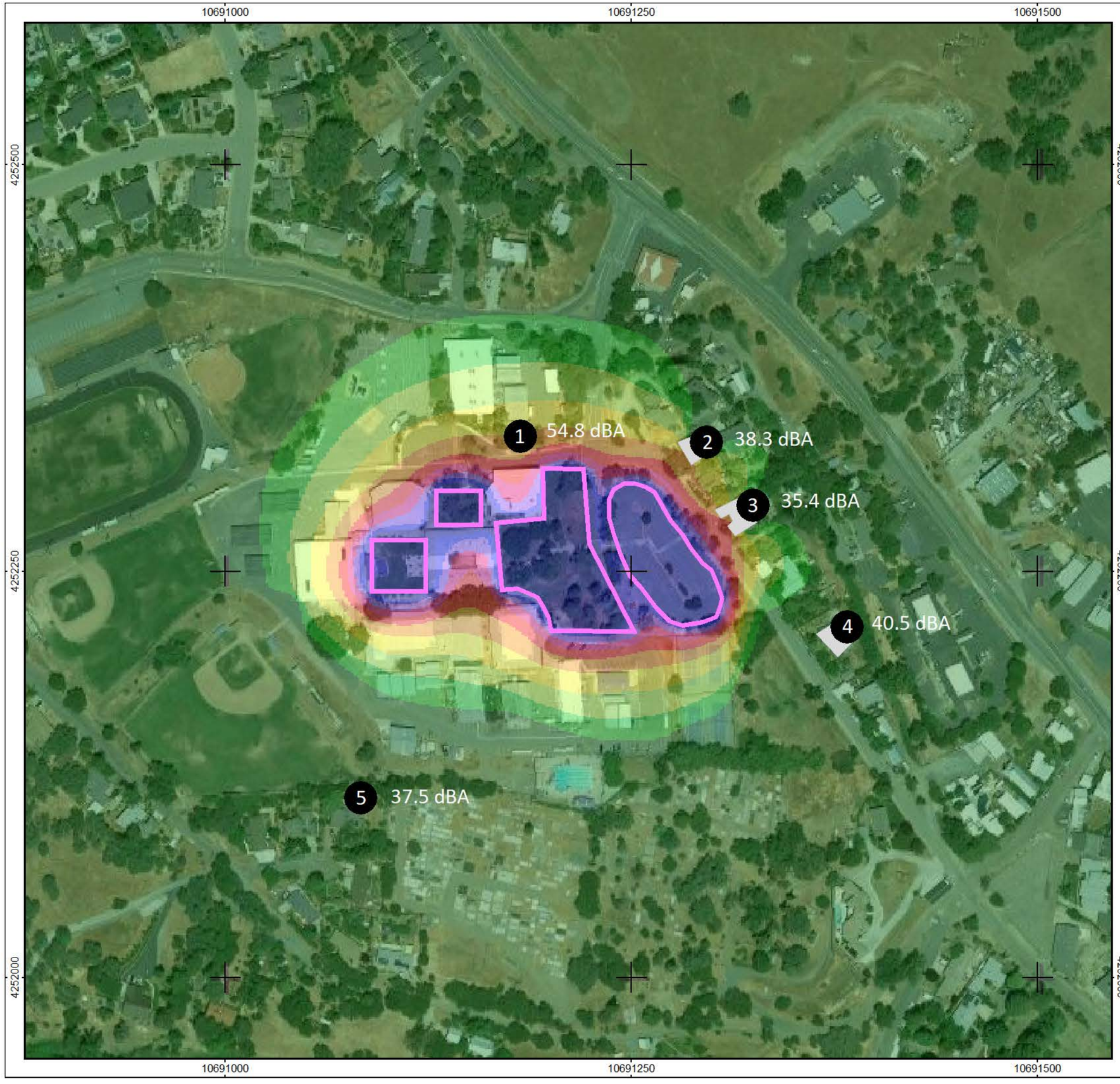
Table 5-4. Modeled Operational Noise Levels - Future Combined Ione and Jackson Junior High Schools (Existing Amador High School)

Location	Modeled Operational Noise Attributed to the Project (dBA L_{eq})	Exterior Noise Standard (dBA L_{eq})	Exceed Exterior Noise Standard
#1: Sutter Creek Elementary School	54.8	*N/A*[1]	**No**
#2: Residence east fronting Spanish Street	38.8	*50*	**No**
#3: Residence east fronting Spanish Street	35.4	*50*	**No**
#4: Residence east fronting Spanish Street	40.5	*50*	**No**
#5: Residence southwest fronting Oak Court	37.5	*50*	**No**

Source: SounPLAN v 8.2. Refer to Attachment C for Model Data Outputs.
Notes: [1]The City of Sutter Creek does not have exterior noise standards for educational land uses.

As shown in Table 5-4, Project operational noise would not exceed the exterior noise standard at any location in the area.

Figure 5-1: Future Combined Ione and Jackson Junior High Schools (Existing Amador High School Campus)



Project Noise Levels in dB(A)

- < 49
- 49 - 51
- 51 - 53
- 53 - 55
- 55 - 57
- 57 - 59
- 59 - 61
- 61 - 63
- 63 - 65
- >= 65

Signs and symbols

- Receiver
- Area Source:
  -School drop off/ pick up activity
  -Passing periods/ lunch activity

N

Length scale 1:2388

0 20 40 80 120 160 m

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Future Combined Argonaut and Amador High Schools (Existing Argonaut High School Campus)

The existing Argonaut High School campus location is proposed to accommodate the consolidation of two high schools, Amador High School and Argonaut High School. Multiple site improvements are being proposed (see Table 1-1) however, the improvement that would impact noise sensitive receptors in the area surrounding the campus is the construction of a new parent drop-off/ pick up location. On-site noise has been calculated using the SoundPLAN 3D noise model. The modeling scenario accounts for the major noise producing activity on the campus such as school drop-off/ pick up and passing periods/ lunch. School drop-off/ pick up was modeled as multiple area sources with a large area source encompassing the existing parking lot adjacent to the tennis courts as well as an area source encompassing the new pavement on the northern end of the campus. Additionally, area sources were placed over the existing parking spaces for the parking lot on the northern end of the campus adjacent to the residences fronting Westview Drive (see Figure 5-2). Passing periods/ lunch was modeled as an area source encompassing the region where the main school buildings are located. It is noted that these noise producing events were modeled in SoundPLAN as occurring at the same time due to an overlap in assumed activity areas. As such, the modeled noise levels are expected to be less than what is presented. Table 5-5 presents the predicted noise levels at the nearest noise-sensitive receptors in the area surrounding the existing campus as well as the Amador County Superior Court located east across Argonaut Lane, as predicted by SoundPLAN. The City of Jackson 1987 General Plan Noise Element does not specifically establish noise standards for non-transportation noise sources. Therefore, Project noise is evaluated against the 1987 General Plan Noise Element compatibility standard of 55 dBA at residential land uses (see Table 4-4). This is the most stringent noise threshold in the 1987 General Plan Noise Element Land Use Compatibility chart and is consistent with the City of Jackson General Plan Update 2040 stationary (non-transportation) noise source standards (see Table 4-3), which proposes to also limit sound from non-transportation noise sources at noise-sensitive residences to 55 dBA maximum. Additionally, a noise contour graphic (see Figure 5-2) has been prepared to provide a visual depiction of the predicted noise levels in the campus vicinity from proposed operations.

Table 5-5. Modeled Operational Noise Levels - Future Combined Argonaut and Amador High Schools (Existing Argonaut High School)

Location	Modeled Operational Noise Attributed to the Project (dBA L_{eq})	Exterior Noise Standard (dBA L_{eq})	Exceed Exterior Noise Standard
#1: Residence north fronting Westview Drive	51.2	*55*	**No**
#2: Residence north fronting Westview Drive	48.9	*55*	**No**
#3: Residence north fronting Westview Drive	51.3	*55*	**No**
#4: Residence north fronting Westview Drive	49.7	*55*	**No**
#5: Residence north fronting Westview Drive	49.7	*55*	**No**
#6: Residence north fronting Westview Drive	48.6	*55*	**No**
#7: Residence north fronting Westview Drive	46.6	*55*	**No**
#8: Residence southwest fronting Stony Creek Road[1]	40.6	*55*	**No**
#9: Amador County Superior Court	41.9	*55*	**No**

Source: SounPLAN v 8.2. Refer to Attachment C for Model Data Outputs.

Notes: [1] It is acknowledged that the residence fronting Stony Creek Road is located in the jurisdiction of Amador County however, the City of Jackson noise standards are used as the noise producing activity would occur in the City.

As shown in Table 5-5, operational noise would not exceed the noise standard at any location in the area.

Figure 5-2: Future Combined Argonaut and AmadorHigh Schools (Existing Argonaut High School Campus)

Project Noise Levels in dB(A)

	< 49
	49 - 51
	51 - 53
	53 - 55
	55 - 57
	57 - 59
	59 - 61
	61 - 63
	63 - 65
	>= 65

Signs and symbols

- Proposed Building
- Receiver
- Area Source:
  - -School drop off/ pick up activity
  - -Passing periods/ lunch activity

Length scale 1:2618

0 20 40 80 120 160 m

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Future Ione Elementary School (Existing Ione Junior High School Campus)

The existing Ione Junior High School location is proposed to accommodate the transition from a junior high school to a preschool and transitional kindergarten through sixth grade students. Multiple site improvements are being proposed (see Table 1-1) however, the improvements that would impact noise sensitive receptors in the area surrounding the campus are the expansion of drop-off/ pick up areas as well as new play structures and hard-court areas. On-site noise has been calculated using the SoundPLAN 3D noise model. The modeling scenario accounts for the major noise producing activity on the campus such as school drop-off/ pick up and lunch/ recess. School drop-off/ pick up was modeled as area sources encompassing the student drop-off/ parking lot on South Mills Street as well as the proposed kindergarten drop-off area along the eastern boundary of the campus. School lunch/ recess was modeled as area sources encompassing the two large playground areas. It is noted that these noise producing events were modeled in SoundPLAN as occurring at the same time due to an overlap in assumed activity areas. As such, the modeled noise levels are expected to be less than what is presented. Figure 5-6 presents the predicted noise levels at the nearest noise-sensitive receptors in the area surrounding the existing campus, as predicted by SoundPLAN, and compared to the City of Ione non-transportation exterior noise standards presented in the City's General Plan (see Table 4-5 of this Report). Additionally, a noise contour graphic (see Figure 5-3) has been prepared to provide a visual depiction of the predicted noise levels in the campus vicinity from proposed operations.

Table 5-6. Modeled Operational Noise Levels - Future Ione Elementary School (Existing Ione Junior High School)

Location	Modeled Operational Noise Attributed to the Project (dBA L_{eq})	Exterior Noise Standard (dBA L_{eq})	Exceed Exterior Noise Standard
#1: Residence north fronting Sacramento Street	44.2	*55*	**No**
#2: Residence north fronting Sacramento Street	48.0	*55*	**No**
#3: Residence north fronting South Mills Street	51.9	*55*	**No**
#4: Residence north fronting Marlette Street	49.5	*55*	**No**
#5: Residence north fronting Marlette Street	51.1	*55*	**No**
#6: Residence north fronting Marlette Street	48.2	*55*	**No**
#7: Residence north fronting Marlette Street	43.0	*55*	**No**
#8: Residence north fronting Marlette Street	42.7	*55*	**No**
#9: Residence south fronting State Route 124	37.0	*55*	**No**

Source: SounPLAN v 8.2. Refer to Attachment C for Model Data Outputs.

As shown in Table 5-6, operational noise would not exceed the exterior noise standard at any location in the area.

Figure 5-3: Future Ione Elementary School (Existing Ione Junior High School Campus)

4246500

10680250

10680500

Satellite

42.7 dBA 8

43.0 dBA 7

6 48.2 dBA

5 51.1 dBA

4 49.5 dBA

3 51.9 dBA

2 48.0 dBA

1 44.2 dBA

9 37.0 dBA

Project Noise Levels in dB(A)

	< 49
	49 - 51
	51 - 53
	53 - 55
	55 - 57
	57 - 59
	59 - 61
	61 - 63
	63 - 65
	>= 65

Signs and symbols

- Proposed Building
- Receiver
- Area Source:
  -School drop off/ pick up activity
  -Passing periods/ lunch activity
- Bodeneffekte
- Noise calculation area

Length scale 1:1681

0 15 30 60 90 120 m

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Future Preschool Center (Existing Jackson Junior High School Campus)

The existing Jackson Junior High School campus location is proposed to accommodate the transition from a junior high school to a preschool center. Improvements consist of converting restrooms and fountains with age-appropriate fixtures. On-site noise has been calculated using the SoundPLAN 3D noise model. The modeling scenario accounts for the major noise producing activity on the campus, such as school drop-off/ pick up and lunch/ recess. School drop-off/ pick up was modeled as an area sources encompassing the horseshoe shaped driveway on the campus. School lunch/ recess was modeled as an area source encompassing the large area west of the main school building. It is noted that these noise producing events were modeled in SoundPLAN as occurring at the same time due to an overlap in assumed activity areas. As such, the modeled noise levels are expected to be less than what is presented. Table 5-7 presents the predicted noise levels at the nearest noise-sensitive receptors in the area surrounding the existing campus, as predicted by SoundPLAN. As previously described, the City of Jackson 1987 General Plan Noise Element does not specifically establish noise standards for non-transportation noise sources. Therefore, Project noise is evaluated against the 1987 General Plan Noise Element compatibility standard of 55 dBA at residential land uses (see Table 4-4). This is the most stringent noise threshold in the 1987 General Plan Noise Element Land Use Compatibility chart and is consistent with the City of Jackson General Plan Update 2040 stationary (non-transportation) noise source standards (see Table 4-3), which proposes to also limit sound from non-transportation noise sources at noise-sensitive residences to 55 dBA maximum. Additionally, a noise contour graphic (see Figure 5-4) has been prepared to provide a visual depiction of the predicted noise levels in the campus vicinity from proposed operations.

Table 5-7. Modeled Operational Noise Levels - Future Preschool Center (Existing Jackson Junior High School)

Location	Modeled Operational Noise Attributed to the Project (dBA L_{eq})	Noise Standard (dBA L_{eq})	Exceed Noise Standard
#1: Residence north fronting Vogan Toll Road	42.2	*55*	**No**
#2: Pure Metal Works north fronting Sutter Street	37.4	*70*	**No**
#3: Amador County Special Education Center east	46.6	*55*	**No**
#4: Residence east fronting Rex Avenue	50.4	*55*	**No**
#5: Residence east fronting Hoffman Street	51.9	*55*	**No**
#6: Residence south fronting Hoffman Street	45.7	*55*	**No**
#7: Residence south fronting Hoffman Street	49.2	*55*	**No**
#8: Residence south fronting Hoffman Street	48.7	*55*	**No**
#9: Residence south fronting Hoffman Street	47.8	*55*	**No**
#10: Residence west adjacent to undeveloped land	44.8	*55*	**No**
#11: Residence west adjacent to undeveloped land	45.8	*55*	**No**

Source: SounPLAN v 8.2. Refer to Attachment C for Model Data Outputs.

As shown in Table 5-7, operational noise would not exceed the noise standard at any location in the area.

10694000 10694250

4247500 4247500

4247250 4247250

10694000 10694250

1 42.2 dBA

2 37.4 dBA

3 46.6 dBA

4 50.4 dBA

5 51.9 dBA

6 45.7 dBA

7 49.2 dBA

8 48.7 dBA

9 47.8 dBA

10 44.8 dBA

11 45.8 dBA

Figure 5-4: Future Preschool Center (Existing Jackson Junior High School Campus)

Project Noise Levels in dB(A)

	< 49
	49 - 51
	51 - 53
	53 - 55
	55 - 57
	57 - 59
	59 - 61
	61 - 63
	63 - 65
	>= 65

Signs and symbols

Receiver

Area Source:
-School drop off/ pick up activity
-Lunch/ recess activity

N

Length scale 1:1850

0 15 30 60 90 120 m

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Future Expanded Jackson Elementary School (Existing Jackson Elementary School Campus)

The existing Jackson Elementary School campus location is proposed to accommodate the expansion of operations to include sixth grade students. No site improvements are being proposed. On-site noise has been calculated using the SoundPLAN 3D noise model. The modeling scenario accounts for the major noise producing activity on the existing campus, such as school drop-off/ pick up and lunch/ recess. School drop-off/ pick up activity was modeled as an area source encompassing the drop-off/ pick up lane fronting Church Street. School lunch/ recess was modeled as area sources enveloping the hard-court area on the north end of the campus. It is noted that these noise producing events were modeled in SoundPLAN as occurring at the same time due to an overlap in assumed activity areas. As such, the modeled noise levels are expected to be less than what is presented. Table 5-8 presents the predicted noise levels at the nearest noise-sensitive receptors in the area surrounding the existing campus, as predicted by SoundPLAN. As previously described, the City of Jackson 1987 General Plan Noise Element does not specifically establish noise standards for non-transportation noise sources. Therefore, Project noise is evaluated against the 1987 General Plan Noise Element compatibility standard of 55 dBA at residential land uses (see Table 4-4). This is the most stringent noise threshold in the 1987 General Plan Noise Element Land Use Compatibility chart and is consistent with the City of Jackson General Plan Update 2040 stationary (non-transportation) noise source standards (see Table 4-3), which proposes to also limit sound from non-transportation noise sources at noise-sensitive residences to 55 dBA maximum. Additionally, a noise contour graphic (see Figure 5-5) has been prepared to provide a visual depiction of the predicted noise levels in the campus vicinity from proposed operations.

Table 5-8. Modeled Operational Noise Levels - Future Expanded Jackson Elementary School (Existing Jackson Elementary School)

Location	Modeled Operational Noise Attributed to the Project (dBA L_{eq})	Exterior Noise Standard (dBA L_{eq})	Exceed Exterior Noise Standard
#1: Residence northwest fronting Church Street	49.6	*55*	**No**
#2: Residence west fronting Church Street	52.8	*55*	**No**
#3: Residence west fronting Church Street	54.4	*55*	**No**
#4: Residence southwest fronting Church Street	49.7	*55*	**No**
#5: Residence south fronting Court Street	39.7	*55*	**No**
#6: Residence south fronting Court Street	38.6	*55*	**No**
#7: Residence south fronting Court Street	38.9	*55*	**No**
#8: Residence south fronting Court Street	38.9	*55*	**No**
#9 Residence east fronting Court Street	41.4	*55*	**No**
#10: Residence northeast fronting Placer Drive	39.3	*55*	**No**

Source: SounPLAN v 8.2. Refer to Attachment C for Model Data Outputs.

As shown in Table 5-8, operational noise would not exceed the exterior noise standard at any location in the area.

Figure 5-5: Future Expanded Jackson Elementary School
(Existing Jackson Elementary School Campus)

10694500 10694750

4247250 4247000

10 39.3 dBA
49.3 dBA 1
52.8 dBA 2
54.4 dBA 3
9 41.4 dBA
49.7 dBA 4
5 39.7 dBA
6 38.6 dBA
7 38.9 dBA
8 38.9 dBA

Project Noise Levels in dB(A)

	< 49
	49 - 51
	51 - 53
	53 - 55
	55 - 57
	57 - 59
	59 - 61
	61 - 63
	63 - 65
	>= 65

Signs and symbols

- Receiver
- Area Source:
  - -School drop off/ pick up activity
  - -Passing periods/ lunch activity

N

Length scale 1:1295

0 10 20 40 60 80 m

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Future Expanded Sutter Creek Elementary School (Existing Sutter Creek Elementary School Campus)

The existing Sutter Creek Elementary School campus location is proposed to accommodate the expansion of operations to include transitional kindergarten through 6th grade students. The Project is proposing the construction of twelve new classroom buildings and a lunch shelter. On-site noise has been calculated using the SoundPLAN 3D noise model. The modeling scenario accounts for the major noise producing activity on the campus such as school drop-off/ pick up and lunch/ recess. School drop-off/ pick up activity was modeled as an area source encompassing the drop-off/ pick up lane and parking lot adjacent to Amador High School. School lunch/ recess was modeled as an area source enveloping the hard-court area adjacent to the main school building. It is noted that these noise producing events were modeled in SoundPLAN as occurring at the same time due to an overlap in assumed activity areas. As such, the modeled noise levels are expected to be less than what is presented. Receivers were placed in the back yards of the residences surrounding campus consistent with Policy N-1.1.2 of the City's General Plan. Table 5-9 presents the predicted Project noise levels at the nearest noise-sensitive receptors in the area surrounding the campus, as predicted by SoundPLAN, and compared to the City of Sutter Creek exterior noise limits presented in the City's General Plan (see Table 4-1 of this Report). Additionally, a noise contour graphic (see Figure 5-6) has been prepared to provide a visual depiction of the predicted noise levels in the vicinity from proposed operations.

Table 5-9. Modeled Operational Noise Levels - Future Expanded Sutter Creek Elementary School (Existing Sutter Creek Elementary School

Location	Modeled Operational Noise Attributed to the Project (dBA L_{eq})	Exterior Noise Standard (dBA L_{eq})	Exceed Exterior Noise Standard
#1: Residence northwest fronting Sutter Ione Road	32.9	*50*	**No**
#2: Residence northwest fronting Sutter Ione Road	33.9	*50*	**No**
#3: Residence northwest fronting Sutter Ione Road	30.0	*50*	**No**
#4: Residence southeast fronting Spanish Street	39.1	*50*	**No**
#5: Residence southeast fronting Spanish Street	26.1	*50*	**No**
#6: Residence southeast fronting Spanish Street	31.4	*50*	**No**
#7: Amador High School	53.8	*N/A*[1]	**No**

Source: SounPLAN v 8.2. Refer to Attachment C for Model Data Outputs.
Notes: [1]The City of Sutter Creek does not have exterior noise standards for educational land uses.

As shown in Table 5-9, operational noise would not exceed the exterior noise standard at any noise-sensitive receptors in the area.

10691250

4252500

32.9 dBA

1

33.9 dBA

2

30.0 dBA

3

39.1 dBA

4

26.1 dBA

5

31.4 dBA

6

53.8 dBA

7

4252250

10691250

Figure 5-6: Future Expanded Sutter Cr eek Elementary School (Existing Sutter Creek Elementary School Campus)

Project Noise Levels in dB(A)

	< 49
	49 - 51
	51 - 53
	53 - 55
	55 - 57
	57 - 59
	59 - 61
	61 - 63
	63 - 65
	>= 65

Signs and symbols

Receiver

Area Source:
-School drop off/ pick up activity
-Lunch/ recess activity

N

Length scale 1:1187

0 10 20 40 60 80 m

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Operational Offsite Traffic Noise

Future traffic noise levels as a result of the Project were modeled based on the traffic volumes identified by PlaceWorks, Inc. (2023) to determine the noise levels along Project vicinity roadways. Table 5-10 shows the calculated offsite roadway noise levels under existing traffic levels compared to future build-out of the Project. The thresholds recommended by FICON will be used in this analysis as the analyzed roadways span multiple municipalities within the County. It is noted that the FICON thresholds of significance are the same as the City of Jackson's transportation-related noise thresholds of significance, as proposed by Jackson General Plan Update 2040 Policy N 1.6. Neither the City of Sutter Creek General Plan, City of Jackson 1987 General Plan Noise Element, or City of Ion General specifically promulgate transportation-related noise standards.

FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA L_{dn} and the Project creates a readily perceptible 5 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or

- If the existing noise levels range from 60 to 65 dBA L_{dn} and the Project creates a barely perceptible 3 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or

- If the existing noise levels already exceed 65 dBA L_{dn}, and the Project creates a community noise level increase of greater than 1.5 dBA L_{dn}.

Table 5-10. Existing Plus Project Conditions Predicted Traffic Noise Levels					
Roadway Segment	**Surrounding Uses**	**L_{dn} at 100 feet from Centerline of Roadway**		**Standard**	**Exceed Standard?**
		Existing	**Existing + Project**		
State Route 88					
West of Argonaut Lane	Residential & Commercial	65.9	66.0	>1.5	**No**
Between Argonaut Lane and Hoffman Street	Residential	66.0	66.1	>1.5	**No**
South of Hoffman Street	Residential & Commercial	66.5	66.6	>1.5	**No**
Argonaut Lane					
Between CA 88 and Westview Drive	Residential	53.0	55.2	>*5.0*	**No**
Between Westview Dive and Stony Creek Road	Residential & Educational	54.4	58.1	>*5.0*	**No**
Hoffman Street/ Stony Creek Road					
West of Argonaut Lane	Residential & Educational	52.2	56.5	>*5.0*	**No**
Between Argonaut Lane and CA 88	Residential	51.2	56.1	>*5.0*	**No**
Church Street					
North of Market Street	Residential	60.2	60.9	>3.0	**No**
Between Market Street and Relihan Drive	Residential	60.2	60.3	>3.0	**No**
South of Relihan Drive	Residential	60.0	60.9	>3.0	**No**
Market Street					
West of Church Street	Residential	51.0	54.2	>*5.0*	**No**
East of Church Street	Residential	53.8	56.6	>*5.0*	**No**
Relihan Drive					

Table 5-10. Existing Plus Project Conditions Predicted Traffic Noise Levels

Roadway Segment	Surrounding Uses	L_{dn} at 100 feet from Centerline of Roadway		Standard	Exceed Standard?
		Existing	Existing + Project		
West of Church Street	Residential	45.9	47.5	>*5.0*	**No**
Marlette Street					
West of Mills Street	Residential	53.0	53.3	>*5.0*	**No**
Between Mills Street and Sacramento Street	Residential	54.4	54.0	>*5.0*	**No**
East of Church Street	Residential	50.2	52.1	>*5.0*	**No**
Mills Street					
North of Marlett Street	Residential	41.7	45.8	>*5.0*	**No**
South of Marlette Street	Residential	47.0	52.0	>*5.0*	**No**
Sacramento Street					
North of Marlett Street	Residential	51.1	52.9	>*5.0*	**No**
South of Marlette Street	Residential	46.1	46.6	>*5.0*	**No**

Source: Traffic noise levels were calculated by ECORP using the FHWA traffic noise prediction model in conjunction with the trip generation rate identified by PlaceWorks, Inc. (2023). Refer to Attachment A for traffic noise modeling assumptions and results.

Notes: A total of five intersections were included in the Traffic Impact Analysis however only roadways traversing noise-sensitive receptors were included in the analysis.

As shown in Table 5-10, no roadway segment would experience an increase of noise beyond the FICON significance standards as a result of the Project.

It is noted that the trip generation rates identified by PlaceWorks, Inc. do not include any roadway segments in Sutter Creek, and therefore a qualitative analysis of the effects of Project traffic noise in Sutter Creek is provided here. As a result of the Proposed Project, the estimated enrollment at Sutter Creek Elementary School is anticipated to increase from 204 students to 625 students, an increase of 421 students who would largely arrive and depart school via personal automobile trips. According to information provided by the Amador Unified School District, approximately 8.8 percent of Sutter Creek Elementary School students arrive and depart via school bus. Therefore, it can be expected that approximately 37 of the new 421 students would arrive and depart via school bus (421 x 0.088 = 37), resulting in approximately 384 students arriving

and departing via personal automobile trips (421 – 37 = 384). 384 students arriving and departing via personal automobile trips would equate to 768 new traffic trips daily as a result of the Project (384 students x 2 trips = 768). The majority of these trips would arrive and depart Sutter Creek Elementary School via Old Route 49 and Sutter Ione Road before dispersing into the regional transportation network. Old Route 49 is classified as a Main Arterial roadway in the Sutter Creek General Plan while Sutter Ione Road and the majority of other roadways in the vicinity are classified as Local/Residential roadways.

According to the Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (2013), a doubling of traffic on a roadway is required to result in an increase of 3 dB (outside of the laboratory, a 3-dBA change is considered a just-perceivable difference). Main Arterial roadways, such as Old Route 49, generally accommodate between 10,000 to 25,000 vehicles daily and Local/Residential roadways, such as Sutter Ione Road and the majority of other roadways in the vicinity of Sutter Creek Elementary School generally accommodate between 1,500 vehicles daily. Thus, the Proposed Project would not result in a doubling of traffic on the local transportation network in Sutter Creek, and therefore its contribution to existing traffic noise would not be perceptible.

5.3.3 Would the Project Expose Structures to Substantial Groundborne Vibration During Construction?

Excessive groundborne vibration impacts result from continuously occurring vibration levels. Increases in groundborne vibration levels attributable to the Project would be primarily associated with short-term construction-related activities. Construction on the various sites would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance.

Construction-related ground vibration is normally associated with impact equipment such as pile drivers, jackhammers, and the operation of some heavy-duty construction equipment, such as dozers and trucks. Vibration decreases rapidly with distance, and it is acknowledged that construction activities would occur throughout the Project Site and would not be concentrated at the point closest to sensitive receptors. Groundborne vibration levels associated with construction equipment are summarized in Table 5-11.

Table 5-11. Representative Vibration Source Levels for Construction Equipment	
Equipment Type	**Peak Particle Velocity at 25 Feet (inches per second)**
Large Bulldozer	0.089
Pile Driver	0.170
Loaded Trucks	0.076
Hoe Ram	0.089
Jackhammer	0.035
Small Bulldozer/Tractor	0.003
Vibratory Roller	0.210

Source: FTA 2018; Caltrans 2020b

As previously stated, the Project would require physical site improvements at three campuses: the existing Argonaut High School campus, Ione Junior High School campus, and Sutter Creek Elementary School campus. These campuses are located in the City of Jackson, the City of Ione, and the City of Sutter Creek, respectively. No jurisdiction where nearby land uses could be impacted by construction vibration regulate or have a numeric threshold associated with construction vibrations. However, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, the Caltrans (2020b) recommended standard of 0.3 inches per second PPV with respect to the prevention of structural damage for older residential buildings is used as a threshold. This is also the level at which vibrations may begin to annoy people in buildings.

Based on the representative vibration levels presented for various construction equipment types in Table 5-11 and the construction vibration assessment methodology published by the FTA (2018), it is possible to estimate the potential Project construction vibration levels. The FTA provides the following equation:

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

Table 5-12, Table 5-13, and Table 5-14 below present the expected vibration levels at the nearest land uses to the three campuses where physical site improvements are proposed. Consistent with FTA recommendations for calculating construction vibration, construction vibration was measured from the center of the Project Site (FTA 2018).

Existing Argonaut High School Campus

The nearest structure of concern to the proposed improvements are residences located north of the campus, fronting Westview Drive, with the closest being 400 feet from the campus center.

Table 5-12. Construction Vibration Levels at 400 Feet							
Receiver PPV Levels (in/sec)[1]					Peak Vibration	Threshold	Exceed Threshold?
Large Bulldozer, Caisson Drilling, & Hoe Ram	Loaded Trucks	Jackhammer	Pile Driver	Vibratory Roller			
0.0013	0.0011	0.0005	0.0026	0.0032	0.0032	*0.3*	**No**

Notes: [1]Based on the Vibration Source Levels of Construction Equipment included on Table 5-11 (FTA 2018). Distance to the nearest structure of concern is approximately 400 feet measured from proposed improvements on the Project Site.

As shown in Table 5-12, vibration as a result of onsite construction activities at the existing Argonaut High School campus would not exceed 0.3 PPV at the nearest structure. Thus, onsite construction would not exceed the recommended threshold.

Existing Ione Junior High School Campus

The nearest structure of concern to the proposed improvements are residences located north of the Project Site, fronting Mills Street, with the closest being 300 feet from the campus center.

Table 5-13. Construction Vibration Levels at 300 Feet							
Receiver PPV Levels (in/sec)[1]					Peak Vibration	Threshold	Exceed Threshold?
Large Bulldozer, Caisson Drilling, & Hoe Ram	Loaded Trucks	Jackhammer	Pile Driver	Vibratory Roller			
0.0021	0.0018	0.0008	0.0040	0.0050	0.0050	*0.3*	**No**

Notes: [1]Based on the Vibration Source Levels of Construction Equipment included on Table 5-11 (FTA 2018). Distance to the nearest structure of concern is approximately 300 feet measured from proposed improvements on the Project Site.

As shown in Table 5-13, vibration as a result of onsite construction activities on the existing Ione Junior High School campus would not exceed 0.3 PPV at the nearest structure. Thus, onsite construction would not exceed the recommended threshold.

Existing Sutter Creek Elementary School Campus

The nearest structure of concern to the proposed improvements are residences located north of the campus, fronting Sutter Ione Road, with the closest being 290 feet from the campus center.

Table 5-14. Construction Vibration Levels at 290 Feet							
Receiver PPV Levels (in/sec)[1]					Peak Vibration	Threshold	Exceed Threshold?
Large Bulldozer, Caisson Drilling, & Hoe Ram	Loaded Trucks	Jackhammer	Pile Driver	Vibratory Roller			
0.0025	0.0019	0.0008	0.0043	0.0053	0.0053	*0.3*	**No**

Notes: [1]Based on the Vibration Source Levels of Construction Equipment included on Table 5-11 (FTA 2018). Distance to the nearest structure of concern is approximately 290 feet measured from proposed improvements on the Project Site.

As shown in Table 5-14, vibration as a result of onsite construction activities on the campus would not exceed 0.3 PPV at the nearest structure. Thus, onsite construction would not exceed the recommended threshold.

5.3.4 Would the Project Expose Structures to Substantial Groundborne Vibration During Operations?

Project operations for all campuses would not include the use of any stationary equipment that would result in excessive vibration levels. Therefore, the Project would result in negligible groundborne vibration impacts during operations at all campuses.

5.3.5 Would the Project Expose People Residing or Working in the Project area to Excessive Airport Noise?

Existing Amador High School Campus

The nearest airport to the Amador High School campus is the Amador County Airport, located approximately 1.73 miles southeast. According to Figure N-4 of the Amador Conty General Plan (2016), the campus is located outside of the 65 dBA CNEL noise contours for the Amador County Airport. Implementation of the Proposed Project would not affect airport operations nor result in increased exposure of people on this campus to aircraft noise.

Existing Argonaut High School Campus

The nearest airport to the Argonaut High School campus is the Amador County Airport, located approximately 1.21 miles north. According to Figure N-4 of the Amador Conty General Plan (2016), the campus is located outside of the 65 dBA CNEL noise contours for the Amador County Airport. Implementation of the Proposed Project would not affect airport operations nor result in increased exposure of people on this campus to aircraft noise.

Existing Ione Junior High School Campus

The nearest airport to the Ione Junior High School campus is the Camanche Skypark Airport, located approximately 5.88 miles south. The campus is not located within an airport land use plan or within two miles of a public airport or public use airport. Implementation of the Proposed Project would not affect airport operations nor result in increased exposure of people working at or visiting this campus to aircraft noise.

Existing Jackson Junior High School Campus

The nearest airport to the existing Jackson Junior High School campus is the Amador County Airport, located approximately 1.62 miles northwest. According to Figure N-4 of the Amador Conty General Plan (2016), the campus is located outside of the 65 dBA CNEL noise contours for the Amador County Airport. Implementation of the Proposed Project would not affect airport operations nor result in increased exposure of people at this campus to aircraft noise.

Existing Jackson Elementary School Campus

The nearest airport to the Jackson Elementary School campus is the Amador County Airport, located approximately 2.01 miles northwest. According to Figure N-4 of the Amador Conty General Plan (2016), the campus is located outside of the 65 dBA CNEL noise contours for the Amador County Airport. Implementation of the Proposed Project would not affect airport operations nor result in increased exposure of people at this campus to aircraft noise.

Existing Sutter Creek Elementary School Campus

The nearest airport to the Sutter Creek Elementary School campus is the Amador County Airport, located approximately 1.72 miles northwest. According to Figure N-4 of the Amador Conty General Plan (2016), the campus is located outside of the 65 dBA CNEL noise contours for the Amador County Airport. Implementation of the Proposed Project would not affect airport operations nor result in increased exposure of people at this campus to aircraft noise.

6.0 REFERENCES

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LIST OF ATTACHMENTS

ATTACHMENT A

Federal Highway Administration Highway Noise Prediction Model (FHWA-RD-77-108) Outputs – Project Traffic Noise

TRAFFIC NOISE LEVELS

Project Number: 2023-108
Project Name: Amador County Unified School District

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s): **Existing**
Source of Traffic Volumes: Placeworks 2023
Community Noise Descriptor: L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor'	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Peak Hou dB(A) L_{eq}	24-Hour dB(A) Ldn
CA 88													
West of Argonaut Lane	Residential & Commercial	4	0	0	14,976	45	100	0	0	1.8%	0.7%	0.0	65.9
Between Argonaut Lane and Hoffman Street	Residential	4	0	0	15,516	45	100	0	0	1.8%	0.7%	0.0	66.0
South of Hoffman Street	Residential & Commercial	4	0	0	17,163	45	100	0	0	1.8%	0.7%	0.0	66.5
Argonaut Lane													
Between CA 88 and Westview Drive	Residential	2	0	0	1,449	35	100	0	0	1.8%	0.7%	0.0	53.0
Between Westview Dive and Stoney Creek Road	Residential & Educational	2	0	0	1,084	45	100	0	0	1.8%	0.7%	0.0	54.4
Hoffman Street/ Stony Creek Road													
West of Argonaut Lane	Residential & Educational	2	0	0	648	45	100	0	0	1.8%	0.7%	0.0	52.2
Between Argonaut Lane and CA 88	Residential	2	0	0	522	45	100	0	0	1.8%	0.7%	0.0	51.2
Church Street													
North of Market Street	Residential	2	0	0	4,059	45	100	0	0	1.8%	0.7%	0.0	60.2
Between Market Street and Relihan Drive	Residential	2	0	0	4,140	45	100	0	0	1.8%	0.7%	0.0	60.2
South of Relihan Drive	Residential	2	0	0	4,545	45	100	0	0	1.8%	0.7%	0.0	60.6
Market Street													
West of Church Street	Residential	2	0	0	927	35	100	0	0	1.8%	0.7%	0.0	51.0
East of Church Street	Residential	2	0	0	936	45	100	0	0	1.8%	0.7%	0.0	53.8
Relihan Drive													
West of Church Street	Residential	2	0	0	288	35	100	0	0	1.8%	0.7%	0.0	45.9
Marlette Street													
West of Mills Street	Residential	2	0	0	1,467	35	100	0	0	1.8%	0.7%	0.0	53.0
Between Mills Street and Sacramento Street	Residential	2	0	0	2,007	35	100	0	0	1.8%	0.7%	0.0	54.4
East of Church Street	Residential	2	0	0	774	35	100	0	0	1.8%	0.7%	0.0	50.2
Mills Street													
North of Marlett Street	Residential	2	0	0	108	35	100	0	0	1.8%	0.7%	0.0	41.7
South of Marlette Street	Residential	2	0	0	369	35	100	0	0	1.8%	0.7%	0.0	47.0
Sacramento Street													
North of Marlett Street	Residential	2	0	0	954	35	100	0	0	1.8%	0.7%	0.0	51.1
South of Marlette Street	Residential	2	0	0	297	35	100	0	0	1.8%	0.7%	0.0	46.1

TRAFFIC NOISE LEVELS

Project Number: 2023-108
Project Name: Amador County Unified School District

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s): **Existing + Project**
Source of Traffic Volumes: Placeworks 2023
Community Noise Descriptor: L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition / Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor'	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix: Medium Trucks	Vehicle Mix: Heavy Trucks	Peak Hou dB(A) L_{eq}	24-Hour dB(A) Ldn
CA 88													
West of Argonaut Lane	Residential & Commercial	4	0	0	15,273	45	100	0	0	1.8%	0.7%	0.0	66.0
Between Argonaut Lane and Hoffman Street	Residential	4	0	0	15,709	45	100	0	0	1.8%	0.7%	0.0	66.1
South of Hoffman Street	Residential & Commercial	4	0	0	17,721	45	100	0	0	1.8%	0.7%	0.0	66.6
Argonaut Lane													
Between CA 88 and Westview Drive	Residential	2	0	0	2,434	35	100	0	0	1.8%	0.7%	0.0	55.2
Between Westview Dive and Stoney Creek Road	Residential & Educational	2	0	0	2,508	45	100	0	0	1.8%	0.7%	0.0	58.1
Hoffman Street/ Stony Creek Road													
West of Argonaut Lane	Residential & Educational	2	0	0	1,764	45	100	0	0	1.8%	0.7%	0.0	56.5
Between Argonaut Lane and CA 88	Residential	2	0	0	1,605	45	100	0	0	1.8%	0.7%	0.0	56.1
Church Street													
North of Market Street	Residential	2	0	0	4,827	45	100	0	0	1.8%	0.7%	0.0	60.9
Between Market Street and Relihan Drive	Residential	2	0	0	4,198	45	100	0	0	1.8%	0.7%	0.0	60.3
South of Relihan Drive	Residential	2	0	0	4,815	45	100	0	0	1.8%	0.7%	0.0	60.9
Market Street													
West of Church Street	Residential	2	0	0	1,942	35	100	0	0	1.8%	0.7%	0.0	54.2
East of Church Street	Residential	2	0	0	1,809	45	100	0	0	1.8%	0.7%	0.0	56.6
Relihan Drive													
West of Church Street	Residential	2	0	0	411	35	100	0	0	1.8%	0.7%	0.0	47.5
Marlette Street													
West of Mills Street	Residential	2	0	0	1,584	35	100	0	0	1.8%	0.7%	0.0	53.3
Between Mills Street and Sacramento Street	Residential	2	0	0	1,831	35	100	0	0	1.8%	0.7%	0.0	54.0
East of Church Street	Residential	2	0	0	1,197	35	100	0	0	1.8%	0.7%	0.0	52.1
Mills Street													
North of Marlett Street	Residential	2	0	0	279	35	100	0	0	1.8%	0.7%	0.0	45.8
South of Marlette Street	Residential	2	0	0	1,152	35	100	0	0	1.8%	0.7%	0.0	52.0
Sacramento Street													
North of Marlett Street	Residential	2	0	0	1,440	35	100	0	0	1.8%	0.7%	0.0	52.9
South of Marlette Street	Residential	2	0	0	333	35	100	0	0	1.8%	0.7%	0.0	46.6

ATTACHMENT B

Federal Highway Administration Roadway Construction Noise Model Outputs – Project Construction

ARGONAUT HIGH SCHOOL RCNM OUTPUTS

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Argonaut- Demolition

Description	**Affected Land Use**
Argonaut- Demolition	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Concrete Saw	No	20		89.6	400
Dozer	No	40		81.7	400
Tractor	No	40	84		400
Tractor	No	40	84		400
Tractor	No	40	84		400

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Concrete Saw		71.5	64.5
Dozer		63.6	59.6
Tractor		65.9	62
Tractor		65.9	62
Tractor		65.9	62
	Total	**71.5**	**69.3**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Argonaut- Site Preparation

Description	**Affected Land Use**
Argonaut- Site Preparation	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Grader	No	40	85		400
Dozer	No	40		81.7	400
Tractor	No	40	84		400

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Grader		66.9	63
Dozer		63.6	59.6
Tractor		65.9	62
	Total	**66.9**	**66.5**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Argonaut- Grading

Description	**Affected Land Use**
Argonaut- Grading	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Grader	No	40	85		400
Dozer	No	40		81.7	400
Tractor	No	40	84		400
Tractor	No	40	84		400

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Grader	66.9	63
Dozer	63.6	59.6
Tractor	65.9	62
Tractor	65.9	62
Total	**66.9**	**67.8**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Argonaut- Building Construction, Paving & Architectural Coating

Description	**Affected Land Use**
Argonaut- Building Construction, Paving & Architectural Coating	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Crane	No	16		80.6	400
Gradall	No	40		83.4	400
Generator	No	50		80.6	400
Tractor	No	40	84		400
Welder / Torch	No	40		74	400
Welder / Torch	No	40		74	400
Welder / Torch	No	40		74	400
Concrete Mixer Truck	No	40		78.8	400
Paver	No	50		77.2	400
Paver	No	50		77.2	400
Roller	No	20		80	400
Tractor	No	40	84		400
Compressor (air)	No	40		77.7	400

	Calculated (dBA)	
Equipment	***Lmax**	**Leq**
Crane	62.5	54.5
Gradall	65.3	61.4

Generator	62.6	59.6
Tractor	65.9	62
Welder / Torch	55.9	52
Welder / Torch	55.9	52
Welder / Torch	55.9	52
Concrete Mixer Truck	60.7	56.8
Paver	59.2	56.1
Paver	59.2	56.1
Roller	61.9	54.9
Tractor	65.9	62
Compressor (air)	59.6	55.6
Total	**65.9**	**69.1**

*Calculated Lmax is the Loudest value.

IONE JUNIOR HIGH SCHOOL RCNM OUTPUTS

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Ione- Demolition

Description	**Affected Land Use**
Ione- Demolition	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Concrete Saw	No	20		89.6	300
Excavator	No	40		80.7	300
Excavator	No	40		80.7	300
Excavator	No	40		80.7	300
Dozer	No	40		81.7	300
Dozer	No	40		81.7	300

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Concrete Saw		74	67
Excavator		65.1	61.2
Excavator		65.1	61.2
Excavator		65.1	61.2
Dozer		66.1	62.1
Dozer		66.1	62.1
	Total	**74**	**70.9**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Ione- Site Preparation

Description	**Affected Land Use**
Ione- Site Preparation	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Dozer	No	40		81.7	300
Dozer	No	40		81.7	300
Dozer	No	40		81.7	300
Tractor	No	40	84		300
Tractor	No	40	84		300
Tractor	No	40	84		300
Tractor	No	40	84		300

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Dozer		66.1	62.1
Dozer		66.1	62.1
Dozer		66.1	62.1
Tractor		68.4	64.5
Tractor		68.4	64.5
Tractor		68.4	64.5
Tractor		68.4	64.5
	Total	**68.4**	**72.1**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Ione- Grading

Description	**Affected Land Use**
Ione- Grading	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Excavator	No	40		80.7	300
Grader	No	40	85		300
Dozer	No	40		81.7	300
Tractor	No	40	84		300
Tractor	No	40	84		300
Tractor	No	40	84		300

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Excavator	65.1	61.2
Grader	69.4	65.5
Dozer	66.1	62.1
Tractor	68.4	64.5
Tractor	68.4	64.5
Tractor	68.4	64.5
Total	**69.4**	**71.7**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Ione- Building Construction, Paving & Architectural Coating

Description	**Affected Land Use**
Ione- Building Construction, Paving & Architectural Coating	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Crane	No	16		80.6	300
Gradall	No	40		83.4	300
Gradall	No	40		83.4	300
Gradall	No	40		83.4	300
Generator	No	50		80.6	300
Tractor	No	40	84		300
Tractor	No	40	84		300
Tractor	No	40	84		300
Welder / Torch	No	40		74	300
Paver	No	50		77.2	300
Paver	No	50		77.2	300
Paver	No	50		77.2	300
Paver	No	50		77.2	300
Roller	No	20		80	300
Roller	No	20		80	300
Compressor (air)	No	40		77.7	300

Calculated (dBA)

Equipment		*Lmax	Leq
Crane		65	57
Gradall		67.8	63.9
Gradall		67.8	63.9
Gradall		67.8	63.9
Generator		65.1	62.1
Tractor		68.4	64.5
Tractor		68.4	64.5
Tractor		68.4	64.5
Welder / Torch		58.4	54.5
Paver		61.7	58.6
Paver		61.7	58.6
Paver		61.7	58.6
Paver		61.7	58.6
Roller		64.4	57.4
Roller		64.4	57.4
Compressor (air)		62.1	58.1
	Total	**68.4**	**73.6**

*Calculated Lmax is the Loudest value.

SUTTER CREEK ELEMENTARY SCHOOL RCNM
OUTPUTS

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Sutter Creek- Demolition

Description	**Affected Land Use**
Sutter Creek- Demolition	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Concrete Saw	No	20		89.6	290
Dozer	No	40		81.7	290
Tractor	No	40	84		290
Tractor	No	40	84		290

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Concrete Saw		74.3	67.3
Dozer		66.4	62.4
Tractor		68.7	64.8
Tractor		68.7	64.8
	Total	**74.3**	**71.2**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.

Report date: 8/16/2023
Case Description: Sutter Creek-Site Preparation

Description	**Affected Land Use**
Sutter Creek-Site Preparation	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Grader	No	40	85		290
Tractor	No	40	84		290

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Grader	69.7	65.8
Tractor	68.7	64.8
Total	**69.7**	**68.3**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Sutter Creek- Grading

Description	**Affected Land Use**
Sutter Creek- Grading	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Grader	No	40	85		290
Dozer	No	40		81.7	290
Tractor	No	40	84		290

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Grader		69.7	65.8
Dozer		66.4	62.4
Tractor		68.7	64.8
	Total	**69.7**	**69.3**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/16/2023
Case Description: Sutter Creek- Building Construction, Paving & Architectural Coating

Description **Affected Land Use**
Sutter Creek- Building Construction, Paving & Architectural Coating Residential

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)
Crane	No	16		80.6	390
Gradall	No	40		83.4	390
Gradall	No	40		83.4	390
Tractor	No	40	84		390
Tractor	No	40	84		390
Paver	No	50		77.2	390
Paver	No	50		77.2	390
Paver	No	50		77.2	390
Paver	No	50		77.2	390
Paver	No	50		77.2	390
Roller	No	20		80	390
Tractor	No	40	84		390
Compressor (air)	No	40		77.7	390

Calculated (dBA)

Equipment	*Lmax	Leq
Crane	62.7	54.7
Gradall	65.6	61.6

Gradall		65.6	61.6
Tractor		66.2	62.2
Tractor		66.2	62.2
Paver		59.4	56.4
Paver		59.4	56.4
Paver		59.4	56.4
Paver		59.4	56.4
Paver		59.4	56.4
Roller		62.2	55.2
Tractor		66.2	62.2
Compressor (air)		59.8	55.8
	Total	**66.2**	**70.4**

*Calculated Lmax is the Loudest value.

ATTACHMENT C

SoundPLAN Onsite Noise Generation

AMADOR HIGH SCHOOL SOUNDPLAN OUTPUT DATA

SoundPLAN
Output Source Information

Number	Reciever Name	Floor	Level at Receiver (dBA)
1	Sutter Creek Elementary School	Ground Floor	54.8
2	Residence east fronting Spanish Street	Ground Floor	38.8
3	Residence east fronting Spanish Street	Ground Floor	35.4
4	Residence east fronting Spanish Street	Ground Floor	40.5
5	Residence southwest fronting Oak Court	Ground Floor	37.5

Number	Noise Source Information	Citation	Level at Source
1	School Drop Off/ Pick Up Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during morning drop off)	64.6 dBA
2	Lunch/Recess Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during recess)	68.8 dBA

ARGONAUT HIGH SCHOOL SOUNDPLAN OUTPUT DATA

SoundPLAN
Output Source Information

Number	Reciever Name	Floor	Level at Receiver (dBA)
1	Residence north fronting Westview Drive	Ground Floor	51.2
2	Residence north fronting Westview Drive	Ground Floor	48.9
3	Residence north fronting Westview Drive	Ground Floor	51.3
4	Residence north fronting Westview Drive	Ground Floor	49.7
5	Residence north fronting Westview Drive	Ground Floor	49.7
6	Residence north fronting Westview Drive	Ground Floor	48.6
7	Residence north fronting Westview Drive	Ground Floor	46.6
8	Residence southwest fronting Stony Creek Road	Ground Floor	40.6
9	Amador County Superior Court	Ground Floor	41.9

Number	Noise Source Information	Citation	Level at Source
1	School Drop Off/ Pick Up Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during morning drop off)	64.6 dBA
2	Passing Periods/ Lunch Activity	Zhang, Bo & Navejar, Regina. 2015. Effects of Ambient Noise on the Measurement of Mathematics Achievement for Urban High School Students. University of Wisconsin.	63.7 dBA

IONE JUNIOR HIGH SCHOOL SOUNDPLAN OUTPUT DATA

SoundPLAN
Output Source Information

Number	Reciever Name	Floor	Level at Receiver (dBA)
1	Residence north fronting Sacramento Street	Ground Floor	44.2
2	Residence north fronting Sacramento Street	Ground Floor	48
3	Residence north fronting South Mills Street	Ground Floor	51.9
4	Residence north fronting Marlette Street	Ground Floor	49.5
5	Residence north fronting Marlette Street	Ground Floor	51.1
6	Residence north fronting Marlette Street	Ground Floor	48.2
7	Residence north fronting Marlette Street	Ground Floor	43
8	Residence north fronting Marlette Street	Ground Floor	42.7
9	Residence south fronting State Route 124	Ground Floor	37

Number	Noise Source Information	Citation	Level at Source
1	School Drop Off/ Pick Up Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during morning drop off)	64.6 dBA
2	Lunch/Recess Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during recess)	68.8 dBA

JACKSON JUNIOR HIGH SCHOOL SOUNDPLAN OUTPUT DATA

SoundPLAN
Output Source Information

Number	Reciever Name	Floor	Level at Receiver (dBA)
1	Residence north fronting Vogan Toll Road	Ground Floor	42.2
2	Pure Metal Works north fronting Sutter Street	Ground Floor	37.4
3	Amador County Special Education Center east	Ground Floor	46.6
4	Residence east fronting Rex Avenue	Ground Floor	50.4
5	Residence east fronting Hoffman Street	Ground Floor	51.9
6	Residence south fronting Hoffman Street	Ground Floor	45.7
7	Residence south fronting Hoffman Street	Ground Floor	49.2
8	Residence south fronting Hoffman Street	Ground Floor	48.7
9	Residence south fronting Hoffman Street	Ground Floor	47.8
10	Residence west adjacent to undeveloped land	Ground Floor	44.8
11	Residence west adjacent to undeveloped land	Ground Floor	45.8

Number	Noise Source Information	Citation	Level at Source
1	School Drop Off/ Pick Up Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during morning drop off)	64.6 dBA
2	Lunch/Recess Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during recess)	68.8 dBA

JACKSON ELEMENTARY SCHOOL SOUNDPLAN
OUTPUT DATA

SoundPLAN
Output Source Information

Number	Reciever Name	Floor	Level at Receiver (dBA)
1	Residence northwest fronting Church Street	Ground Floor	49.3
2	Residence west fronting Church Street	Ground Floor	52.8
3	Residence west fronting Church Street	Ground Floor	54.4
4	Residence southwest fronting Church Street	Ground Floor	49.7
5	Residence south fronting Court Street	Ground Floor	39.7
6	Residence south fronting Court Street	Ground Floor	38.6
7	Residence south fronting Court Street	Ground Floor	38.9
8	Residence south fronting Court Street	Ground Floor	38.9
9	Residence east fronting Court Street	Ground Floor	41.4
10	Residence northeast fronting Placer Drive	Ground Floor	39.3

Number	Noise Source Information	Citation	Level at Source
1	School Drop Off/ Pick Up Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during morning drop off)	64.6 dBA
2	Lunch/Recess Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during recess)	68.8 dBA

SUTTER CREEK ELEMENTARY SCHOOL SOUNDPLAN OUTPUT DATA

SoundPLAN
Output Source Information

Number	Reciever Name	Floor	Level at Receiver (dBA)
1	Residence northwest fronting Sutter Ione Road	Ground Floor	32.9
2	Residence northwest fronting Sutter Ione Road	Ground Floor	33.9
3	Residence northwest fronting Sutter Ione Road	Ground Floor	30
4	Residence southeast fronting Spanish Street	Ground Floor	39.1
5	Residence southeast fronting Spanish Street	Ground Floor	26.1
6	Residence southeast fronting Spanish Street	Ground Floor	31.4
7	Amador High School	Ground Floor	53.8

Number	Noise Source Information	Citation	Level at Source
1	School Drop Off/ Pick Up Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during morning drop off)	64.6 dBA
2	Lunch/Recess Activity	ECORP Consulting, Inc. Noise Measurements (Elementary school during recess)	68.8 dBA