# Noise Impact Assessment

## Ridgeview High School Project

Paradise, California

**Prepared For:**

Paradise Unified School District
6696 Clark Road
Paradise, CA 95969

**January 2021**

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

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| | |
|---|---|
| County | Butte County |
| CNEL | Community Noise Equivalent Level |
| dB | Decibel |
| dBA | Decibel is A-weighted |
| FHWA | Federal Highway Administration |
| FTA | Federal Transit Administration |
| HDR | High Density Residential |
| Hz | Hertz |
| $L_{dn}$ | Day/Night noise level |
| $L_{eq}$ | Equivalent noise level |
| OPR | Office of Planning and Research |
| OSHA | Occupational Safety and Health Administration |
| PPV | Peak particle velocity |
| Project | Ridgeview High School Project |
| RMS | Root mean square |
| Town | Town of Paradise |
| WEAL | Western Electro-Acoustic Laboratory, Inc. |

# 1.0 INTRODUCTION

This report documents the results of a Noise Impact Assessment completed for the Various Park Improvements at Ridgeview High School Project (Project), which includes the construction of a new high school in the Town of Paradise (Town), California. This assessment was prepared as a comparison of predicted Project noise levels to noise standards promulgated by the Town General Plan Noise Element and Municipal Code. The purpose of this report is to estimate Project-generated noise levels and determine the level of impact the Project would have on the environment.

## 1.1 Project Location and Description

The Project is located on the east side of Maxwell Drive in the Town of Paradise, across from Paradise High School (PHS) and north of Pleasant Lane (Figure 1. Project Location). The site corresponds to a portion of Section 14, Township 22 North, and Range 3 East of the "Paradise East, California" 7.5-minute quadrangle (North American Datum [NAD]27) (U.S. Geological Survey [USGS] 1994). The approximate center of the Project is located at latitude 39.762264° (North American Datum [NAD]83) and longitude 121.611785° (NAD83).

The Project includes relocating the existing Ridgeview High School (a continuation high school that accommodates up to 150 students) to the Maxwell Drive site from its current location in Magalia, approximately seven miles north of the Project site. The new facilities would include 17,00 square feet of classroom building space, outdoor basketball and baseball/softball facilities, and 135 parking spaces (Figure 2. Project Site Plan). An increase in student enrollment within the school district is not expected as a result of the relocation. Since Ridgeview High School is a continuation school, students who attend the school are already enrolled in the school district and would otherwise attend PHS if they were not attending Ridgeview High School.

The Project site has a Town of Paradise zoning classification of Community Facilities (C-F). The C-F zone is intended for land areas that are planned to or already provide for public and public institutional land uses, such as public schools, or private land uses which serve a community purpose or benefit the community.


Map Date: *12/15/2020*

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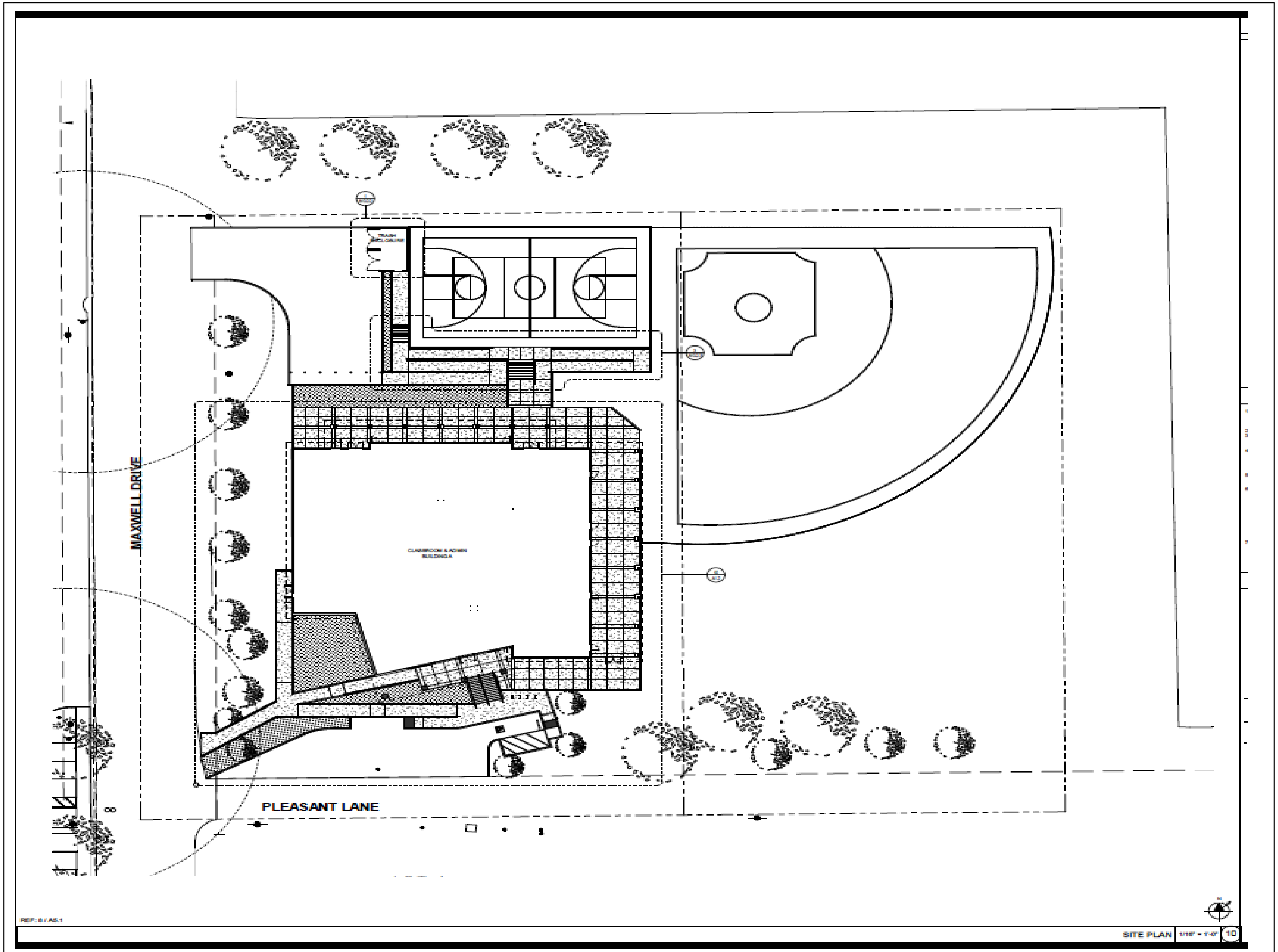
**Figure 1. Project Location**

*2020-122 Ridgeview High School*




Map Date: *12/23/2020*
Photo (or Base) Source: *BCA Architects 2020*

**Figure 2. Project Site Plan**

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*2020-122 Ridgeview High School*

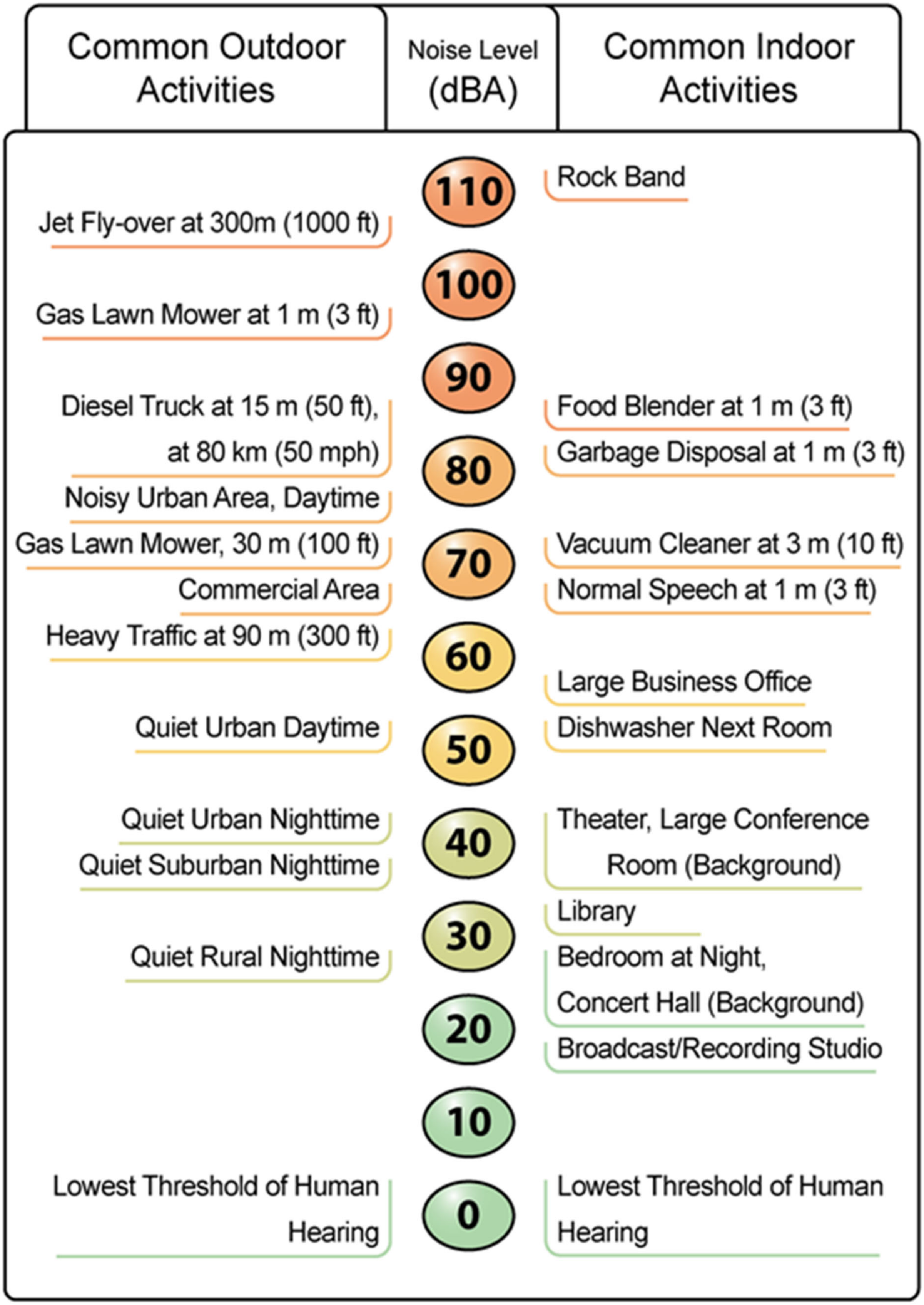
# 2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS

## 2.1 Fundamentals of Noise and Environmental Sound

### *2.1.1 Addition of Decibels*

The decibel (dB) scale is logarithmic, not linear; 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 on Figure 3.




**Source: California Department of Transportation (Caltrans) 2020**



**Figure 3 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 six dB for each doubling of distance from a stationary or point source. 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 three dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2011). 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 dB 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 2008), 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. [WEAL] 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 structures 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 structures is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. [HMMH] 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 typically 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 $L_{eq}$ is a measure of ambient noise, while the $L_{dn}$ and CNEL (Community Noise Equivalent Level) 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 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)** is 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 dBA 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 ± one 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 ± one to two 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 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 dBA noise levels, the following relationships should be noted in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of one dBA cannot be perceived by humans.
- Outside of the laboratory, a three-dBA change is considered a just-perceivable difference.
- A change in level of at least five dBA is required before any noticeable change in community response would be expected. An increase of five 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*

#### 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.

#### 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. For ground vehicles, a noise level of about 55 dBA $L_{dn}$ is the threshold at which a substantial percentage of people begin to report annoyance.

## 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.

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 2-1 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 earthmoving equipment.

**Table 2-1. Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels**

| PPV (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 | Recommended upper level to which ruins and ancient monuments should be subjected |
| 0.1 | 92 | Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities | Virtually no risk of architectural damage to normal buildings |
| 0.2 | 94 | Vibrations may begin to annoy people in buildings | Threshold at which there is a risk of architectural damage to normal dwellings |
| 0.4–0.6 | 98–104 | Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges | Architectural damage and possibly minor structural damage |

*Source: Caltrans 2020b*

For the purposes of this analysis, a PPV descriptor with units of inches per section is used to evaluate construction-generated vibration for building damage and human complaints.

# 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.

The nearest noise-sensitive land use to the Project site includes PHS when in session. As previously described, PHS is located across Maxwell Drive from the Project site. There are also existing noise-sensitive residential land uses on Elliot Road to the south of the Project. Additionally, the Project itself would be considered a sensitive receptor when built.

## 3.2 Existing Ambient Noise Environment

The noise environment in the proposed Project area is impacted by various noise sources. Mobile sources of noise, especially cars and trucks on area roadways such as Maxwell Drive, are the most common and significant sources of noise in the Project area. Other sources of noise are those associated with PHS. In more than 250 sound tests over two days, research identified an average noise level at high schools reaching levels of 63.7 dBA within the camps, with peak events of 85 dBA, generated from activities, e.g., hallway talking, door slamming, student yelling (Zhang and Navejar 2015). In addition to typical noise levels during school hours, PHS also accommodates football and softball games and practices on existing fields to the east of the Project site. Previous noise measurements conducted by ECORP at outdoor high school sporting events identify noise levels ranging up to 66 dBA.

The Project site is located outside of any airport land use plan. Furthermore, the Project site is located beyond two miles from any airport. The Paradise Airport is the closest airport to the Project site and is located approximately 3.2 miles away.

### *3.2.1 Existing Ambient Noise Measurements*

The proposed Project site is predominantly surrounded by a mix of residential and vacant land uses, though as previously stated PHS is located across Maxwell Drive from the Project site. In order to quantify existing ambient noise levels in the Project area, ECORP Consulting, Inc. conducted a long-term noise measurement on the Project site on January 12, 2021 (see Attachment A). The six-hour measurement was taken between 9:25 a.m. and 2:25 p.m. This measurement is representative of the noise levels throughout typical school hours. The average noise levels and sources of noise measured at each location are listed in Table 3-1.

**Table 3-1. Existing (Baseline) Noise Measurements**

| Location Number | Location | $L_{eq}$ | $L_{min}$ | $L_{max}$ | Time |
|---|---|---|---|---|---|
| 1 | On the Project Site | **64.6** | 43.7 | 96.7 | 9:25 a.m.- 2:25 a.m. |

*Source: Measurements were taken by ECORP with a Larson Davis SoundExpert LxT precision sound level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. Prior to the measurements, the SoundExpert LxT sound level meter was calibrated according to manufacturer specifications with a Larson Davis CAL200 Class I Calibrator. See Attachment A for noise measurement outputs.*

As shown in Table 3-1, the ambient recorded noise level is 64.6 dBA at the Project site. The most common noise in the Project vicinity during the baseline noise measurement conducted by ECORP was associated with construction work occurring at the existing PHS campus. Thus, the recorded noise levels identified in Table 3-1 are most likely higher than typically experienced.

### *3.2.2 Existing Roadway Noise Levels*

Existing roadway noise levels were calculated for the roadway segments in the Project vicinity. This task was accomplished using the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108) (see Attachment B) and traffic volumes from the Project's Traffic Impact Study (Headway Transportation 2020). 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 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 | CNEL at 100 feet from Centerline of Roadway |
|---|---|---|
| **Maxwell Drive** | | |
| Between Skyway & Pleasant Lane | Public School | 53.0 |
| Between Pleasant Lane & Elliot Road | Public School | 53.5 |
| **Skyway** | | |
| North of Maxwell Drive | Commercial | 59.2 |
| South of Maxwell Drive | Commercial | 59.7 |
| **Elliot Road** | | |
| West of Maxwell Drive | Residential | 54.7 |
| East of Maxwell Drive | Residential | 54.3 |

*Source:* Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the trip generation rate identified by Headway Transportation (2020). Refer to Attachment B for traffic noise modeling assumptions and results.

As shown, the existing traffic-generated noise levels on Project-vicinity roadways currently range from 53.0 to 60.9 dBA CNEL at a distance of 100 feet from the roadway centerline. As previously described, CNEL is 24-hour average noise level 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.

# 4.0 REGULATORY FRAMEWORK

## 4.1 Federal

### *4.1.1 Occupational Safety and Health Act (OSHA) of 1970*

OSHA regulates onsite noise levels and protects workers from occupational noise exposure. To protect hearing, worker noise exposure is limited to 90 dB with A-weighting (dBA) over an eight-hour work shift (29 Code of Federal 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.

## 4.2 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.

## 4.3 Local

### 4.3.1 Town of Paradise General Plan Noise Element

The Noise Element of the Town of Paradise General Plan provides policy direction for minimizing noise impacts on the community. By identifying noise-sensitive land uses and establishing compatibility guidelines for land use and noises, noise considerations will influence the general distribution, location, and intensity of future land uses. The result is that effective land use planning and mitigation can alleviate the majority of noise problems.

The Noise Element sets various goals and policies that would apply to projects within Paradise. The following policy provisions are applicable to the proposed Project:

**Objective NO-1:** New development of noise-sensitive uses shall not be allowed where the noise level due to non-transportation noise sources will exceed the noise level standards of [Table 4-1 below], as measured immediately within the property line of the new development, unless effective noise mitigation measures have been incorporated into the development design to achieve the standards specified in [Table 4-1].

**Objective NO-2:** Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of [Table 4-1 below] as measured immediately within the property line of lands designated for noise-sensitive uses. This objective does not apply to noise sources associated with agricultural operations on lands zoned for agricultural uses.

| Table 4-1. Noise Level Performance Standards for New Project Affected by or Including Non-Transportation Sources | | |
|---|---|---|
| **Noise Level Descriptor** | **Daytime (7:00 a.m. to 10:00 p.m.)** | **Nighttime (10:00 a.m. to 7:00 p.m.)** |
| Hourly | 50 dBA $L_{eq}$ | 45 dBA $L_{eq}$ |
| Maximum | 70 dBA $L_{eq}$ | 65 dBA $L_{eq}$ |

*Source: Town of Paradise 1994*

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

**Objective NO-3:** New development of noise-sensitive land uses will not be permitted in areas exposed to existing or projected levels of noise from transportation noise sources which exceed the levels specified in [Table 4-2 below].

**Objective NO-4:** Noise created by new transportation noise sources, including roadway improvement projects, shall be mitigated so as not to exceed the levels specified in [Table 4-2 below] at outdoor activity areas or interior spaces of existing noise-sensitive land uses in either the incorporated or unincorporated area.

| Table 4-2. Maximum Allowable Noise Exposure from Transportation Noise Sources | | | |
|---|---|---|---|
| **Land Use** | **Outdoor Activity Areas[1] CNEL** | **Interior Spaces** | |
| | | **CNEL** | **$L_{eq}$[2]** |
| Residential | 60[3] | 45 | -- |
| Transient Lodging | 60[3] | 45 | -- |
| Hospitals, Nursing Homes | 60[3] | 45 | -- |
| Theaters, Auditoriums, Music Halls | -- | -- | 35 |
| Churches, Meeting Halls | 60[3] | -- | 40 |
| Office Buildings | 60[3] | -- | 45 |
| Schools, Libraries, Museums | -- | -- | 45 |
| Playgrounds, Neighborhood Parks | 70 | -- | -- |

*Source: Town of Paradise 1994*

*Notes: [1]Where the location of outdoor activity areas is unknown the exterior noise level standard shall be applied to the property line of the receiving land use.*

*[2]As determined for a typical worst-case hour during periods of use.*

*[3]Where it is not possible to reduce noise in outdoor activity areas to 60 dB CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.*

**Policy NP-2:** The feasibility of proposed projects with respect to existing and future transportation noise levels should be evaluated by comparison to Figure 6.4-1, Land Use Compatibility Guidelines [of the General Plan].

Figure 6.4-1 of the General Plan identifies an ambient noise environment of 60 dBA CNEL or less as "Acceptable" for the location of school uses. An ambient noise environment of 61 – 75 dBA CNEL is identified as "Conditionally Acceptable" for school uses, which means that schools can only be permitted in such noise environments after careful study and inclusion of protective measures.

### *4.3.2 Town of Paradise Municipal Code*

Per Section 9.18.160 (Construction or demolition—Generally), "It is unlawful and in violation of this chapter for any person to operate or cause the operation of any tools equipment used in construction, drilling, repair, alteration, or demolition work between the hours of 7:00 p.m. and 6:00 a.m. on weekdays or at any time on Sundays or holidays, in such a manner that creates noise clearly audible across a residential zoned or a commercial zoned real property boundary."

### *4.3.3 Federal Interagency Committee on Noise (FICON)*

The FICON thresholds of significance assist in the evaluation of increased traffic noise. The 2000 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 and future noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA CNEL and the project creates a readily perceptible 5 dBA CNEL or greater 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 CNEL and the project creates a barely perceptible 3 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA CNEL, and the project creates a community noise level increase of greater than 1.5 dBA CNEL.

The nearest noise-sensitive land use to the Project site includes PHS when in session. There are also existing noise-sensitive residential land uses on Elliot Road to the south of the Project. Objective NO-4 of the Town General Plan Noise Element promulgates an exterior noise standard of 60 dBA CNEL for residential land uses affected by transportation noise and a residential interior noise standard of 45 dBA CNEL. The Town does not promulgate an exterior noise standard for schools affected by transportation noise, but only an interior standard of 45 $L_{eq}$, as determined for a typical worst-case hour during periods of use (see Table 4-2). For the purposes of evaluating the impact of increased traffic noise, the numeric exterior noise level threshold of 60 dBA CNEL coupled with FICON standards is employed for vicinity residential land uses affected by Project traffic noise. The numeric interior noise level threshold of 45 dBA $L_{eq}$ is employed for PHS, which would be affected by Project traffic noise.

# 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 produce the following:

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 purposes of this analysis and where applicable, the Town noise standards were used for evaluation of Project-related noise impacts. Town noise standards are coupled with FICON standards for the purpose of evaluating the impact of increased traffic noise.

## 5.2 Methodology

This analysis of the existing and future noise environments is based on noise prediction modeling and empirical observations. In order to estimate the worst-case construction noise levels that may occur at the nearest noise-sensitive receptors in the Project vicinity, predicted construction noise levels were calculated utilizing the FHWA's Roadway Construction Model (2006). Stationary noise sources are addressed qualitatively based on reference measurements taken by ECORP Consulting, Inc. The Project's contribution of traffic noise has been calculated with the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108) coupled with traffic data provided by Headway Transportation (2020). Groundborne vibration levels associated with construction-related activities were evaluated utilizing typical groundborne vibration levels associated with construction equipment based on the Caltrans guidelines set forth above. Potential groundborne vibration impacts related to structural damage and human annoyance are evaluated, taking into account the distance from construction activities to nearby land uses.

## 5.3 Impact Analysis

### *5.3.1 Project Construction Noise*

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

Construction noise associated with the proposed Project would be temporary and would vary depending on the 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., building construction, paving). Noise generated by construction equipment, including earthmovers, material handlers, 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 receptors in the vicinity of the construction site.

Nearby noise-sensitive land uses consist of PHS when in session. PHS is located across Maxwell Drive from the Project site at a distance of approximately 110 feet at the nearest. As previously described, Section 9.18.160 of the Town Municipal Code prohibits construction between the hours of 7:00 p.m. and 6:00 a.m. on weekdays and at any time on Sundays or holidays. The City does not promulgate a numeric threshold 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. Additionally, construction would occur throughout the 2.3-acre Project site and would not be concentrated at one point.

To estimate the worst-case onsite construction noise levels that may occur at the nearest noise-sensitive receptors in the Project vicinity, the construction equipment noise levels were calculated using the Roadway Noise Construction Model for the various construction phases and compared against the construction-related noise level threshold established in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998 by National Institute for Occupational Safety and Health (NIOSH). A division of the US 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.

The anticipated short-term construction noise levels generated for the necessary equipment were calculated using the Roadway Noise Construction Model for the site preparation, grading, building construction, paving and architectural coating phases. Consistent with FTA recommendations for calculating construction noise, construction noise was measured from the center of the Project site (FTA 2018), which is approximately 200 feet from PHS. The anticipated short-term construction noise levels generated for the necessary equipment is presented in Table 5-1.

**Table 5-1. Construction Average (dBA) Noise Levels at Nearest Receptor**

| Equipment | Estimated Exterior Construction Noise Level @ 200 feet | Construction Noise Standards (dBA Leq) | Exceeds Standard at Nearest Receptor? |
|---|---|---|---|
| **Site Preparation** | | | |
| Scraper | 67.6 | *85* | **No** |
| Grader | 69.0 | *85* | **No** |
| Tractors/Loaders/Backhoe | 68.0 | *85* | **No** |
| **Combined Site Preparation Equipment** | **73.0** | *85* | **No** |
| **Grading** | | | |
| Grader | 69.0 | *85* | **No** |
| Rubber Tired Dozer | 65.6 | *85* | **No** |
| Tractors/Loaders/Backhoes (2) | 68.0 (each) | *85* | **No** |
| **Combined Grading Equipment** | **72.9** | *85* | **No** |
| **Building Construction** | | | |
| Crane | 60.6 | *85* | **No** |
| Forklifts (3) | 67.4 (each) | *85* | **No** |
| Generator Set | 65.6 | *85* | **No** |
| Backhoe | 61.5 | *85* | **No** |
| Welders (3) | 58.0 | *85* | **No** |
| **Combined Building Construction Equipment** | **72.8** | *85* | **No** |
| **Paving** | | | |
| Paver | 64.9 | *85* | **No** |
| Paving Equipment | 70.5 | *85* | **No** |
| Rollers (2) | 61.0 (each) | *85* | **No** |
| Cement and Mortar Mixer | 64.9 | *85* | **No** |
| Loaders | 63.1 | *85* | **No** |
| **Combined Paving Equipment** | **73.1** | *85* | **No** |
| **Painting** | | | |
| Air Compressor | 61.6 | *85* | **No** |
| **Combined Architectural Coating Equipment** | 61.6 | *85* | **No** |

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

*Notes: Construction equipment used during construction derived from CalEEMod 2016.3.2. 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. The distance to the nearest sensitive receptor was calculated from the center of the Project site (approximately 200 feet).*

As shown in Table 5-1, no individual or cumulative pieces of construction equipment would exceed the 85 dBA NIOSH construction noise threshold during any phase of construction at the nearby noise-sensitive receptors.

Project construction would result in minimal additional traffic on adjacent roadways over the time period that construction occurs. According to the CalEEMod model, which is used to predict air pollutant emissions associated with Project construction, including those generated by worker commute trips and vendor trips, the maximum number of construction workers and vendors traveling to and from the Project site on a single day would be 32 (23 worker trips and 9 vendor trips). According to the California Department of Transportation (Caltrans) *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (2013), 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). The Project construction would not result in a doubling of traffic, and therefore its contribution to existing traffic noise would not be perceptible.

### *5.3.2 Project Operational Noise*

#### Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of County 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. The nearest noise-sensitive land use to the Project site includes PHS when in session. As previously described, PHS is located across Maxwell Drive from the Project site.

#### Project Land Use Compatibility

Figure 6.4-1 of the Town General Plan identifies an ambient noise environment of 60 dBA CNEL or less as "Acceptable" for the location of new school uses. An ambient noise environment of 61 – 75 dBA CNEL is identified as "Conditionally Acceptable" for school uses, which means that schools can only be permitted in such noise environments after careful study and inclusion of protective measures. Existing roadway noise levels were calculated for the roadway segments in the Project vicinity, as shown in Table 3-2. The modeled noise levels depicted in Table 3-2 are reported in the noise metric, CNEL, which is the same noise metric promulgated by Town noise compatibility guidelines contained in Figure 6.4-1 of the Town General Plan. As shown in Table 3-2, the noise emanating from the segment of Maxwell Drive traversing the entirety of the western boundary of the Project site was calculated as ranging from 53.0 to 53.5 dBA CNEL under existing conditions. These noise levels fall within the range considered acceptable for the placement of new schools.

Additionally, ECORP conducted a six-hour noise measurement on January 12, 2021 in order to record a representative noise level experienced at the Project site during typical school hours. As shown in Table 3-1, the ambient noise level recorded on the Project site is 64.6 dBA $L_{eq}$. As previously described, the exterior-to-interior reduction of newer buildings is generally 30 dBA or more (HMMH 2006). Thus, the recorded noise level on the Project site of 64.6 dBA $L_{eq}$ would fall below the 45 dBA $L_{eq}$ interior noise level standard (see Table 4-2) for schools with the implementation of standard building techniques [64.6 dBA – 30 dBA = 34.6 dBA].

### *Project Operational Offsite Traffic Noise*

Future traffic noise levels throughout the Project vicinity for the proposed Project were modeled based on the traffic volumes identified by Headway Transportation (2020) to determine the noise levels along Project vicinity roadways. Table 5-2 shows the calculated offsite roadway noise levels under existing traffic levels compared to future buildout of the Project. The calculated noise levels as a result of the Project at affected land uses are compared to the appropriate Town of Paradise numeric noise thresholds coupled with the FICON recommendations for evaluating the impact of increased traffic noise.

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

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

As previously stated, Objective NO-4 of the Town General Plan Noise Element promulgates an exterior noise standard of 60 dBA CNEL for residential land uses affected by transportation noise and a residential interior noise standard of 45 dBA CNEL (see Table 4-2). The Town does not promulgate an exterior noise standard for schools affected by transportation noise, but only an interior standard of 45 $L_{eq}$, as determined for a typical worst-case hour during periods of use (see Table 4-2). For the purposes of evaluating the impact of increased traffic noise, the numeric exterior noise level threshold of 60 dBA CNEL coupled with FICON standards is employed for vicinity residential land uses affected by Project traffic noise. The numeric interior noise level threshold of 45 dBA $L_{eq}$ is employed for PHS, which would be affected by Project traffic noise.

**Table 5-2. Proposed Project Predicted Traffic Noise Levels**

| Roadway Segment | Surrounding Uses | CNEL (or $L_{eq}$) at 100 feet from Centerline of Roadway | | FICON Noise Standard (dBA CNEL) | Town Numeric Noise Standards | | Exceed Standards |
|---|---|---|---|---|---|---|---|
| | | Existing Conditions | Existing + Project Conditions | | Exterior | Interior | |
| **Maxwell Drive** | | | | | | | |
| Between Skyway & Pleasant Lane | Public School | 34.2 dBA $L_{eq}$[1] | 34.6 dBA $L_{eq}$[1] | *>5* | -- | *45 dBA $L_{eq}$* | **No** |
| Between Pleasant Lane & Elliot Road | Public School | 34.8 dBA $L_{eq}$[1] | 35.1 dBA $L_{eq}$[1] | *>5* | -- | *45 dBA $L_{eq}$* | **No** |
| **Skyway** | | | | | | | |
| North of Maxwell Drive | Commercial | 59.2 dBA CNEL | 59.3 dBA CNEL | *>5* | -- | -- | **No** |
| South of Maxwell Drive | Commercial | 59.7 dBA CNEL | 59.8 dBA CNEL | *>5* | -- | -- | **No** |
| **Elliot Road** | | | | | | | |
| West of Maxwell Drive | Residential | 54.7 dBA CNEL | 55.0 dBA CNEL | *>5* | *60 dBA CNEL* | *45 dBA CNEL* | **No** |
| East of Maxwell Drive | Residential | 54.3 dBA CNEL | 54.5 dBA CNEL | *>5* | *60 dBA CNEL* | *45 dBA CNEL* | **No** |

*Source: Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the trip generation rate identified by Headway Transportation (2020). Refer to Attachment B for traffic noise modeling assumptions and results.*

*[1]Noise levels associated with traffic noise affecting Paradise High School are provided in dBA $L_{eq}$, consistent with Town numeric standards, and have been adjusted by reducing the calculated exterior noise level by 20 dBA. This adjustment is consistent with the determination that older structures in California were constructed in the manner which generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002).*

As shown in Table 5-2, the Project would not result in interior noise levels at PHS in excess of the Town of Paradise interior traffic noise standard for existing schools. Additionally, the Project would not generate an increase of noise beyond the FICON significance standards at any vicinity land use and would not result in noise levels exceeding the 60 dBA CNEL exterior noise standard at any residential land use. As previously stated, the manner in which older structures 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). Thus, the Project would not result in noise levels exceeding the 45 dBA CNEL interior noise standard at any residential land use [55.0 dBA CNEL – 20 = 35 dBA CNEL].

### *Operational Stationary Noise*

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. School uses, such as that proposed by the Project, are not typically associated with excessive, ongoing operations-related noise that would lead to substantial permanent increases in ambient noise levels. Instead, research has identified an average noise level at high schools reaching levels of 63.7 dBA $L_{eq}$ within the campus, with peak events of 85 dBA $L_{max}$, generated from activities, e.g., hallway talking, door slamming, student yelling (Zhang and Navejar 2015). The nearest noise-sensitive land use to the

Project site includes PHS when in session. As previously described, PHS is located across Maxwell Drive from the Project site. However, onsite noise-related impacts associated with the proposed Project would be similar to the noise generated at PHS. Since the nearest sensitive receptor to the proposed high school is an existing high school, operation of the Project is not expected to result in any substantial changes in the ambient noise environment experienced in the area, including the PHS campus. The nearest residential lots in the Project vicinity are located approximately 140 feet from the proposed classroom building. As previously stated, sound levels attenuate at a rate of approximately six dB for each doubling of distance from a stationary or point source. Therefore, the nearest residential properties could experience exterior noise levels up to 41.2 dBA $L_{eq}$, with peak events reaching 62.5 $L_{max}$. These noise levels fall below the Town daytime standards of 50 dBA $L_{eq}$ and 70 dBA $L_{max}$ (see Table 4-1).

## Would the Project Result in the Generation of Excessive Groundborne Vibration or Groundborne Noise Levels?

### *Construction-Generated Vibration*

Excessive groundborne vibration impacts result from continuously occurring vibration levels. Increases in groundborne vibration levels attributable to the proposed Project would be primarily associated with short-term construction-related activities. Construction on the Project site 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. It is not anticipated that pile drivers would be necessary during Project construction. 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 5-3.

**Table 5-3. Representative Vibration Source Levels for Construction Equipment**

| Equipment Type | PPV at 25 Feet (inches per second) |
|---|---|
| Large Bulldozer | 0.089 |
| Pile Driver | 0.170 |
| Caisson Drilling | 0.089 |
| Loaded Trucks | 0.076 |
| Rock Breaker | 0.089 |
| Jackhammer | 0.035 |
| Small Bulldozer/Tractor | 0.003 |

*Source: FTA 2018; Caltrans 2020*

The Town of Paradise does not regulate vibrations associated with construction. However, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, the Caltrans (2020) recommended standard of 0.2 inch 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. Consistent with FTA recommendations for calculating construction vibration, construction vibration was measured from the center of the Project site (FTA 2018). The nearest structures of concern to the construction site is a building located on the PHS campus located across Maxwell Drive from the Project site.

Based on the representative vibration levels presented for various construction equipment types in Table 5-3 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:

$$PPVequip = PPVref \times (25/D)^{1.5}$$

Table 5-4 presents the expected Project related vibration levels at a distance of 250 feet.

**Table 5-4. Project Construction Vibration Levels at 250 Feet**

| Receiver PPV Levels (in/sec)[1] | | | | | | | Peak Vibration | RMS Velocity Levels[2] | Threshold | Exceed Threshold |
|---|---|---|---|---|---|---|---|---|---|---|
| Large Bulldozer | Pile Driver | Drilling | Loaded Trucks | Rock Breaker | Jack-hammer | Small Bulldozer | | | | |
| 0.002 | 0.005 | 0.002 | 0.002 | 0.002 | 0.001 | 0.000 | 0.005 | **0.0035** | *0.01* | **No** |

*[1]Based on the Vibration Source Levels of Construction Equipment included on Table 5-3 (FTA 2018).*
*[2]Vibration levels in PPV are converted to RMS velocity using a 0.70 conversion factor identified by Caltrans (2020),*

As shown, groundborne vibrations attenuate rapidly from the source due to geometric spreading and material damping. Geometric spreading occurs because the energy is radiated from the source and spreads over an increasingly large distance while material damping is a property of the friction loss which occurs during the passage of a vibration wave. As shown in Table 5-4, the nearest structures at 250 feet from the construction site would not experience groundborne levels in exceedance of standards.

### *Operational Groundborne Vibration*

Project operations would not include the use of any stationary equipment that would result in excessive groundborne vibration levels.

## Would the Project Expose People Residing or Working in the Project Area to Excessive Airport Noise?

The Project site is located outside of any airport land use plan and is beyond two miles from any airport. The Paradise Airport is the closest airport to the Project site and is located approximately 3.2 miles away. Thus, implementation of the proposed Project would not affect airport operations nor result in increased exposure of people working at or visiting the Project site to aircraft noise.

## Would the Project Result in Cumulatively Considerable Noise Impacts?

### *Cumulative Construction Noise*

Construction activities associated with the proposed Project and other construction projects in the area may overlap, resulting in construction noise in the area. However, construction noise impacts primarily affect the areas immediately adjacent to the construction site. Construction noise for the proposed Project was determined to be less than significant following compliance with the NIOSH construction noise threshold. Cumulative development in the vicinity of the Project site could result in elevated construction noise levels at sensitive receptors in the Project area. However, each project would be required to comply with the applicable noise limitations on construction. Therefore, the Project would not contribute to cumulative impacts during construction.

### *Cumulative Onsite Operational Noise*

Cumulative long-term noise sources associated with development at the Project, combined with other cumulative projects, could cause local noise level increases. Noise levels associated with the proposed Project and related cumulative projects together could result in higher noise levels than considered separately. Considering the proposed high school is located across from an existing high school, operations would not result in any substantial changes in the noise environment due to onsite sources. Noise increase as a result of the Project would not exceed Town standards. Therefore, the Project would not contribute to cumulative impacts during operations

### *Cumulative Traffic Noise*

Cumulative traffic noise levels throughout the Project vicinity (i.e., vicinity roadway segments that traverse noise-sensitive land uses) were modeled based on the traffic volumes identified by Headway Transportation (2020) to determine the noise levels along Project vicinity roadways. Table 5-5 shows the calculated offsite roadway noise levels under cumulative conditions without the Project (Cumulative No Project) compared to cumulative conditions plus future buildout of the Project (Cumulative Plus Project). The calculated noise levels as a result of the Project at affected land uses are compared to the appropriate Town of Paradise numeric noise thresholds coupled with the FICON recommendations for evaluating the impact of increased traffic noise. FICON's measure of substantial increase for transportation noise exposure is as follows:

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

**Table 5-5. Cumulative Traffic Noise Scenario**

| Roadway Segment | Surrounding Uses | CNEL (or $L_{eq}$) at 100 feet from Centerline of Roadway | | FICON Noise Standard (dBA CNEL) | Town Numeric Noise Standards | | Exceed Standards |
|---|---|---|---|---|---|---|---|
| | | Cumulative No Project | Cumulative + Project | | Exterior | Interior | |
| **Maxwell Drive** | | | | | | | |
| Between Skyway & Pleasant Lane | Public School | 36.9 dBA $L_{eq}$[1] | 37.1 dBA $L_{eq}$[1] | *>5* | -- | *45 dBA $L_{eq}$* | **No** |
| Between Pleasant Lane & Elliot Road | Public School | 37.4 dBA $L_{eq}$[1] | 37.6 dBA $L_{eq}$[1] | *>5* | -- | *45 dBA $L_{eq}$* | **No** |
| **Skyway** | | | | | | | |
| North of Maxwell Drive | Commercial | 61.7 dBA CNEL | 61.7 dBA CNEL | *>3* | -- | -- | **No** |
| South of Maxwell Drive | Commercial | 62.2 dBA CNEL | 62.2 dBA CNEL | *>3* | -- | -- | **No** |
| **Elliot Road** | | | | | | | |
| West of Maxwell Drive | Residential | 58.4 dBA CNEL | 58.5 dBA CNEL | *>5* | *60 dBA CNEL* | *45 dBA CNEL* | **No** |
| East of Maxwell Drive | Residential | 58.0 dBA CNEL | 58.1 dBA CNEL | *>5* | *60 dBA CNEL* | *45 dBA CNEL* | **No** |

*Source: Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the trip generation rate identified by Headway Transportation (2020). Refer to Attachment B for traffic noise modeling assumptions and results.*

*[1]Noise levels associated with traffic noise affecting Paradise High School are provided in dBA $L_{eq}$, consistent with Town numeric standards, and have been adjusted by reducing the calculated exterior noise level by 20 dBA. This adjustment is consistent with the determination that older structures in California were constructed in the manner which generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002).*

As shown in Table 5-5, the Project would not result in interior noise levels at PHS in excess of the Town of Paradise interior traffic noise standard for existing schools under cumulative conditions. Additionally, the Project would not generate an increase of noise beyond the FICON significance standards at any vicinity land use and would not result in noise levels exceeding the 60 dBA CNEL exterior noise standard at any residential land use under cumulative conditions. As previously stated, the manner in which older structures 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). Thus, the Project would not result in noise levels exceeding the 45 dBA CNEL interior noise standard at any residential land use under cumulative conditions [58.5 dBA CNEL – 20 = 38.5 dBA CNEL].

## 6.0 REFERENCES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## LIST OF ATTACHMENTS

# ATTACHMENT A

Baseline (Existing) Noise Measurements – Project Site

| | | | |
|---|---|---|---|
| **Site Number:** Ridgeview High School Site | | | |
| **Recorded By:** Collin Crawford-Martin | | | |
| **Job Number:** 202-122 | | | |
| **Date:** 1/12/2021 | | | |
| **Time:** 09:25 | | | |
| **Location:** Across from Paradise High School adjacent to Maxwell Dr. | | | |
| **Source of Peak Noise:** Vehicles on Maxwell Dr, construction, school activity, tree trimming activity | | | |
| **Noise Data** | | | |
| **Leq (dB)** | **Lmin (dB)** | **Lmax (dB)** | **Peak (dB)** |
| 64.6 | 43.7 | 96.7 | 119.9 |

| Equipment | | | | | | |
|---|---|---|---|---|---|---|
| **Category** | **Type** | **Vendor** | **Model** | **Serial No.** | **Cert. Date** | **Note** |
| Sound | Sound Level Meter | **Larson Davis** | **LxT SE** | **0005120** | **8/05/2019** | |
| | Microphone | **Larson Davis** | **377B02** | **315201** | **9/23/2019** | |
| | Preamp | **Larson Davis** | **PRMLxT1L** | **099947** | **10/10/2019** | |
| | Calibrator | **Larson Davis** | **CAL200** | **17325** | **10/18/2019** | |

| Weather Data | | | |
|---|---|---|---|
| **Est.** | **Duration:** 6 hrs | | **Sky:** overcast |
| | **Note:** dBA Offset = 0.13 | | **Sensor Height (ft): 3.5ft** |
| | **Wind Ave Speed (mph)** | **Temperature (degrees Fahrenheit)** | **Barometer Pressure (hPa)** |
| | 1-5 mph | 58 | |

# Measurement Report

## Report Summary

| | | | |
|---|---|---|---|
| Meter's File Name | LxT_Data.029 | Computer's File Name | SLM_0006133_LxT_Data_029.02.ldbin |
| Meter | LxT1 | | |
| Firmware | 2.402 | | |
| User | | Location | |
| Description | | | |
| Note | | | |

| | | | | | |
|---|---|---|---|---|---|
| Start Time | 2021-1-12 9:25:38 | Duration | 6:00:00.0 | | |
| End Time | 2021-1-12 02:25:38 | Run Time | 6:00:00.0 | Pause Time | 0:00:00.0 |

## Results

### Overall Metrics

| | | | |
|---|---|---|---|
| $LA_{eq}$ | 64.6 dB | | |
| LAE | 107.9 dB | SEA | --- dB |
| EA | 6.9 mPa²h | | |
| EA8 | 9.2 mPa²h | | |
| EA40 | 45.8 mPa²h | | |
| $LZS_{peak}$ | 119.9 dB | 2021-1-12 | 00:22:13 |
| $LAS_{max}$ | 96.7 dB | 2021-1-12 | 00:22:13 |
| $LAS_{min}$ | 43.7 dB | 2021-1-12 | 10:52:36 |
| $LA_{eq}$ | 64.6 dB | | |
| $LC_{eq}$ | 73.0 dB | $LC_{eq}$ - $LA_{eq}$ | 8.4 dB |
| $LAI_{eq}$ | 68.7 dB | $LAI_{eq}$ - $LA_{eq}$ | 4.1 dB |

### Exceedances

| Exceedances | Count | Duration |
|---|---|---|
| LAS > 85.0 dB | 9 | 0:00:23.0 |
| LAS > 115.0 dB | 0 | 0:00:00.0 |
| LZSpeak > 135.0 dB | 0 | 0:00:00.0 |
| LZSpeak > 137.0 dB | 0 | 0:00:00.0 |
| LZSpeak > 140.0 dB | 0 | 0:00:00.0 |

### Community Noise

| LDN | LDay | LNight | |
|---|---|---|---|
| 71.2 dB | 63.4 dB | 0.0 dB | |
| **LDEN** | **LDay** | **LEve** | **LNight** |
| --- dB | --- dB | 63.4 dB | 64.9 dB |

### Any Data

| | A | | C | | Z | |
|---|---|---|---|---|---|---|
| | Level | Time Stamp | Level | Time Stamp | Level | Time Stamp |
| $L_{eq}$ | 64.6 dB | | --- dB | | --- dB | |
| $Ls_{(max)}$ | 96.7 dB | 2021-1-12 00:22:13 | --- dB | | --- dB | |
| $LS_{(min)}$ | 43.7 dB | 2021-1-12 11:52:36 | --- dB | | --- dB | |
| $L_{Peak(max)}$ | --- dB | | --- dB | | 119.9 dB | 22021-1-12 00:22:13 |

### Overloads

| Count | Duration |
|---|---|
| 0 | 0:00:00.0 |

### Statistics

| | |
|---|---|
| LAS 5.0 | 68.9 dB |
| LAS 10.0 | 65.4 dB |
| LAS 33.3 | 58.1 dB |
| LAS 50.0 | 55.8 dB |
| LAS 66.6 | 54.1 dB |
| LAS 90.0 | 51.4 dB |

# ATTACHMENT B

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

## TRAFFIC NOISE LEVELS

**Project Number:** Ridgeview High School
**Project Name:** 2020-122

### Background Information

| | |
|---|---|
| Model Description: | FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels. |
| Analysis Scenario(s): | Existing Conditions |
| Source of Traffic Volumes: | Headway Transportation |
| Community Noise Descriptor: | $L_{dn}$: ____ CNEL: X |

| 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

**Existing Conditions**

| Analysis Condition / Roadway Segment | Land Use | Lanes | Median Width | Peak Hour Volume | ADT Volume | Design Speed (mph) | Dist. from Center to Receptor[1] | Alpha Factor | Barrier Attn. dB(A) | Vehicle Mix Medium Trucks | Vehicle Mix Heavy Trucks | Peak Hour dB(A) $L_{eq}$ | 24-Hour dB(A) CNEL | Traffic Volumes 24-Hour Day | Eve | Night | Peak Hour MTp | HTp | 24-Hour MTd | HTd | MTe | HTe | MTn | HTn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maxwell Drive** | | | | | | | | | | | | | | | | | | | | | | | | |
| Skyway to Pleasant Lane | Public School | 2 | 0 | 426 | 3,834 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 54.2 | 53.0 | 2,979 | 487 | 368 | 7 | 3 | 60 | 24 | 3 | 1 | 5 | 2 |
| Pleasant Lane to Elliot Road | Public School | 2 | 0 | 479 | 4,311 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 54.8 | 53.5 | 3,350 | 547 | 414 | 8 | 3 | 68 | 27 | 4 | 1 | 6 | 2 |
| **Skyway** | | | | | | | | | | | | | | | | | | | | | | | | |
| North of Maxwell Drive | Commercial | 2 | 0 | 883 | 7,947 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 60.4 | 59.2 | 6,175 | 1,009 | 763 | 14 | 6 | 125 | 50 | 7 | 2 | 11 | 4 |
| South of Maxwell Drive | Commercial | 2 | 0 | 986 | 8,874 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 60.9 | 59.7 | 6,895 | 1,127 | 852 | 16 | 6 | 140 | 55 | 8 | 2 | 12 | 5 |
| **Elliot Road** | | | | | | | | | | | | | | | | | | | | | | | | |
| West of Maxwell Drive | Residential | 2 | 0 | 424 | 3,816 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 56.0 | 54.7 | 2,965 | 485 | 366 | 7 | 3 | 60 | 24 | 3 | 1 | 5 | 2 |
| East of Maxwell Drive | Residential | 2 | 0 | 383 | 3,447 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 55.5 | 54.3 | 2,678 | 438 | 331 | 6 | 2 | 54 | 21 | 3 | 1 | 5 | 2 |

[1] Distance is from the centerline of the roadway segment to the receptor location.

## TRAFFIC NOISE LEVELS

**Project Number:** Ridgeview High School
**Project Name:** 2020-122

### 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 Conditions
Source of Traffic Volumes: Headway Transportation
Community Noise Descriptor: $L_{dn}$: ____ CNEL: X

| 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

**Existing + Project Conditions**

| Analysis Condition / Roadway Segment | Land Use | Lanes | Median Width | Peak Hour Volume | ADT Volume | Design Speed (mph) | Dist. from Center to Receptor[1] | Alpha Factor | Barrier Attn. dB(A) | Vehicle Mix Medium Trucks | Vehicle Mix Heavy Trucks | Peak Hour dB(A) $L_{eq}$ | 24-Hour dB(A) CNEL | Traffic Volumes 24-Hour Day | Eve | Night | Peak Hour MTp | HTp | 24-Hour MTd | HTd | MTe | HTe | MTn | HTn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maxwell Drive** | | | | | | | | | | | | | | | | | | | | | | | | |
| Skyway to Pleasant Lane | Public School | 2 | 0 | 460 | 4,140 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 54.6 | 53.3 | 3,217 | 526 | 397 | 7 | 3 | 65 | 26 | 4 | 1 | 6 | 2 |
| Pleasant Lane to Elliot Road | Public School | 2 | 0 | 518 | 4,662 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 55.1 | 53.9 | 3,622 | 592 | 448 | 8 | 3 | 73 | 29 | 4 | 1 | 6 | 3 |
| **Skyway** | | | | | | | | | | | | | | | | | | | | | | | | |
| North of Maxwell Drive | Commercial | 2 | 0 | 895 | 8,055 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 60.5 | 59.3 | 6,259 | 1,023 | 773 | 14 | 6 | 127 | 50 | 7 | 2 | 11 | 5 |
| South of Maxwell Drive | Commercial | 2 | 0 | 1,006 | 9,054 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 61.0 | 59.8 | 7,035 | 1,150 | 869 | 16 | 6 | 142 | 56 | 8 | 2 | 12 | 5 |
| **Elliot Road** | | | | | | | | | | | | | | | | | | | | | | | | |
| West of Maxwell Drive | Residential | 2 | 0 | 448 | 4,032 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 56.2 | 55.0 | 3,133 | 512 | 387 | 7 | 3 | 63 | 25 | 4 | 1 | 5 | 2 |
| East of Maxwell Drive | Residential | 2 | 0 | 402 | 3,618 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 55.7 | 54.5 | 2,811 | 459 | 347 | 6 | 3 | 57 | 23 | 3 | 1 | 5 | 2 |

[1] Distance is from the centerline of the roadway segment to the receptor location.

## TRAFFIC NOISE LEVELS

**Project Number:** Ridgeview High School
**Project Name:** 2020-122

### Background Information

| | |
|---|---|
| Model Description: | FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels. |
| Analysis Scenario(s): | Cumulative No Project |
| Source of Traffic Volumes: | Headway Transportation |
| Community Noise Descriptor: | $L_{dn}$: ____ CNEL: X |

| 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

**Cumulative No Project**

| 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 Hour dB(A) $L_{eq}$ | 24-Hour dB(A) CNEL | Traffic Volumes 24-Hour Day | Eve | Night | Peak Hour MTp | HTp | 24-Hour MTd | HTd | MTe | HTe | MTn | HTn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maxwell Drive** | | | | | | | | | | | | | | | | | | | | | | | | |
| Skyway to Pleasant Lane | Public School | 2 | 0 | 794 | 7,146 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 56.9 | 55.7 | 5,552 | 908 | 686 | 12 | 5 | 112 | 45 | 6 | 1 | 10 | 4 |
| Pleasant Lane to Elliot Road | Public School | 2 | 0 | 878 | 7,902 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 57.4 | 56.1 | 6,140 | 1,004 | 759 | 14 | 5 | 124 | 49 | 7 | 2 | 11 | 4 |
| **Skyway** | | | | | | | | | | | | | | | | | | | | | | | | |
| North of Maxwell Drive | Commercial | 2 | 0 | 1,565 | 14,085 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 62.9 | 61.7 | 10,944 | 1,789 | 1,352 | 25 | 10 | 222 | 88 | 13 | 3 | 19 | 8 |
| South of Maxwell Drive | Commercial | 2 | 0 | 1,744 | 15,696 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 63.4 | 62.2 | 12,196 | 1,993 | 1,507 | 27 | 11 | 247 | 98 | 14 | 3 | 21 | 9 |
| **Elliot Road** | | | | | | | | | | | | | | | | | | | | | | | | |
| West of Maxwell Drive | Residential | 2 | 0 | 986 | 8,874 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 59.6 | 58.4 | 6,895 | 1,127 | 852 | 16 | 6 | 140 | 55 | 8 | 2 | 12 | 5 |
| East of Maxwell Drive | Residential | 2 | 0 | 895 | 8,055 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 59.2 | 58.0 | 6,259 | 1,023 | 773 | 14 | 6 | 127 | 50 | 7 | 2 | 11 | 5 |

## TRAFFIC NOISE LEVELS

**Project Number:** Ridgeview High School
**Project Name:** 2020-122

### Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s): Cumulative Plus Project
Source of Traffic Volumes: Headway Transportation
Community Noise Descriptor: $L_{dn}$: ____ CNEL: X

| 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

**Cumulative Plus Project**

| Analysis Condition / Roadway Segment | Land Use | Lanes | Median Width | Peak Hour Volume | ADT Volume | Design Speed (mph) | Dist. from Center to Receptor[1] | Alpha Factor | Barrier Attn. dB(A) | Vehicle Mix Medium Trucks | Vehicle Mix Heavy Trucks | Peak Hour dB(A) $L_{eq}$ | 24-Hour dB(A) CNEL | Traffic Volumes 24-Hour Day | Eve | Night | Peak Hour MTp | HTp | 24-Hour MTd | HTd | MTe | HTe | MTn | HTn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maxwell Drive** | | | | | | | | | | | | | | | | | | | | | | | | |
| Skyway to Pleasant Lane | Public School | 2 | 0 | 828 | 7,452 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 57.1 | 55.9 | 5,790 | 946 | 715 | 13 | 5 | 117 | 46 | 7 | 1 | 10 | 4 |
| Pleasant Lane to Elliot Road | Public School | 2 | 0 | 917 | 8,253 | 25 | 100 | 0.5 | 0 | 1.8% | 0.7% | 57.6 | 56.3 | 6,413 | 1,048 | 792 | 14 | 6 | 130 | 51 | 8 | 2 | 11 | 5 |
| **Skyway** | | | | | | | | | | | | | | | | | | | | | | | | |
| North of Maxwell Drive | Commercial | 2 | 0 | 1,577 | 14,193 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 62.9 | 61.7 | 11,028 | 1,803 | 1,363 | 25 | 10 | 223 | 89 | 13 | 3 | 19 | 8 |
| South of Maxwell Drive | Commercial | 2 | 0 | 1,764 | 15,876 | 35 | 100 | 0.5 | 0 | 1.8% | 0.7% | 63.4 | 62.2 | 12,336 | 2,016 | 1,524 | 28 | 11 | 250 | 99 | 14 | 3 | 21 | 9 |
| **Elliot Road** | | | | | | | | | | | | | | | | | | | | | | | | |
| West of Maxwell Drive | Residential | 2 | 0 | 1,010 | 9,090 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 59.7 | 58.5 | 7,063 | 1,154 | 873 | 16 | 6 | 143 | 57 | 8 | 2 | 12 | 5 |
| East of Maxwell Drive | Residential | 2 | 0 | 914 | 8,226 | 30 | 100 | 0.5 | 0 | 1.8% | 0.7% | 59.3 | 58.1 | 6,392 | 1,045 | 790 | 14 | 6 | 129 | 51 | 7 | 2 | 11 | 5 |

[1] Distance is from the centerline of the roadway segment to the receptor location.

# ATTACHMENT C

Roadway Construction Noise Model Outputs – Project Construction Noise

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

**Report date:** 1/6/2021
**Case Description:** Ridgview High School - Site Preparation

| **Sensitive Receptor** | **Land Use** |
|---|---|
| Paradise High School | School |

| **Description** | **Impact Device** | **Usage(%)** | **Equipment Spec Lmax (dBA)** | **Actual Lmax (dBA)** | **Receptor Distance (feet)** | **Estimated Shielding (dBA)** |
|---|---|---|---|---|---|---|
| Scraper | No | 40 | | 83.6 | 200 | 0 |
| Tractor | No | 40 | 84 | | 200 | 0 |
| Grader | No | 40 | 85 | | 200 | 0 |

**Results**

| **Equipment** | Calculated (dBA) ***Lmax** | **Leq** |
|---|---|---|
| Scraper | 71.5 | 67.6 |
| Tractor | 72 | 68 |
| Grader | 73 | 69 |
| **Total** | 73 | **73** |

*Calculated Lmax is the Loudest value.

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

**Report date:** 1/6/2021
**Case Description:** Ridgeview High School - Grading

| **Sensitive Receptor** | **Land Use** |
|---|---|
| Paradise High School | School |

| **Description** | **Impact Device** | **Usage(%)** | **Equipment Spec Lmax (dBA)** | **Actual Lmax (dBA)** | **Receptor Distance (feet)** | **Estimated Shielding (dBA)** |
|---|---|---|---|---|---|---|
| Dozer | No | 40 | | 81.7 | 200 | 0 |
| Tractor | No | 40 | 84 | | 200 | 0 |
| Grader | No | 40 | 85 | | 200 | 0 |
| Backhoe | No | 40 | | 77.6 | 200 | 0 |

**Results**

Calculated (dBA)

| **Equipment** | ***Lmax** | **Leq** |
|---|---|---|
| Dozer | 69.6 | 65.6 |
| Tractor | 72 | 68 |
| Grader | 73 | 69 |
| Backhoe | 65.5 | 61.5 |
| **Total** | 73 | **72.9** |

*Calculated Lmax is the Loudest value.

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

**Report date:** 1/6/2021
**Case Description:** Ridgeview High School - Building Construction

| **Sensitive Receptor** | **Land Use** |
|---|---|
| Paradise High School | School |

| **Description** | **Impact Device** | **Usage(%)** | **Equipment Spec Lmax (dBA)** | **Actual Lmax (dBA)** | **Receptor Distance (feet)** | **Estimated Shielding (dBA)** |
|---|---|---|---|---|---|---|
| Generator | No | 50 | | 80.6 | 200 | 0 |
| Crane | No | 16 | | 80.6 | 200 | 0 |
| Gradall | No | 40 | | 83.4 | 200 | 0 |
| Gradall | No | 40 | | 83.4 | 200 | 0 |
| Backhoe | No | 40 | | 77.6 | 200 | 0 |
| Welder / Torch | No | 40 | | 74 | 200 | 0 |
| Welder / Torch | No | 40 | | 74 | 200 | 0 |
| Welder / Torch | No | 40 | | 74 | 200 | 0 |

**Results**

Calculated (dBA)

| **Equipment** | | ***Lmax** | **Leq** |
|---|---|---|---|
| Generator | | 68.6 | 65.6 |
| Crane | | 68.5 | 60.6 |
| Gradall | | 71.4 | 67.4 |
| Gradall | | 71.4 | 67.4 |
| Backhoe | | 65.5 | 61.5 |
| Welder / Torch | | 62 | 58 |
| Welder / Torch | | 62 | 58 |
| Welder / Torch | | 62 | 58 |
| | **Total** | 71.4 | **72.8** |

*Calculated Lmax is the Loudest value.

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

**Report date:** 1/6/2021
**Case Description:** Ridgeview High School - Paving

| **Sensitive Receptor** | **Land Use** |
|---|---|
| Paradise High School | School |

| **Description** | **Impact Device** | **Usage(%)** | **Equipment Spec Lmax (dBA)** | **Actual Lmax (dBA)** | **Receptor Distance (feet)** | **Estimated Shielding (dBA)** |
|---|---|---|---|---|---|---|
| Drum Mixer | No | 50 | | 80 | 200 | 0 |
| Paver | No | 50 | | 77.2 | 200 | 0 |
| Roller | No | 20 | | 80 | 200 | 0 |
| Roller | No | 20 | | 80 | 200 | 0 |
| Front End Loader | No | 40 | | 79.1 | 200 | 0 |
| Pavement Scarafier | No | 20 | | 89.5 | 200 | 0 |

Results

Calculated (dBA)

| **Equipment** | ***Lmax** | **Leq** |
|---|---|---|
| Drum Mixer | 68 | 64.9 |
| Paver | 65.2 | 62.2 |
| Roller | 68 | 61 |
| Roller | 68 | 61 |
| Front End Loader | 67.1 | 63.1 |
| Pavement Scarafier | 77.5 | 70.5 |
| **Total** | 77.5 | **73.1** |

*Calculated Lmax is the Loudest value.

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

**Report date:** 1/6/2021
**Case Description:** Ridgeview High School - Painting

| **Sensitive Receptor** | **Land Use** |
|---|---|
| Paradise High School | School |

| **Description** | **Impact Device** | **Usage(%)** | **Equipment Spec Lmax (dBA)** | **Actual Lmax (dBA)** | **Receptor Distance (feet)** | **Estimated Shielding (dBA)** |
|---|---|---|---|---|---|---|
| Compressor (air) | No | 40 | | 77.7 | 200 | 0 |

Results

Calculated (dBA)

| **Equipment** | | ***Lmax** | **Leq** |
|---|---|---|---|
| Compressor (air) | | 65.6 | 61.6 |
| | **Total** | 65.6 | **61.6** |

*Calculated Lmax is the Loudest value.