3.3 Noise

3.3.1 Introduction

This section identifies and evaluates potential noise impacts related to the Project. Data for this section were developed based on field investigations performed on April 15, 2015 and April 18, 2015 that measured existing noise levels during school activities (Appendix E); two sound level assessments prepared for the Project; a review of current noise standards and noise assessment methodologies including the Santa Barbara County Comprehensive Plan Noise Element and the Santa Barbara County Environmental Thresholds and Guidelines Manual (2015); and an analysis of construction-related noise based on methodology and estimates developed by the U.S. Environmental Protection Agency (USEPA) and Federal Highway Administration.

3.3.1.1 Fundamentals of Noise

Noise may be defined as unwanted sound. It is usually objectionable because it is disturbing or annoying. The objectionable nature of noise can be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the amplitude of sound waves combined with the reception characteristics of the ear. Commonly used technical acoustical terms are defined in Table 3.3-1.

Decibels and Frequency

In addition to the concepts of pitch and loudness, several noise measurement scales are used to describe noise. The decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. Zero on the decibel scale is based on the lowest sound pressure that a healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 dB represents a tenfold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its level. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness over a wide range of amplitudes. Because decibels are logarithmic units, sound pressure levels are not added arithmetically. When two sounds of equal sound pressure level are added, the result is a sound pressure level that is 3 dB higher. For example, if the sound level is 80 dB when one generator is operating, then it would be 83 dB when two generators are operating at the same distance from the observer. Doubling the amount of energy would result in a 3 dB increase to the sound level. Noise levels do not change much when a quieter noise source is added to relatively louder ambient noise levels. For example, if a 60 dB noise source is added to 70 dB ambient noise levels, the resulting noise level is equal to 70.4 dB at the location of the new noise source.

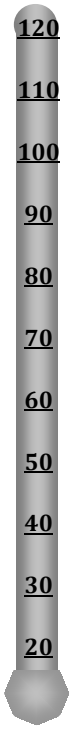
Frequency relates to the number of pressure oscillations per second, or Hertz (Hz). The range of sound frequencies that can be heard by healthy human ears is from about 20 Hz at the low-frequency end to 20,000 Hz (20 kilohertz [kHz]) at the high-frequency end.

Table 3.3-1. Definitions of Acoustical Terms

Term	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 micropascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 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 in air). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 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 A-weighted sound equivalent level during the measurement period. The measurement period of 10-minutes was used for this report and is denoted as $L_{eq}[10]$.
Community Noise Equivalent Level (CNEL)	The average A-weighted noise level during a 24-hour day obtained after the addition of 5 dB to sound levels in the evening from 7 p.m. to 10 p.m. and after the addition of 10 dB to sound levels in the night between 10 p.m. and 7 a.m.
Day/Night Noise Level (L_{dn})	The average A-weighted noise level during a 24-hour day obtained after the addition of 10 dB to levels measured in the night between 10 p.m. and 7 a.m.
Minimum noise level (L_{min})	The minimum noise level measured during the measurement period.
Maximum sound level (L_{max})	The maximum noise level measured during the measurement period.
L_1, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1 percent, 10 percent, 50 percent, and 90 percent of the time during the measurement period.
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	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.

There are several methods for characterizing sound. The most common is the *dBA*. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Studies have shown that the dBA is closely correlated with annoyance to traffic noise. Other frequency weighting networks, such as *C-weighting,* or *dBC*, have been devised to describe noise levels for specific types of noise (e.g., explosives). Table 3.3-2 shows typical A-weighted noise levels that occur in human environments.

Table 3.3-2. Typical Noise Levels in the Environment

Noise Level dBA	Extremes	Home Appliances	Speech at 3 Feet	Motor Vehicles at 50 Feet	General Type of Community Environment
	Jet aircraft at 500 feet				
		Chain saw			
		Power lawnmower		Diesel truck (not muffled)	
		Shop tools	Shout	Diesel truck (muffled)	
		Blender	Loud voice	Automobile at 70 mph	Major metropolis
		Dishwasher	Normal voice	Automobile at 40 mph	Urban (daytime)
		Air-conditioner	Normal voice (back to listener)	Automobile at 20 mph	Suburban (daytime)
		Refrigerator			Rural (daytime)
	Threshold of hearing				

Source: Miller & Hanson, Inc. 2003.

3.3.1.2 Noise Descriptors

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 is 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. This energy-equivalent sound/noise descriptor is called L_{eq}. A common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration. The ambient noise measurements reported in Section 3.3.4, *Methodology* below are averaged over 10 minutes (L_{eq} 10-min). The scientific instrument used to measure noise is the sound level meter, which can accurately measure environmental noise levels to within approximately plus or minus 1 dBA. Two metrics are commonly used to describe the 24-hour A-weighted average sound level, L_{dn} and CNEL. Both include penalties for noise during the nighttime hours (10 p.m. to 7 a.m.). CNEL also penalizes noise during the evening hours (7:00 p.m. to 10:00 p.m.). CNEL and L_{dn}, which are normally within 1 dBA of each other, are used interchangeably in this section.

3.3.1.3 Human Response to Noise

Noise-sensitive receptors are generally defined as locations where people reside or where the presence of unwanted sound may adversely affect the use of the land. Noise-sensitive receptors typically include residences, hospitals, schools, guest lodging, libraries, and certain types of passive recreational uses. Studies have shown that under controlled conditions in an acoustics laboratory, a healthy human ear is able to discern changes in sound levels of 1 dBA. In the normal environment, changes in noise level of 3 dBA are considered just noticeable to most people. A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as being twice as loud.

Noise and Health

A number of studies have linked increases in noise with health effects, including hearing impairment, sleep disturbance, cardiovascular effects, psychophysiological effects, and potential impacts on fetal development (Babisch 2005). Potential health effects appear to be caused by both short- and long-term exposure to very loud noises and long-term exposure to lower levels of sound. Acute sounds (i.e., L_{AF}[1] greater than 120 dB) can cause mechanical damage to hair cells of the cochlea (the auditory portion of the inner ear) and hearing impairment (Babisch 2005). An L_{AF} greater than 120 dB is equivalent to a rock concert or an airplane flying overhead at 984 feet.

The World Health Organization and the USEPA consider an L_{eq} equal to 70 dBA to be a safe daily average noise level for the ear. However, even this "ear-safe" level can cause disturbance to sleep and concentration and may be linked to chronic health impacts such as hypertension and heart disease (Babisch 2006).

A number of studies have looked at the potential health effects of chronic lower noise levels, such as traffic, especially as these noise levels affect children. In a study of school children in Germany, blood pressure was significantly higher in a group of students exposed to road traffic noise from high-traffic transit routes (Babisch 2006). A study by Kwanda (2004) showed that exposure to airplane noise was found to be associated with decreased fetal body weight in pregnant women.

Noise Annoyance

People's 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 stress and annoyance. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases. Annoyance may occur at noise levels well below levels known to cause direct physiological harm.

Unwanted noise interferes with human activities by distracting attention and by making activities more difficult to perform, especially when concentration is needed. Interference from noise can even make some activities (such as communication or sleep) virtually impossible. However, except in the case of interference with verbal communication, the degree of interference is difficult to quantify or to relate to the level of noise exposure (USEPA 1979).

The degree of interference and annoyance depends on noise volume, duration and frequency of occurrence, time of year, time of day or night, accustomed ambient noise levels, previous experiences of intrusive noise, attitude toward the noise source, and noise characteristics (USEPA 1979). Noises

[1] L_{AF} = sound level with "A" frequency weighting and fast-time weighting.

that can be particularly annoying include: pure tones (e.g., truck back-up beepers), low-frequency noise (e.g., rumbling of heavy equipment), and impulsive noise (e.g., helicopters, pile drivers).

3.3.1.4 Sound Propagation

When sound propagates over a distance, it changes in both level and frequency content. The manner in which noise is reduced with distance depends on the factors discussed below.

Geometric spreading: In the absence of obstructions, sound from a single source (i.e., a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance. Highway noise is not a single stationary point source of sound. The movement of vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a "line" source) rather than from a point. This results in cylindrical spreading rather than the spherical spreading resulting from a point source. The drop-off in sound level from a line source is 3 dBA per doubling of distance.

Ground absorption: Usually the noise path between the source and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation caused by geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 200 feet, prediction results based on this scheme are sufficiently accurate. For acoustically "hard" sites (i.e., sites with a reflective surface, such as a parking area or a smooth body of water, between the source and the receptor), no excess ground attenuation is assumed. For acoustically absorptive or "soft" sites (i.e., sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

Atmospheric effects: Research by Caltrans and others has shown that atmospheric conditions can have a major effect on noise levels. Wind has been shown to be the single most important meteorological factor within approximately 500 feet, whereas vertical air temperature gradients are more important over longer distances. Other factors, such as air temperature, humidity, and turbulence, also have major effects. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur because of temperature inversion conditions (i.e., increasing temperature with elevation).

Shielding by natural or human-made features: A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by this shielding depends on the size of the object, proximity to the noise source and receptor, surface weight, solidity, and the frequency content of the noise source. Natural terrain features (such as hills and dense woods) and human-made features (such as buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. A higher barrier may provide as much as 20 dB of noise reduction.

3.3.2 Noise

3.3.3 Environmental Setting

3.3.3.1 Existing Noise Environment

The Project site is located approximately one mile northwest of the City of Carpinteria in the unincorporated portion of Santa Barbara County and is designated as an Educational Facility and zoned Agriculture (A-I-10). The Project vicinity generally experiences low noise levels. Noise experienced in this rural setting is characteristic of rural areas and quiet suburban neighborhoods that typically experience noise between 46 and 52 CNEL[2] (USEPA 1974). Ambient sound levels in the neighborhood were measured at 45 dBA on February 13, 2014 between 10:00 a.m. and 11:00 a.m. (45dB.com, LLC Acoustics Consulting 2014a).

Cate School generates minor noise levels associated with normal student activities on campus such as team practices, physical education classes, and outdoor activities during breaks. Existing special events such as sporting events, summer programs, alumni weekends, graduation, and private events also generate noise from traffic, cheering, and other typical noises. Many of these special events occur at the baseball and athletic fields in the northern portion of the Project site.

Another existing source of noise is the onsite wastewater treatment system, located north of the athletic fields. Sound levels recorded at the property line near the wastewater treatment system were a constant average of 58 dBA. The wastewater treatment plant operates at a reduced noise level during evening and night hours, due to lower demand. Lower nighttime sound levels significantly reduce the CNEL 24 hour level (45dB.com, LLC Acoustics Consulting 2014a; 2014b).

3.3.3.2 Sensitive Receptors

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the current or planned land uses. Human response to noise varies widely depending on the type of noise, time of day, and sensitivity of the receptor. Certain land uses are particularly sensitive to noise, including schools, hospitals, rest homes, long-term medical and mental care facilities, and parks and recreation areas. Residential areas are also considered noise-sensitive, especially during the nighttime hours.

The definition of "sensitive uses" found in the County of Santa Barbara Environmental Thresholds and Guidelines Manual (2015) includes residences, transient lodging, hospitals, and public or private educational facilities. Sensitive land uses in the Project site include: classrooms and campus facilities (libraries, laboratories, etc.), a daycare center, existing dormitories, existing faculty residences, and recreational uses. Sensitive land uses in the Project vicinity include rural residences adjacent to the north of the Project site and a number of very low-density residences surrounding the Cate School property. While residential land uses are located adjacent to the Cate School campus property, the closest residences are located between 300 to 1,000 feet of the Cate School campus property. Residences on lands adjacent to the north are approximately 400 feet from the Cate School campus property line. A few rural residences are located along Lillingston Canyon Road to the east, approximately 300 to 1,000 feet from the Cate School campus. There are also rural residences to the

[2] The referenced level was expressed as Day-Night Average Noise Level, an older metric that is generally similar to CNEL. Here it is expressed as CNEL for consistency.

southeast along Gobernador Canyon Road, located at least 600 feet from the Cate School campus (see Figure 3.3-1).

3.3.4 Regulatory Setting

3.3.4.1 Federal

Federal Noise Control Act (1972)

Public Law 92-574 regulates noise emissions from operation of all construction equipment and facilities; establishes noise emission standards for construction equipment and other categories of equipment; and provides standards for the testing, inspection, and monitoring of such equipment. This Act gives states and municipalities primary responsibility for noise control.

3.3.4.2 State

California Noise Control Act (1973)

This Act declares that excessive noise is a serious hazard to the public health and welfare, and established the now defunct Office of Noise Control, which had the responsibility to set standards for noise exposure in cooperation with local governments or the California Legislature. The California Office of Noise Control land use compatibility guidelines defined a 70 dBA CNEL noise level as the upper limit of "normally acceptable" noise levels for sensitive uses such as schools, libraries, hospitals, nursing homes, churches, parks, offices, and commercial and professional businesses. Although the Office of Noise Control is defunct, its guidelines still apply under the Act.

California Building Standards Code (Title 24)

Title 24 of the California Code of Regulations includes sound transmission control requirements that establish uniform minimum noise insulation performance standards for new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family units. Specifically, Title 24 states that interior noise levels attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room of new dwellings. Dwellings are to be designed so that interior noise levels would meet this standard for at least ten years from the time of building permit application.

3.3.4.3 Local

County of Santa Barbara Comprehensive Plan Noise Element

The County of Santa Barbara Comprehensive Plan Noise Element (2009) includes the following guidelines related to noise:

Policy 1: In the planning of land use, a 65 dB day-night average sound level is regarded as the maximum exterior noise exposure compatible with noise-sensitive uses unless noise mitigation features are included in project designs.

Policy 2: Noise-sensitive land uses should be considered to include:

a) Residential, including single and multifamily dwellings, mobile home parks, dormitories, and similar uses.

b) Transparent lodging, including hotels, motels, and similar uses.

c) Hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care.

d) Public or private educational facilities, libraries, churches, and places of public assembly.

The Planning and Development Department, including the Building and Safety Division, and the Public Health Department's Environmental Health Services Division have administrative procedures for determining project compliance with the State of California Noise Insulation Standards related to interior noise levels.

County of Santa Barbara Noise Ordinance, Chapter 40 (Section 40-2 Noises Prohibited)

The County of Santa Barbara Noise Ordinance provides the following regulations with possible relevance to the proposed Project:

> It shall be unlawful within the unincorporated area of the County of Santa Barbara to make, assist in making, permit, continue, create, or cause to be made, any loud and unreasonable noise, music, percussion or other sound which is broadcast outside of any residence or building by means of any amplified musical instrument, drum, or similar device, or by means of any radio, loudspeaker, sound amplifier or phonograph, or by means of or employing any similar device which amplifies and produces, reproduces or broadcasts sound, during any of the following periods of time:
>
> - The night and following morning of any Sunday, Monday, Tuesday, Wednesday, or Thursday between the hours of 10:00 p.m. of such day and 7:00 a.m. the following morning; or,
> - The morning hours after midnight of any Friday or Saturday, between twelve midnight, following such day, and 7:00 a.m. the following morning.
>
> Within such time periods, and for the purposes of this chapter, a loud and unreasonable sound shall include any sound created by means prohibited above which is clearly discernable at a distance of 100 feet from the property line of the property upon which it is broadcast or which is at any level of sound in excess of 60 decibels at the edge of the property line of the property upon which the sound is broadcast.

3.3.5 Environmental Impact Analysis

This section discusses the potential noise impacts associated with construction and operation of the Project, including associated school activities and special events. Development standards and mitigation measures that apply to the proposed Project are presented in Section 3.10.4.3, and a summary of the potential noise impacts, including their residual effects following mitigation, is presented in Table 3.3-4.

3.3.5.1 Thresholds of Significance

CEQA Guidelines

According to Appendix G of the California Environmental Quality Act (CEQA) Guidelines, a project would normally have a significant impact on the environment if it would:

- Expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies.
- Expose persons to or generate excessive ground-borne vibration or ground-borne noise levels.
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- Be located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels.
- Be located in the vicinity of a private airstrip and expose people residing or working in the project area to excessive noise levels.

County of Santa Barbara Environmental Thresholds and Guidelines Manual

The CEQA Guidelines (Appendix G) criteria are expanded and made more specific in the County's noise thresholds contained in the County of Santa Barbara Environmental Thresholds and Guidance Manual (2015). The County's thresholds are intended to be used with flexibility because each project must be viewed in its specific circumstances. The following noise thresholds will be applied in the impact analysis for determining significance of noise impacts for the Project:

a. A proposed development that would generate noise levels in excess of 65 dBA CNEL and could affect sensitive receptors would generally be presumed to have a significant impact.[3]

b. Outdoor living areas of noise-sensitive uses that are subject to noise levels in excess of 65 dBA CNEL would generally be presumed to be significantly affected by ambient noise. A significant impact would also generally occur where interior noise levels cannot be reduced to 45 dBA CNEL or less.[4]

c. A project will generally have a significant effect on the environment if it will increase substantially the ambient noise levels for noise-sensitive receptors adjoining areas. Per item a., this may generally be presumed when ambient noise levels affecting sensitive receptors are increased to 65 dBA CNEL or more. However, a significant effect may also occur when ambient noise levels affecting sensitive receptors increase substantially but remain less than 65 dBA CNEL, as determined on a case-by-case level.

d. Noise from grading and construction activity proposed within 1,600 feet of sensitive receptors, including schools, residential development, commercial lodging facilities, hospitals or care facilities, would generally result in a potentially significant impact. According to USEPA guidelines, average construction noise is 95 dBA[5] at a 50-foot distance from the source. A 6 dB drop occurs with a doubling of the distance from the source. Therefore, locations within 1,600 feet of the construction site would be affected by noise levels over 65 dBA[5]. To mitigate this

[3] Threshold pertains to long-term operational noise

[4] Interior noise is not separately evaluated, as exceedance of the exterior noise threshold at sensitive receptors is assumed to result in exceedance of the interior threshold.

[5] These noise levels represent L_{eq} measurements, not CNEL day-night averages.

impact, construction within 1,600 feet of sensitive receptors shall be limited to weekdays between the hours of 8:00 a.m. to 5:00 p.m. only. Noise attenuation barriers and muffling of grading equipment may also be required. Construction equipment generating noise levels above 95 dBA may require additional mitigation.

3.3.5.2 Methodology

Construction Noise

Construction noise levels are based on the Project's anticipated construction equipment inventory, estimated durations of construction, and construction phasing, and are identified for on- and offsite locations that are sensitive to noise, including local residences.

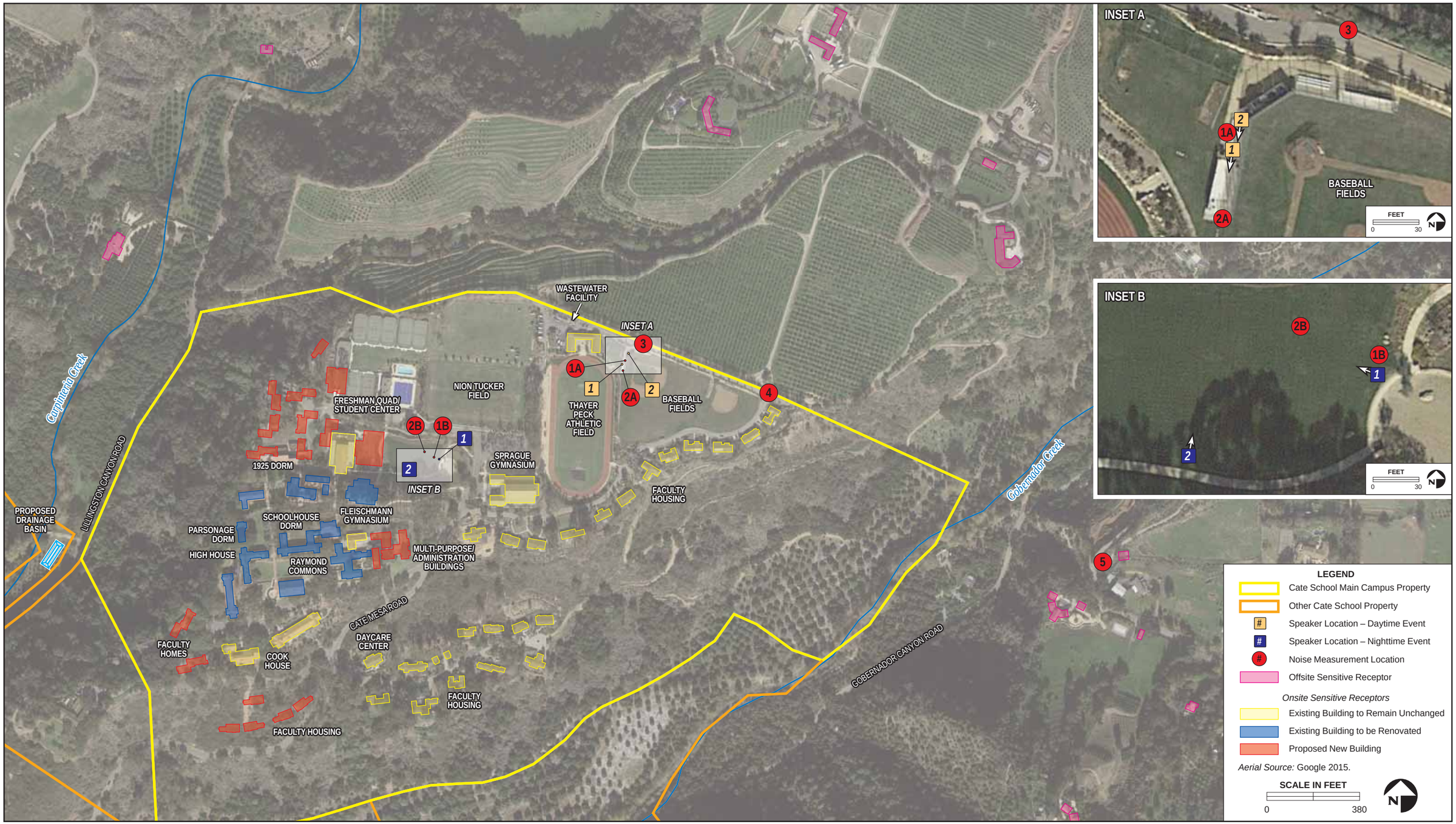
Noise levels were estimated using data published by the Federal Highway Administration regarding the noise-generating characteristics of typical construction activities (see Table 3.3-6). These noise levels would diminish rapidly with distance from the construction site, at a rate of approximately 6 dBA per doubling of distance as equipment is generally stationary or confined to specific areas during construction. For example, a noise level of 86 dBA measured at 50 feet from the noise source to the receptor would reduce to 80 dBA at 100 feet from the source to the receptor, and reduce by another 6 dBA to 74 dBA at 200 feet from the source to the receptor. The noise levels from construction at the offsite sensitive uses can be determined with the following equation from the High-Speed Ground Noise and Vibration Impact Assessment, Final Report:

$$L_{eq} \text{ at sensitive use} = L_{eq} \text{ at 50 feet} - 20 \text{ Log}(D/50)$$

L_{eq} = noise level of noise source, D = distance from the noise source to the receiver, and L_{eq} at 50 feet = noise level of source at 50 feet (U.S. Department of Transportation 2012).

Operational Noise

Operational noise associated with the proposed Project include special events and daily operational activities. In order to address the noises associated with special events, Amec Foster Wheeler conducted a Noise Analysis to assess amplified noise systems associated with actual scheduled special events at the main campus (Appendix E). Noise levels were measured using a Quest Technologies SoundPro SP DL-1 precision sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. The noise measurements were taken on Wednesday, April 15, 2015, between 3:00 p.m. and 5:00 p.m. and on Saturday, April 18, 2015 between 8:00 p.m. and 10:00 p.m. during events that used amplified speaker systems. The daytime event was a Cate School baseball game that took place at the baseball field in the northern portion of the Project site (Figure 3.3-1). During this event, temperatures ranged from 72.2 to 78.5 degrees Fahrenheit and wind speed varied from 3.0 to 7.7 miles per hour (mph). The nighttime event was a Freshman/Senior dodgeball game with music and took place on the Kirby Quadrangle lawn near the Student Center (Figure 3.3-1). The temperature was approximately 59 degrees and wind was negligible, ranging from 0 to 2.3 mph. There was light fog and the humidity was 69 percent. Noise measurements were taken over 10-minute intervals at five locations at and around the Project site. Each event included data from two locations near the speakers systems (Site 1a and 2a for the daytime event and Site 1b and 2b for the evening event), two locations along the northern property line (Site 3 and 4), and one location near a sensitive receptor east of the Cate



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Noise Monitoring Locations and Sensitive Receptors

FIGURE 3.3-1

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School Property (Site 5; Figure 3.3-1). Noise measurements taken during the day can be found in Table 3.3-3 and nighttime noise measurements can be found in Table 3.3-4 below.

Table 3.3-3. Noise Measurements during Daytime Sporting Event (April 15, 2015)

	Site 1a	Site 2a	Site 3	Site 4	Site 5
L_{eq}	78.0	73.8	61.5	48.4	42.7
L_{max}	95.5	90.4	74.5	60.7	59.3
Distance to Speaker (feet)	15	45	80	490	1,700

Table 3.3-4. Noise Measurements during Nighttime Special Event (April 18, 2015)

	Site 1b	Site 2b	Site 3	Site 4	Site 5
L_{eq}	101.6	80.9	42.2	37.0	43.5
L_{max}	106.7	88.2	53.1	50.9	66.6
Distance (feet)	15	45	950	1,400	2,700

A prior sound level assessment conducted at Cate School on February 13, 2014 (45dB.com, LLC Acoustics Consulting 2014a), and the impact analysis contained in the Sound Level Assessment for the Proposed Cate School Conditional Use Permit (45dB.com, LLC Acoustics Consulting 2014b) were also reviewed for this impact analysis (Appendix E). Daily operational noise levels generated by Project traffic was derived from the traffic analysis in Appendix G (ATE 2015).

3.3.5.3 Project Impacts

Table 3.3-5 below provides a summary of the impacts related to noise from the Project. The discussion of the impact follows, and mitigation measures are presented in Section 3.3.4.4.

Table 3.3-5. Summary of Noise Impacts

Noise Impacts	Mitigation Measures	Residual Significance
Impact NOI-1. Construction activities would result in significant exposure of persons to, or generation of noise levels.	MM NOI-1a. MM NOI-1b. MM NOI-1c. MM NOI-1d.	Less than significant with mitigation (Class II)
Impact NOI-2. Operation of the Project could result in noise generation from special events and school activities.	MM NOI-2.	Less than significant with mitigation (Class II)
Impact NOI-3. Operation of the Project could result in increases in traffic and associated noise.	No mitigation required	Less than significant (Class III)
Impact NOI-4. The Project could result in noise generation from the operation of stationary equipment and site maintenance activities.	No mitigation required	Less than significant (Class III)

Impact NOI-1. Construction activities would result in significant exposure of persons to, or generation of noise levels.

Construction activities occurring under the proposed Project would result in periodic increases in ambient noise levels. Implementation of the proposed Project would require eight phases of construction in various locations within the Project site that would involve grading totaling 157,410 cubic yards (cy), the demolition of 26,582 square feet (sf) of existing structures, 180,861 sf of new building construction, and 41,402 sf of building renovations (see Table 3.3-6).

Table 3.3-6. Construction Phases

Construction Phase	Building Construction (sf)	Duration of Construction
1. Dining Commons, Arts Expansion and West Basin/Tanks.	42,075	16 months
2. Freshman Quad; Dorms 1 and 2 and Circular Road Turnaround.	31,043	14 months
3. Multipurpose Building	16,031	12 months
4. Freshman Quad; Dorms 3 and 4, '25 House Replacement, Underground Garage and New Classroom Building	55,468	21 months
5. Replacement Dorms A and B, and Single Family Residence Number 32	12,800	8 months
6. Faculty Housing and South Tanks	11,750	6 months
7. Sprague Gym Addition	2,306	4 months
8. Squash Pavilion	9,388	6 months

All phases of construction would involve the use of heavy equipment. Construction activities would also involve the use of smaller power tools, generators, and other equipment that are sources of noise. Haul trucks using the local roadways would generate noise as they move along the road. Each stage of construction would involve various combinations of operating equipment, and noise levels would vary based on the amount and types of equipment and the location of the activity. Further, not all construction equipment would be operated simultaneously and peak sound levels associated with construction equipment would occur sporadically throughout the workday.

Peak sound levels associated with heavy equipment typically range between 75 and 95 dBA at 50 feet from the source (USEPA 1971). The Federal Highway Administration has compiled data regarding the noise generating characteristics of typical construction activities; construction equipment required for the implementation of the Project are listed in Table 3.3-7. Noise levels from equipment would diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 86 dBA measured at 50 feet from the noise source to the receptor would reduce to 80 dBA at 100 feet from the source to the receptor, and reduce by another 6 dBA (to 74 dBA) at 200 feet from the source to the receptor.

Table 3.3-7. Maximum Noise Levels Generated by Construction Equipment

Construction Equipment	Noise Levels at 50 Feet (dBA L_{eq})
Back Hoe	80
Compactor	82
Concrete Mixer	85
Concrete Pumps	82
Compactor	85
Cranes (mobile and derrick)	83–88
Dozer	85
Front Loader	80
Generators	82
Paver	85
Pneumatic Impact Equipment	85
Pump	77
Scraper/Grader	85
Truck	84

Note: Machinery equipped with noise control devices or other noise-reducing design features would generate a lower level of noise emissions than shown in this table.
Source: Federal Highway Administration 2006.

The County's Environmental Thresholds and Guidelines Manual addresses construction noise and identifies typical restrictions to reduce potential impacts. As previously established, these guidelines consider construction noise impacts to be potentially significant to any sensitive receiver located within 1,600 feet of the noise source. The nearest sensitive receptors to the Project site are the classroom uses and school facilities, the day care center, faculty homes, and dormitories within the Project site. Other sensitive receptors include rural residences to the north, east, south and west of Project site within approximately 1,600 feet. Maximum L_{eq} noise levels anticipated to be experienced by these nearby sensitive uses due to Project construction activities are shown in Table 3.3-8. These estimates represent conservative values as calculations do not account for potential noise barriers due to vegetation or topography.

Table 3.3-8. Estimated Outdoor Construction Peak Noise Levels at Sensitive Receptors (Unmitigated)

	Project Site Campus Facilities and Residences	Northern Property Line	Residences to the West	Residences to the South	Residences to the East
Distance from construction	50 feet	400 feet	800 feet	1,000 feet	1,500 feet
Construction Noise (dBA L_{eq})	75-95	57-77	51-71	49-69	46-66

Note: Noise levels at sensitive uses were determined with the following equation from the High-Speed Ground Noise and Vibration Impact Assessment, Final Report: Leq = Leq at 50 feet. – 20 Log(D/50), where Leq = noise level of noise source, D = distance from the noise source to the receiver, Leq at 50 feet = noise level of source at 50 feet. Noise levels have been rounded up to the nearest whole number.
Source: U.S. Department of Transportation 2012.

According to the Santa Barbara County Thresholds and Guidelines Manual, construction activities within 1,600 feet of sensitive receptors are restricted to weekdays between the hours of 8:00 a.m. and 5:00 p.m, and noise attenuation barriers and muffling of grading equipment may also be required. Given that construction activities would occur near sensitive receptors who are anticipated to experience noise levels above 65 dBA, construction activities would be subject to this requirement, and mitigation would be required to remain consistent with Policy 1 of the County of Santa Barbara Comprehensive Plan Noise Element (maximum 65 dB day-night average sound). Construction activities would take place more than 400 feet away from the nearest sensitive residential land uses. The highest anticipated peak construction-related noise levels at the Project site would be reduced to levels near 77 dBA at the Cate School's northern property line. The nearest sensitive receptor would be approximately 800 feet from construction activities, and construction noise levels may be up to 71 dBA L_{eq}. Per established County guidelines and MM NOI-1a, *Construction Hours,* construction activities for this Project would be limited to weekdays between the hours of 8:00 a.m. to 5:00 p.m. only. MM NOI-1b, *Noise Equipment Shielding-Construction*, would implement noise shielding measures that would ensure that noise generated from construction activities would be reduced to below 65 dBA at the nearest sensitive receptors. MM NOI-1c, *Staging Area*, and MM NOI-1d, *Construction Routes*, would require that construction staging and construction truck haul routes are located away from sensitive receptor to the maximum extent feasible. These measures would reduce noise impacts from construction to levels below the 65 dBA construction threshold for nearby sensitive receptors. Consequently, noise impacts from construction activities would be *less than significant with mitigation* (Class II).

Impact NOI-2. Operation of the Project could result in noise generation from special events and school activities.

Cate School currently hosts several special events on campus for up to 500 participants and guests both during and outside of school sessions. The Project does not propose to increase the frequency or intensity of special events from existing conditions; however, it does propose the use of a PA system. Primary noise associated with events would occur from the use of the proposed PA sound system and from participants socializing or cheering. These noises may result in disturbance to nearby residents as existing ambient noise levels are relatively low.

The noise analysis performed for this EIR (Appendix E), as well as the prior sound assessment measurements conducted during special events found that noise during special events at the baseball field using an amplified sound system did not exceed 61.5 dBA L_{eq} at the northern property line. This 10-minute sound level is well below the 24-hour 65 dBA threshold. Special events held at the Kirby Quadrangle lawn are located in the center of the Cate School campus away from offsite sensitive receptors, and sound levels measured at the northern property line and offsite receptor did not exceed 43.5 L_{eq} (Table 3.3-4). The results of the noise analysis indicate that noise levels from these special events would not exceed the applicable noise level threshold of 65 dBA (long-term operational average level, not peak). However, these measurements only represent a sample of the noise generated by such special events. In order to ensure that the amplified sound system does not generate noise in excess of the 24-hour 65 dBA threshold, MM NOI-2, *Amplified Sound System Plan and Monitoring*, would be implemented which requires the preparation of an amplified sound system plan, including volume requirements, allowable hours of operation, and a detailed procedure for logging and responding to complaints in a timely fashion.

Further, the Project would be required to operate within regulations of the County's Noise Ordinance, which would restrict noise generated from special events during late night and early morning hours,

and prohibit amplified sound levels greater than 60 dBA at the property line outside of the hours stated within the Noise Ordinance (10 p.m. to 7 a.m.). Special events and school activities would not occur during these hours in accordance with the Noise Ordinance and therefore, no noise above 60 dBA would be generated during these hours. As such, impacts associated with the continuation of special events under the Project would be *less than significant with mitigation* with implementation of MM NOI-2, *Amplified Sound System Plan and Monitoring* (Class II).

Impact NOI-3. Operation of the Project could result in increases in traffic and associated noise.

The proposed Project would incrementally increase traffic in the area, contributing to the area's noise levels. According to the Traffic Analysis, the Project is forecasted to generate 111 average daily trips (ADT), 18 a.m. peak hour trips, and 17 p.m. peak hour trips (ATE 2015, see Appendix G). Traffic counts in the traffic analysis show 3,850 to 5,900 ADT for roadway segments on major roads in the Project vicinity. Given the existing traffic volumes, the addition of 101 ADT on Highway 192 and 84 ADT on Casitas Pass Road, or approximately 18 peak hour trips would represent an incremental increase in traffic. This is significantly below the 40 percent increase that is estimated to raise noise levels by 2 dBA (Harris Miller Miller & Hanson Inc. 2006). Therefore, the Project-related increases in noise would be negligible and would not exceed established significance thresholds. Therefore, noise impacts from operational traffic resulting from the proposed Project would be *less than significant* (Class III).

Impact NOI-4. The Project could result in noise generation from the operation of stationary equipment and site maintenance activities.

Under the Project, operational noise would include noise from operation of the wastewater treatment plant, HVAC systems, and landscaping and maintenance activities.

Wastewater treatment: The wastewater treatment plant on the Project site was previously measured at 58 dBA during normal daytime operations. The 30 percent increase in wastewater throughput could incrementally increase this noise level, but is not anticipated to substantially increase ambient noise levels. The wastewater treatment plant typically operates at a reduced level during evening and nighttime hours when demand is lower, resulting in a slight reduction in noise generation during this period (45dB.com, LLC Acoustics Consulting 2014b). As such, wastewater treatment under the Project would generate noise levels well below the 65 dBA CNEL threshold.

Heating, ventilation, and air conditioning (HVAC) systems: Noise levels from commercial HVAC equipment can reach 100 dBA at a distance of three feet (USEPA 1971); however, these units are typically fitted with noise shielding cabinets, placed on the roof or in mechanical equipment rooms to reduce noise levels. Mechanical equipment associated with operation of the proposed Project is required to comply with the California Building Standards Code requirements pertaining to noise attenuation. Therefore, with the application of these noise reduction techniques, noise from these pieces of equipment does not typically exceed 55 dBA at 50 feet, and would not exceed 45 dBA CNEL in any habitable room as required by Title 24 of the California Building Standards Code. As such, noise levels from HVAC systems would be below the interior and exterior ambient noise thresholds.

Landscaping: Landscaping activities may include the use of equipment such as noise-compliant leaf blowers or hedge trimmers, which would reach levels of 65 dBA at 50 feet. Landscaping and maintenance personnel perform maintenance and performance activities within daytime hours between 8:00 a.m. and 5:00 p.m.

Emergency Generators: Noise from the two emergency generators is not anticipated to be audible to offsite sensitive receptors, due to its central location within the Cate School campus. The two generators would only be used for occasional testing and maintenance, and in the event of an emergency; as such, they are not expected to generate any noise the majority of the time.

With the implementation of noise-reducing standard procedures and practices, noise generated from building operations and site maintenance noise would not exceed the 24-hour 65 dBA threshold at the property line. Any noise level increases from existing building operations and maintenance are anticipated to be barely perceptible to off-site sensitive receptors due to distance. This would not constitute a substantial increase in ambient noise levels at offsite locations and therefore would not exceed interior or exterior ambient noise thresholds at offsite locations. Therefore, impacts related to the operation of stationary equipment and site maintenance activities would be *less than significant* (Class III).

3.3.5.4 Proposed Mitigation Measures

To further reduce noise levels resulting from construction of the Project, the following mitigation measures would be implemented to supplement County noise standard conditions:

MM NOI-1a ***Construction Hours.*** *The Applicant, including all contractors and subcontractors, shall limit construction activity, including equipment maintenance and site preparation, to the hours between 8:00 a.m. and 5:00 p.m., Monday through Friday. No construction shall occur on weekends or state holidays. Non-noise generating construction activities such as interior plumbing, electrical, drywall and painting (depending on compressor noise levels) are not subject to these restrictions. Any subsequent amendment to the Comprehensive General Plan, applicable Community or Specific Plan, or Zoning Code noise standard upon which these construction hours are based shall supersede the hours stated herein.*

Plan Requirements and Timing. The Applicant shall provide and post signs stating these restrictions at construction site entries. Signs shall be posted prior to commencement of construction and maintained throughout construction. Construction plans shall note construction hours as 8:00 a.m. to 5:00 p.m. At the pre-construction meeting all construction workers shall be briefed on restricted construction hour limitations. A workday schedule of 8:00 a.m. to 5:00 p.m. will be adhered to for the duration of construction.

Monitoring. The Applicant shall demonstrate that required signs are posted prior to grading/building permit issuance and pre-construction meeting. Building inspectors and permit compliance staff shall spot check and respond to complaints.

MM NOI-1b ***Noise Equipment Shielding-Construction****. Stationary construction equipment that generates noise which exceeds 65 dBA at the Project boundaries shall be shielded with appropriate acoustic shielding to Planning and Development's satisfaction and shall be located at a minimum of 400 feet from the Cate School northern property line and offsite occupied residences. The County's construction contracts shall require implementation of the following construction best management practices (BMPs) by all construction contractors and subcontractors working in or around the Project site to reduce construction noise levels:*

- *The Applicant and its contractors and subcontractors shall ensure that construction equipment is properly muffled according to manufacturer's specifications or as required by the County, whichever is the more stringent.*
- *The Applicant and its contractors and subcontractors shall place noise-generating construction equipment and locate construction staging areas away from noise-sensitive activities, where feasible, to the satisfaction of the County.*
- *The Applicant and its contractors and subcontractors shall implement noise attenuation measures which may include, but are not limited to, noise barriers or noise blankets to the satisfaction of the County.*

Plan Requirements and Timing. The Applicant shall designate the equipment area with appropriate acoustic shielding on building and grading plans. Equipment and shielding shall be installed prior to construction and remain in the designated location throughout construction activities. Construction plans shall identify BMPs to be implemented during construction. All construction workers shall be briefed at a pre-construction meeting on how, why, and where BMP measures are to be implemented. BMPs shall be identified and described for submittal to Santa Barbara County Planning and Development for review and approval prior Zoning Clearance issuance. BMPs shall be adhered to for the duration of the Project.

Monitoring. The Applicant shall demonstrate that the acoustic shielding is in place prior to commencement of construction activities. Planning and Development staff shall ensure compliance throughout construction.

MM NOI-1c ***Staging Area****. The Applicant's contracts with its construction contractors and subcontractors shall include the requirement that construction staging areas, construction worker parking, and the operation of earthmoving equipment within the Project site are located as far away from vibration- and noise-sensitive sites as possible. Contract provisions incorporating the above requirements shall be included as part of the Project's construction documents, which shall be reviewed and approved by the County.*

Plan Requirements and Timing. Construction plans shall clearly identify staging, parking and construction locations away from faculty residences and dormitories in Cate School to the extent feasible. Plans are to be submitted to Santa Barbara County Planning and Development for approval prior to Zoning Clearance issuance for each phase of development.

Monitoring. Permit compliance staff shall ensure compliance and respond to complaints.

MM NOI-1d ***Construction Routes****. Construction routes shall be limited to Cate Mesa Road via Lillingston Canyon Road and Highway 192, and routed away from residential streets and sensitive receptors to the maximum extent feasible. The Applicant shall provide all adjacent property owners with a construction activity schedule and construction routes 10 days in advance of construction activities. Any alterations or additions shall require 5-day notification. Contract specifications shall be included in the proposed Project construction documents, including haul truck destinations and routes, which shall be reviewed by the County prior to Zoning Clearance issuance.*

Plan Requirements and Timing. Construction plans shall include truck routes and shall be submitted to the Santa Barbara County Planning and Development Department prior to Zoning Clearance issuance for each phase of development. Schedule and mailing list shall be submitted 10 days prior to initiation of any earth movement.

Monitoring. Permit compliance monitoring staff shall perform periodic site inspections to verify compliance with activity schedules.

MM NOI-2 ***Amplified Sound System Plan and Monitoring****. An amplified sound system plan shall be prepared by an acoustical engineer prior to Zoning Clearance issuance. The plan shall assess noise levels resulting from public address speaker systems and amplified speaker systems at the baseball fields and contain maximum volume levels allowed for amplified systems at the location of the baseball fields and for other outdoor events at Cate School. The Plan shall comply with the Noise Ordinance and prohibit use of the amplified sound system between the hours of 10 p.m. and 7 a.m. A qualified noise monitor shall monitor and record noise levels at each outdoor special event that utilizes amplified speaker systems. The noise monitor shall prepare and submit to the County of Santa Barbara an annual noise monitoring report. All recommendations in the plan shall be incorporated into the Project design to reduce exterior noise to at or below 65 dBA and interior noise to at or below 45 dBA at offsite sensitive receptors.*

Plan Requirements and Timing. The amplified sound system plan shall be incorporated into design of the Project and detailed on building plans. The amplified sound system plan shall specify maximum volumes allowed during outdoor special events and shall be prepared prior to Zoning Clearance issuance. The noise monitor shall submit annual noise monitoring reports to Planning and Development, along with documentation of all noise complaints.

Monitoring. Planning and Development compliance monitoring staff will ensure recommended levels have been reached prior to Zoning Clearance issuance, and shall require the submittal of annual noise monitoring noise documentation.

3.3.5.5 Residual Impacts

Some noise from construction activities associated with Impact NOI-1 would occur despite implementation of mitigation measures MM NOI-1a through NOI-1d. These residual noise impacts would be temporary and would occur within limited hours consistent with Chapter 40, *Nighttime Noise Restrictions*, of the County Noise Ordinance; construction activities would avoid sensitive receptors to the maximum extent feasible. Impacts associated with school activity and special event noise generation are expected to be less than significant with implementation of MM NOI-2, *Amplified Sound System Plan and Monitoring*, to require Project conformance to an amplified sound system plan and monitoring program. Therefore, residual impacts to Impacts NOI-1 and NOI-2 would be *less than significant with mitigation* (Class II). Residual impacts resulting from NOI-3 and NOI-4 were found to be *less than significant* (Class III).