

3.6 NOISE AND VIBRATION

This section includes a summary of applicable regulations related to noise and vibration, a description of ambient-noise conditions, and an analysis of potential short-term construction and long-term operational-source noise impacts associated with the project. Mitigation measures are recommended as necessary to reduce significant noise impacts. Additional data is provided in Appendix C.

Several comment letters regarding noise were received in response to the notice of preparation (see Appendix A). The letters, from members of the public, expressed concerns related to the potential for increased traffic noise along Blue Oaks Boulevard, the potential use of new or modified sound walls along Blue Oaks Boulevard to reduce traffic noise, and the potential use of a masonry wall to separate the existing Creekview neighborhood from project construction to reduce construction noise and other construction-related impacts. These comments are addressed in this section.

3.6.1 Regulatory Setting

COMMON NOISE DESCRIPTORS

Prior to providing the regulatory and environmental setting, some fundamental definitions of commonly used noise terms are provided in this section. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors used throughout this section.

Equivalent Continuous Sound Level (L_{eq}): L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound level that occurs during the same period (Caltrans 2013b: 2-48). For instance, the 1-hour equivalent sound level, also referred to as the hourly L_{eq} , is the energy average of sound levels occurring during a 1-hour period and is the basis for noise abatement criteria used by the California Department of Transportation (Caltrans) and the Federal Transit Administration (FTA) (Caltrans 2013b: 2-47; FTA 2018).

Maximum Sound Level (L_{max}): L_{max} is the highest instantaneous sound level measured during a specified period (Caltrans 2013b: 2-48; FTA 2018).

Day-Night Level (L_{dn}): L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-decibels (dB) "penalty" applied to sound levels occurring during nighttime hours between 10 p.m. and 7 a.m. (Caltrans 2013b: 2-48; FTA 2018).

Community Noise Equivalent Level (CNEL): CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m. and a 5-dB penalty applied to the sound levels occurring during evening hours between 7 p.m. and 10 p.m. (Caltrans 2013b: 2-48).

Vibration Decibels (VdB): VdB is the vibration velocity level in decibel scale (FTA 2018: Table 5-1).

Peak Particle Velocity (PPV): PPV is the peak signal value of an oscillating vibration waveform. Usually expressed in inches/second (FTA 2018: Table 5-1).

FEDERAL

US Environmental Protection Agency Office of Noise Abatement and Control

The US Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at more local levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, documents and research completed

by the EPA Office of Noise Abatement and Control continue to provide value in the analysis of noise effects. Specifically, EPA identified in the Noise Effects Handbook a level of 70 A-weight decibels (dBA) at which the chances for sleep awakening become more prevalent. For evaluating the potential for noise sources to disrupt sleep, the 70 dBA (Single-Event Noise Level) can be applied.

Federal Transit Administration

To address the human response to ground vibration, FTA has set forth guidelines for maximum-acceptable vibration criteria for various types of land uses. These guidelines are presented in Table 3.6-1. FTA has also established construction vibration damage criteria, as shown in Table 3.6-2

Table 3.6-1 Ground-Borne Vibration Impact Criteria for General Assessment

Land Use Category	GVB Impact Levels (VdB, 1 micro-inch/second)		
	Frequent Events ¹	Occasional Events ²	Infrequent Events ³
<i>Category 1:</i> Buildings where vibration would interfere with interior operations.	65 ⁴	65 ⁴	65 ⁴
<i>Category 2:</i> Residences and buildings where people normally sleep.	72	75	80
<i>Category 3:</i> Institutional land uses with primarily daytime uses.	75	78	83

Notes: GVB = ground-borne vibration; VdB, 1 micro-inch/second = vibration decibels referenced to 1 micro-inch per second and based on the root mean square velocity amplitude.

¹ "Frequent Events" is defined as more than 70 vibration events of the same source per day.

² "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.

³ "Infrequent Events" is defined as fewer than 30 vibration events of the same source per day.

⁴ This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define acceptable vibration levels.

Source: FTA 2018: Table 6-3.

Table 3.6-2 Federal Transit Administration Construction Vibration Damage Criteria

Land Use Category	PPV in/sec
Reinforced-concrete, steel or timber (no plaster)	0.5
Engineered concrete and masonry (no plaster)	0.3
Non-engineered timber and masonry buildings	0.2
Buildings extremely susceptible to vibration damage	0.12

Notes: PPV = peak particle velocity; in/sec = inches per second.

Source: FTA 2018: Table 7-5.

STATE

At the state level, the State of California establishes general guidance and regulatory frameworks related to noise and vibration through various codes and publications, including but not limited to the California Building Code transmission standards, the California General Plan Guidelines (Governor's Office of Land Use and Climate Innovation), and Caltrans' *Transportation and Construction Vibration Guidance Manual*. While these documents provide overarching guidance, the analysis in this document primarily relies on noise and vibration standards adopted at the local level, as local jurisdictions are typically responsible for establishing and enforcing specific noise ordinances and land use compatibility standards.

California Department of Transportation Standards for Exposure to Ground Vibration

In 2013, Caltrans published the Transportation and Construction Vibration Manual (Caltrans 2013a). The manual provides general guidance on vibration issues associated with construction and operation of projects in relation to

human perception and structural damage. Table 3.6-3 presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

Table 3.6-3 Caltrans Recommendations Regarding Levels of Vibration Exposure

PPV (in/sec)	Effect on Buildings
0.4–0.6	Architectural damage and possible minor structural damage
0.2	Risk of architectural damage to normal dwelling houses
0.1	Virtually no risk of architectural damage to normal buildings
0.08	Recommended upper limit of vibration to which ruins and ancient monuments should be subjected
0.006–0.019	Vibration unlikely to cause damage of any type

Notes: PPV = Peak Particle Velocity; in/sec = inches per second.

Source: Caltrans 2013b.

LOCAL

City of Roseville General Plan 2035

The Noise Element in the City of Roseville General Plan outlines policies and implementation measures to achieve the City's goals of protecting Roseville residents from the harmful and annoying effects of exposure to excessive noise. It establishes separate acceptable noise level criteria for land uses affected by fixed or transportation-related noise sources (City of Roseville 2020).

The following policies would apply to the project:

- ▶ **Policy N1.1:** The City's exterior noise compatibility standards for uses affected by transportation noise sources are included as Table IX-1 of the General Plan 2035 (presented as Table 3.6-3). Exterior noise levels shall be mitigated to the extent feasible using site planning, building orientation, and/or other construction techniques or design features. Noise barriers should only be used after other feasible noise reduction strategies are exhausted, and not where they would interrupt existing or future community pedestrian or bicycle connectivity.
- ▶ **Policy N1.2:** The City's interior noise compatibility standards for uses affected by transportation noise sources are 45 dBA L_{dn} for noise-sensitive uses such as residences, lodging, hospitals, assisted living facilities, and other places where people normally sleep. For noise-sensitive uses where people do not sleep, such as offices, schools, and uses with similar noise sensitivity, noise levels should be no greater than 45 dBA L_{eq} . Proposed projects should incorporate noise reduction strategies, if necessary, to achieve these interior noise levels.
- ▶ **Policy N1.3:** The City's exterior noise compatibility standards for uses affected by non-transportation-related noise are defined within the City's Noise Ordinance, and should be applied consistent with the Noise Ordinance.
- ▶ **Policy N1.4:** The City will require new transportation improvement projects to be designed to limit noise impacts consistent with the standards contained in Table IX-1 (presented as Table 3.6-4) of the General Plan 2035, to the extent feasible, using appropriate attenuation techniques.
- ▶ **Policy N1.5:** If existing noise levels exceed the noise compatibility standards in Table IX-1 (presented as Table 3.6-4) or Policy N1.2, then feasible methods of reducing noise to levels consistent with standards should be considered, but are not required. However, if existing noise levels exceed noise compatibility standards and a project results in a significant increase in noise (as defined below), then feasible methods of reducing noise to avoid a significant noise increase should be applied. In no case should a project result in a Clearly Unacceptable noise level according to Table IX-1 of the Noise Element (presented as Table 3.6-3).
 - ▶ Where existing exterior noise is less than 60 dB, a ≥ 5 dBA increase in noise is significant.
 - ▶ Where existing exterior noise is between 60 and 65 dBA, a ≥ 3 dB increase in noise is significant.
 - ▶ Where existing exterior noise is greater than 65 dB a ≥ 1.5 dBA increase in noise is significant.

- **Policy N1.9:** Construction-related noise that is consistent with the City's Noise Ordinance is exempt from the noise standards outlined in this Element.

Table 3.6-4 Exterior Noise Compatibility Standards for Uses Affected by Transportation Noise

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dBA)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential	50-60	60-65	65-70	70-80
Lodging-Motels, Hotels	50-65	65-70	70-75	75-80
Schools, Libraries, Places of Worship, Hospitals, Assisted Living	50-65	65-70	70-75	75-80
Auditoriums, Concert Halls, Amphitheaters	NA	50-70	NA	70-80
Sports Arena, Outdoor Spectator Sports	NA	50-70	NA	70-80
Playgrounds, Neighborhood Parks	50-65	65-70	70-75	75-80
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-70	NA	70-75	75-80
Office Buildings	50-65	65-70	70-75	75-80

Notes: CNEL = Community Equivalent Noise Level; dBA = A-weighted decibel; L_{dn} = day-night average noise level.

Source: City of Roseville 2020.

City of Roseville Municipal Code

The City of Roseville has a Noise Ordinance (Chapter 9.24 of the City Code) designed to prohibit unnecessary, excessive, and annoying sound levels from all sources. Key provisions of the ordinance that may apply to the project include (City of Roseville 2025):

► Section 9.24.030 Exemptions

Sound or noise emanating from the following sources and activities are exempt from the provisions of this title:

- Sound sources typically associated with residential uses (e.g., children at play, air conditioning and similar equipment, but not including barking dogs);
- Sound sources associated with property maintenance (e.g., lawn mowers, edgers, blowers, pool pumps, power tools, etc.) provided such activities take place between the hours of 8:00 a.m. and 9:00 p.m.;
- Safety, warning and alarm devices, including house and car alarms, and other warning devices that are designed to protect the health, safety and welfare, provided such devices are not negligently maintained or operated;
- The normal operation of public and private schools typically consisting of classes and other school-sponsored activities;
- Maintenance (e.g., lawn mowers, edgers, aerators, blowers, etc.) of golf courses, provided such activities take place between the hours of 5:00 a.m. and 9:00 p.m. May through September, and 6:00 a.m. and 9:00 p.m. October through April;
- Emergencies involving the execution of the duties of duly authorized governmental personnel and others providing emergency response to the general public, including, but not limited to, sworn peace officers, emergency personnel, utility personnel, and the operation of emergency response vehicles and equipment;
- Private construction (e.g., construction, alteration or repair activities) between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 8:00 p.m. Saturday and Sunday; provided, however, that all construction equipment shall be fitted with factory installed muffling devices and that all construction equipment shall be maintained in good working order.

► **Section 9.24.100 Sound Limits for Sensitive Receptors**

It is unlawful for any person at any location to create any sound, or to allow the creation of any sound, on property owned, leased, occupied or otherwise controlled by such person, which causes the exterior sound level when measured at the property line of any affected sensitive receptor to exceed the ambient sound level by three dBA or exceed the sound level standards as set forth in Table 1 (presented as Table 3.6-5), by three dBA, whichever is greater.

Table 3.6-5 Sound Level Standards (for Non-Transportation or Fixed Sound Sources)

Sound Level Descriptors	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Hourly L_{eq} , dBA	50	45
Maximum Level, dBA	70	65

Notes: dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level.

- A. Each of the sound level standards specified in Table 3.6-4 shall be reduced by five dB for simple tone noises, consisting of speech and music. However, in no case shall the sound level standard be lower than the ambient sound level plus three dB.
- B. If the intruding sound source is continuous and cannot reasonably be discontinued or stopped for a time period whereby the ambient sound level can be measured, the sound level measured while the source is in operation shall be compared directly to the sound level standards of Table 3.6-4.

Source: City of Roseville 2025.

► **Section 9.24.140 Operational Standards for City Activities**

Notwithstanding any other provisions of this chapter, city operations and activities are not subject to the provisions of this chapter. The city council may, by resolution, adopt operational standards for city activities to effectuate the purposes of this chapter.

3.6.2 Environmental Setting

ACOUSTIC FUNDAMENTALS

Prior to discussing the noise setting for the project, background information about sound, noise, vibration, and common noise descriptors is needed to provide context and a better understanding of the technical terms referenced throughout this section.

Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a human ear. Noise is a loud, unexpected, disruptive, or unwanted sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determine the sound level and characteristics of the noise the receiver perceives. The field of acoustics deals primarily with the propagation and control of sound.

Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, or thousands of hertz. Humans generally have an audible frequency range between 20 Hz and 20,000 Hz.

Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth

(0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different noise environments can range from less than 100 to 100,000,000 mPa. Because of this extensive range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in dB.

Addition of Decibels

Because decibels are logarithmic units, SPLs cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources produce sound of the same loudness simultaneously, the resulting sound level at a given distance would be 3 dB higher than if only one of the sound sources were producing sound under the same conditions. For example, if one idling truck generates an SPL of 70 dB, two trucks idling simultaneously would not produce 140 dB; instead, they would combine to produce 73 dB. Under the decibel scale, three noise sources of equal loudness together produce a sound level approximately 5 dB louder than one source.

A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound substantially affect the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies and in how it perceives the SPL. People are generally most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within this range better than sounds of the same amplitude with frequencies outside this range. To approximate the human ear's response, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of A-weighted decibels) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgment correlates well with the A-scale sound levels of those sounds. Thus, noise levels are typically reported in terms of A-weighted decibels. Unless otherwise noted, all sound levels discussed in this section are expressed in A-weighted decibels. Table 3.6-6 describes typical A-weighted noise levels for various noise sources.

Table 3.6-6 Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet	— 100 —	
Gas lawn mower at 3 feet	— 90 —	
Diesel truck at 50 feet at 50 miles per hour	— 80 —	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, daytime, Gas lawn mower at 100 feet	— 70 —	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	— 60 —	
Quiet urban daytime	— 50 —	Large business office, Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime	— 30 —	Library, Bedroom at night
Quiet rural nighttime	— 20 —	
	— 10 —	Broadcast/recording studio
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Notes: dB = decibel.

Source: Caltrans 2013b: Table 2-5.

Human Response to Changes in Noise Levels

The doubling of sound energy results in a 3-dB increase in the sound level. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different from what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear can discern 1-dB changes in sound levels when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000–8,000 Hz) range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 Hz and perceives higher and lower frequency sounds of the same magnitude with less intensity (Caltrans 2013b: 2-18). In typical noisy environments, changes in noise of 1–2 dB are generally not perceptible. However, it is widely accepted that people can begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as distinctly noticeable, and a 10-dB increase is usually perceived as a doubling of loudness (Caltrans 2013b). Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Vibration sources include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous (e.g., operating factory machinery) or transient (e.g., explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in PPV or root-mean-square (RMS) vibration velocity. PPV and RMS vibration velocity are generally described in inches per second (in/sec) or millimeters per second. PPV is the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in monitoring transient and impact vibration and has been found to correlate well with the stresses experienced by buildings (FTA 2018: 110; Caltrans 2020: 6).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2018: 110, 199; Caltrans 2020: 7). This is based on a reference value of 1 micro inch per second.

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Ground vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2018: 120; Caltrans 2020: 27).

Typical outdoor sources of perceptible ground vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground vibration is rarely perceptible. The range of interest is from approximately 50 VdB, the typical background vibration-velocity level, to 100 VdB, the general threshold where minor damage can occur to fragile buildings. Construction activities can generate sufficient ground vibrations to pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2018: 113).

Vibrations generated by construction activity can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Vibratory pile drivers, large pumps, and compressors generate continuous vibrations. Random vibrations can result from jackhammers, pavement breakers, and heavy construction equipment.

Table 3.6-7 summarizes the general human response to different ground vibration-velocity levels.

Table 3.6-7 Human Response to Different Levels of Ground Noise and Vibration

Vibration-Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Notes: VdB = vibration decibels referenced to 1 μ inch/second and based on the root mean square velocity amplitude.

Source: FTA 2018.

Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which a noise level decreases with distance depends on the following factors:

Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Roads and highways consist of several localized noise sources on a defined path. They can be treated as a line source, approximating the effect of several point sources, thus propagating slower than a point source. Noise from a line source propagates outward in a cylindrical pattern called cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

Ground Absorption

The noise propagation path from a source to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling provides additional attenuation associated with geometric spreading. Traditionally, this additional attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an additional ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the attenuation rate associated with cylindrical spreading, the additional ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance. This would hold true for point sources, resulting in an overall drop-off rate of up to 7.5 dB per doubling of distance.

Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels, as wind can carry sound. Sound levels can be increased over large distances (e.g., more than 500 feet) from the source because of atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also affect sound attenuation.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver attenuates noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction (Caltrans 2013b: 2-41; FTA 2018: 42). Barriers higher than the line of sight provide increased noise reduction (FTA 2018:16). Vegetation between the source and receiver is rarely effective in reducing noise because it does not create a solid barrier unless there are multiple rows of vegetation (FTA 2018: 15).

EXISTING NOISE ENVIRONMENT

Existing Noise- and Vibration-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 and 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 and the potential for nighttime noise to result in sleep disruption. Additional land uses such as schools, transient lodging, historic sites, cemeteries, and places of worship are also generally considered sensitive to increases in noise levels. These land use types are also considered vibration-sensitive land uses in addition to commercial and industrial buildings where vibration could interfere with operations within the building, including levels that may be well below those associated with human annoyance.

The closest existing residences to the project site are located approximately 50 feet to the east in the Creekview Specific Plan area and approximately 600 feet to the south in the West Roseville Specific Plan area. The Creekview Specific Plan area to the east is planned to accommodate 2,011 residential units at buildout. To the south, along the southern edge of the project site, is the future extension of Blue Oaks Boulevard and the West Roseville Specific Plan area (adopted by the City in 2004), and will include 9,496 residential units, parks, open space, and commercial and industrial uses.

The predominant noise source in the project area is vehicle traffic on the surrounding roadway network (e.g., Pleasant Grove Boulevard, Blue Oaks Boulevard, Philip Road, Westbrook Boulevard). Existing traffic noise levels on roadway segments in the project area were modeled using calculation methods consistent with Federal Highway Administration (FHWA) Traffic Noise Model, Version 2.5 (FHWA 2004) and using average daily traffic volumes provided in the traffic analysis conducted by Fehr & Peers and summarized in Section 3.3, "Transportation and Circulation." Table 3.6-8 summarizes the modeled existing traffic noise levels at 100 feet from the centerline of each roadway segment and lists distances from each roadway centerline to the 70, 65, and 60 CNEL traffic noise contours. For further details on traffic noise modeling inputs and parameters, refer to Appendix C.

Table 3.6-8 Summary of Modeled Existing Traffic Noise Levels

Roadway Segment/Segment Description	L _{dn} at 100 feet from Roadway Centerline	Distance (feet) from Roadway Centerline to CNEL Contour		
		70 dBA	65 dBA	60 dBA
Blue Oaks Boulevard from Project Site to Westbrook Boulevard	54.2	3	9	29
Blue Oaks Boulevard from Westbrook Boulevard to North Hayden Parkway	62.9	22	69	218
Blue Oaks Boulevard from North Hayden Parkway to Fiddymment Road	64.3	30	95	300
Blue Oaks Boulevard from Fiddymment Road to Del Webb Boulevard	68.2	74	234	739
Pleasant Grove Boulevard from Market Street to Fiddymment Road	67.1	57	181	573
Westbrook Boulevard from Blue Oaks Boulevard to Pleasant Grove Boulevard	59.1	9	29	91
Hayden Parkway from Fiddymment Road to Blue Oaks Boulevard	58.1	7	23	73
Hayden Parkway from Blue Oaks Boulevard to Crawford Parkway	58.6	8	26	81
Fiddymment Road from Del Webb Boulevard to Blue Oaks Boulevard	67.4	62	195	617
Fiddymment Blue Oaks Boulevard to Crawford Parkway	66.7	53	166	526

Notes: dBA = A-weighted decibels; CNEL = Community Noise Equivalent Level.

All modeling assumes average pavement, level roadways (less than 1.5 percent grade), constant traffic flow, and does not account for shielding of any type or finite roadway adjustments. All noise levels are reported as A-weighted noise levels. For additional details, refer to Appendix C for detailed traffic data, and traffic-noise modeling input data and output results.

Source: Data modeled by Ascent in 2025.

Existing Noise Sources and Ambient Levels

To characterize the existing ambient noise environment at the project site, a noise survey consisting of three short-term noise measurements and two long-term measurements was conducted from May 12, 2025, to May 13, 2025. The locations of the noise monitoring sites are shown in Figure 3.6-1.

A SoftdB Piccolo II and a Larson Davis SoundExpert LxT precision integrating sound level meter were used for the ambient noise level measurement surveys. The meters were calibrated before use with Larson Davis Laboratories Model CAL200 acoustical calibrator to ensure measurement accuracy. The measurement equipment meets all pertinent specifications of the American National Standards Institute. The ambient noise measurement survey results are summarized in Tables 3.6-9 and 3.6-10. Detailed summaries of the measured noise level data are in Appendix C.

Table 3.6-9 Summary of Existing Ambient Short-Term Noise Measurements

Location ¹	Short-Term Measurements Date and Time	Duration	Noise Level Descriptors (dBA)			
			L _{eq}	L _{max}	L ₅₀	L ₉₀
ST-1	May 13, 2025 - 12:18 p.m.	15 Minutes	48.7	66.0	42.4	37.6
ST-2	May 13, 2025 - 1:52 p.m.	15 Minutes	40.6	58.5	35.6	32.9
ST-3	May 12, 2025 - 1:18 p.m.	15 Minutes	43.8	56.9	41.7	38.7

Notes: ST = short-term; L_{max} = continuous maximum sound level; L_{eq} = equivalent sound level; L_x = percentile-exceeded sound level; dBA = A-weighted decibel.

¹ Refer to Figure 3.6-1 for ambient noise level measurement locations.

Source: Data collected by Ascent in 2025.

Table 3.6-10 Summary of Existing Ambient Long-Term Noise Measurements

Location ¹	Long-Term Measurements Date	Time of Day	Noise Level Descriptors (dBA)				
			L _{dn}	L _{eq}	L _{max}	L ₅₀	L ₉₀
LT-1	May 12 to May 13, 2025	Day Average	59.2	59.9	81.8	51.8	36
		Night Average		47.7	66.5	42.7	34.6
LT-2	May 12 to May 13, 2025	Day Average	52.7	52.6	75.6	47.3	34.8
		Night Average		42.8	65.7	37.7	30.5

Notes: LT = long-term; L_{max} = continuous maximum sound level; L_{dn} = day-night level; L_{eq} = equivalent sound level; L_x = percentile-exceeded sound level; dBA = A-weighted decibel.

¹ Refer to Figure 3.6-1 for ambient noise level measurement locations.

Source: Data collected by Ascent in 2025.



Source: Adapted by Ascent in 2025.

Figure 3.6-1 Noise Measurement Locations

3.6.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

Construction Noise and Vibration

To assess potential short-term (construction-related) noise and vibration impacts, sensitive receptors and their relative exposure were identified. Project-generated construction source noise and vibration levels were determined based on methodologies, reference emission levels, and usage factors from FTA's *Guide on Transit Noise and Vibration Impact Assessment* methodology (FTA 2018) and FHWA's *Roadway Construction Noise Model User's Guide* (FHWA 2006). Reference levels for noise and vibration emissions for specific equipment or activity types are well documented, and the usage thereof is common practice in the field of acoustics.

Operational Noise and Vibration

With respect to non-transportation noise sources (e.g., stationary) associated with project implementation, the assessment of long-term (operational-related) impacts was based on reference noise emission levels of activities and equipment associated with project operation (e.g., heating, ventilation and air conditioning [HVAC] units, delivery docks), and standard attenuation rates and modeling techniques. In addition, the analysis considers the potential range of operational noise sources and their approximate on-site locations.

To assess potential long-term (operation-related) noise impacts due to project-generated increases in traffic, noise levels were estimated using calculations consistent with the FHWA's Traffic Noise Model Version 2.5 (FHWA 2004) and project-specific traffic data (Appendix C). The analysis is based on the reference noise emission levels for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and ground attenuation factors. Truck usage and vehicle speeds on area roadways were estimated from the project-specific traffic data. Note that the modeling conducted does not account for reflection off building surfaces.

THRESHOLDS OF SIGNIFICANCE

Thresholds of significance are based on Appendix G of the State CEQA Guidelines, noise policies and standards in the City of Roseville 2035 General Plan and City of Roseville Municipal Code, and Caltrans and FTA vibration standards. The project would have a significant impact related to noise or vibration if it would:

- ▶ generate substantial construction noise occurring outside of the City's construction noise exemption hours (i.e., 7:00 a.m. and 7:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 8:00 p.m. Saturday and Sunday) that exceeds 50 dB L_{eq} and 70 dB L_{max} for daytime (7:00 a.m. to 10:00 p.m.) and 45 dB L_{eq} and 65 dB L_{max} for nighttime (10:00 p.m. to 7:00 a.m.) at the property line of any affected sensitive receptors;
- ▶ generate substantial permanent increase in ambient noise in the vicinity of the project in excess of the following City of Roseville noise standards:
 - Transportation noise levels that exceed 60 dBA CNEL for residential land uses. In addition, and consistent with Policy N1.5, the following additional standards apply:
 - Where existing exterior noise is less than 60 dB, a ≥ 5 dB increase in noise is significant.
 - Where existing exterior noise is between 60 and 65 dB, a ≥ 3 dB increase in noise is significant.
 - Where existing exterior noise is greater than 65 dB a ≥ 1.5 dB increase in noise is significant.
 - Non-Transportation noise standards are established by Section 9.24.120 of the Roseville Municipal Code for industrial zones where an industrial land use shares a common property line with a sensitive receptor or is separated from a sensitive receptor by a roadway, which are applicable to the proposed project. Based on this code, the applicable standards applied to non-transportation stationary sources are:

- Daytime (7:00 a.m. to 10:00 p.m.) noise limits of 57 dBA L_{eq} and 77 dBA L_{max} .
 - Nighttime (10:00 p.m. to 7:00 am) noise limits of 52 dBA L_{eq} and 72 dBA L_{max} .
- ▶ result in construction-generated vibration levels exceeding Caltrans’s recommended standards with respect to the prevention of structural building damage (0.2 and 0.08 in/sec PPV for normal and historical buildings, respectively) (Caltrans 2013b) or FTA’s maximum-acceptable-vibration standard with respect to human response (80 VdB for residential uses) at nearby existing vibration-sensitive land uses (FTA 2018); or
- ▶ 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, expose people residing or working in the project area to excessive noise levels.

ISSUES NOT DISCUSSED FURTHER

The project is not located within an airport land use plan, or within two miles of a public airport or public use airport. Additionally, the project is not located within two miles of a private airstrip. Lincoln Regional Airport is the closest airport and is located approximately 8 miles northeast of the project site. Thus, the project would not result in noise impacts related to the exposure of people residing or working in the project area to excessive aircraft-related noise levels. This issue is not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.6-1: Construction-Generated Noise

Short-term construction-generated noise levels associated with the project would not expose nearby noise-sensitive receptors to noise levels that would exceed applicable local standards. These activities would be temporary in nature and would also be exempt from the local noise standards according to the City of Roseville’s Municipal Code. Thus, this impact would be **less than significant**.

Construction of the project would involve noise-generating activities. Short-term construction noise levels on and near the project site would fluctuate depending on the type, number, and duration of usage for the varying types of heavy-duty equipment. The effects of construction noise largely depend on the type of construction activities being performed, noise levels generated by those activities, distances to noise-sensitive receptors, the relative locations of noise attenuating features such as vegetation and existing structures, and existing ambient noise levels.

Construction noise would be temporary in nature and would include noise from activities such as grading, excavation, and the installation of mechanical, electrical, and plumbing infrastructure. It is not anticipated that pile-driving or rock blasting would occur as part of construction; therefore, this analysis evaluates potential construction noise associated with typical construction activities/equipment use. Construction noise typically occurs intermittently and varies depending on the nature of the construction activities being performed. Noise is generated by construction equipment, including scrapers and dozers. Thus, existing noise-sensitive land uses located near areas of potential construction activity could be exposed to construction noise within the project area, or from off-site construction activity associated with infrastructure improvements along nearby roadways.

Noise-generating activities occurring during the more noise-sensitive evening and nighttime hours are of increased concern. Because exterior ambient noise levels typically decrease during the late evening and nighttime hours as typical levels of community activities (e.g., industrial activities, vehicle traffic) decrease, construction activities performed during the more noise-sensitive evening and nighttime hours could result in increased annoyance and potential sleep disruption for occupants of nearby residential land uses.

Based on the types of construction activities assumed for the project (e.g., paving, earth moving, trenching, structure erection), it is expected that the primary sources of noise would include backhoes, dozers, graders, excavators, dump trucks, pavers, and various trucks (e.g., job trucks, water trucks, fuel trucks). Noise levels generated by common types of construction equipment are shown in Table 3.6-11.

Table 3.6-11 Noise Emission Levels from Construction Equipment

Equipment Type	Typical Noise Level (dBA) at 50 feet
Dump Truck	76
Drill Rig Truck	79
Concrete Mixer	85
Crane	85
Dozer	85
Grader	85
Excavator	85
Front End Loader/Backhoe	80
Paver	89
Roller	85
Scraper	89

Notes: dBA = A-weighted decibel. Assumes all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacturer-specified noise levels for each piece of heavy construction equipment.

Source: FTA 2018.

As described in Chapter 2, "Project Description," construction of the residential component of the project is anticipated to occur in five phases with construction of Phase 1 beginning in 2028 and ending with Phase 5 in 2033. Full occupancy is projected to occur in 2033. Construction of the innovation and commercial component is anticipated to occur in four phases with construction beginning in 2029 and ending in 2036. It is projected that the residential component of the project would be completed before the commercial and innovation component; therefore, this analysis considers the potential exposure of construction noise from the development of the innovation and commercial component on the proposed residential component. The timing of future phases will be determined based on market readiness and tenant demand. Construction noise modeling was based on the anticipated use of typical construction equipment as well as the simultaneous use of numerous pieces of equipment; thus, modeled noise levels represent a reasonably conservative construction noise scenario. Construction hours would be 7:00 a.m. to 7:00 p.m. Monday through Friday. Construction could also occur from 8:00 a.m. to 8:00 p.m. on Saturdays and Sundays on an as-needed basis. There would not be any construction during nighttime hours (i.e., 7:00 p.m. to 7:00 a.m. Monday to Friday and 8:00 p.m. to 8:00 a.m. Saturday to Sunday).

The construction-noise evaluation conservatively assumed that two of the highest noise-generating pieces (i.e., scraper and dozer) of equipment would operate simultaneously near each other and near the boundaries of the project site. Based on the reference noise levels listed in Table 3.6-11 and accounting for typical usage factors of individual pieces of equipment, on-site construction-related activities could generate a combined hourly average noise level of approximately 82 dBA L_{eq} and a maximum noise level as high as 86 dBA L_{max} at 50 feet from the construction activity. Detailed inputs and parameters for the estimated construction noise exposure levels are provided in Appendix C.

The nearest noise-sensitive receptors are existing and planned future residences located in the Creekview Specific Plan area (adopted by the City in 2012), approximately 500 feet from the center of construction activity to façade of nearest receptor to the east. This area is anticipated to accommodate 2,011 residential units at buildout. To the south, approximately 2,200 feet from the center of construction activity to the façade of the nearest receptor, along the southern edge of the project site, is the future extension of Blue Oaks Boulevard and the West Roseville Specific Plan area (adopted by the City in 2004), and will include 9,496 residential units, parks, open space, and commercial and industrial uses. Based on current anticipated construction phasing, Village 1 of the residential component of the project will be exposed to the construction noise of innovation center buildings G, H, and I. Village 1 would be approximately 500 feet from the center of construction activity for Innovation Center buildings G, H, and I. The project would also involve the off-site improvements of Blue Oaks Boulevard, Phillip Road, and the extension or

construction of utility infrastructure. The nearest sensitive receptors to these improvements would be the residences to the east of the project which would be approximately 100 feet from the center of improvements on Blue Oaks Boulevard. The residences to the south of the project site would be approximately 590 feet from the center of improvements on Blue Oaks Boulevard.

Table 3.6-12 shows the L_{eq} and L_{max} at these sensitive receptors during daytime construction. These values represent a conservative assessment because the modeling assumes that two of the highest noise-generating pieces of equipment (i.e., scrapers and dozers) operate simultaneously near each other in the center of residential construction. All nearby sensitive receptors would be located within the City of Roseville; and thus, City of Roseville noise standards would apply. The distance to noise exposure levels at the receptor locations was estimated for the closest possible construction activities (at the center of residential construction) and are also listed in Table 3.6-12. The closest receptors would be 500 feet to the east and 2,200 feet to the south of residential construction. Assuming that one scraper and dozer would be used simultaneously, the construction-generated noise during daytime could be as high as 76.1 dBA L_{eq} and 80.1 dBA L_{max} at the nearest sensitive receptor as shown in Table 3.6-12. This would exceed the city of Roseville Municipal code standard for daytime noise on sensitive receptors of 57 dBA L_{eq} and 77 dBA L_{max} . Refer to Appendix C for detailed information about the noise modeling.

Table 3.6-12 Noise Exposure at Off-Site Noise-Sensitive Receptors from Typical Construction Activity

Sensitive Receptor	Distance to Center of Construction Activity (feet)	Daytime Construction Noise Exposure Level at Sensitive Receptor ¹	
		L_{eq} (dBA)	L_{max} (dBA)
Residence to the East of the Project	500	62.1	66.1
Residence to the South of the Project	2,200	49.3	53.3
Proposed Residence to the East of the Proposed Innovation Center Buildings G, H, and I	500	62.1	66.1
Residences to the East of the Project Site from the Improvements on Blue Oaks Boulevard	100	76.1	80.1
Residences to the East of the Project Site from the Improvements on Blue Oaks Boulevard	590	60.7	64.7
City of Roseville Municipal Code Standard	—	57	77
Standard Exceeded	—	Yes	Yes

Notes: dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level; L_{max} = maximum sound level.

¹ Assumes all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacturer-specified noise levels for each piece of heavy construction equipment.

Source: Data modeled by Ascent in 2025.

According to the City of Roseville's Municipal Code (Chapter 9.24.030 Exemptions), noise from construction (e.g., construction, alteration or repair activities) is exempt between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 8:00 p.m. Saturday and Sunday provided, however, that all construction equipment is fitted with factory installed muffling devices and that all construction equipment shall be maintained in good working order. As described above, all proposed construction activity would occur within the allowable construction daytime hours as established by the City of Roseville. Thus, construction-generated noise would not operate outside of allowable hours. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.6-2: Construction-Generated Vibration

Short-term construction-generated vibration levels associated with the project would expose nearby sensitive receptors to groundborne vibration or groundborne noise levels that would exceed applicable local standards. Although these activities would be temporary in nature and would also be limited to only daytime hours, this impact would be **significant**.

Construction of the project would not require pile driving or blasting. Construction would involve the use of typical equipment, including loaders, dozers, excavators and rollers, which would not generate levels of ground vibration that could result in structural damage unless used at extremely close distances (i.e., within at least 10 feet of activity). No existing or future receptor is located within 10 feet of proposed construction activities; therefore, this analysis is focused on disturbance to sensitive receptors from construction (rather than structural damage).

Applying standard attenuation rates, a vibratory roller, the anticipated activity to be the most vibration-intensive, could result in a vibration level of 0.074 in/sec PPV at the 50 feet from activity.

The nearest sensitive receptor to potential vibration generating construction activities would be the existing residential land uses located approximately 50 feet east of the project site. Construction generated vibration is measured from the nearest potential source of vibration instead of the center of construction activity to avoid potential structural damage to nearby sensitive receptors. Off-site improvements on adjacent roads (i.e., Blue Oaks Boulevard and Phillip Road) would also generate vibration; however, construction related to these activities would be located 100 feet away from receptors.

To address potential human annoyance in response to ground vibration, FTA has guidelines for maximum acceptable vibration impact criteria for different types of land uses. For residential land uses FTA recommends a maximum acceptable level of 80 VdB for events that occur fewer than 30 times per day. A vibratory roller, expected to be the most vibration-intensive activity, would generate a vibration level of 80 VdB at a distance of 73 feet. Project construction would result in a vibration level of 85 VdB at the nearest existing sensitive receptors approximately 50 feet to the east of the project site. Modeling calculations are provided in Appendix C. The modeled vibration level of 85 VdB at the nearest sensitive receptors would exceed the FTA standard of 80 VdB. Thus, this impact would be **significant**.

Mitigation Measures

Mitigation Measure 3.6-2: Develop and Implement Vibration Control Plan

Prior to the start of construction of any phase of the project, the applicant shall retain a qualified acoustical or vibration specialist to prepare a vibration control plan (VCP) to minimize construction-related groundborne vibration impacts at nearby sensitive receptors. The VCP shall be consistent with the methodologies and thresholds contained in the FTA's *Transit Noise and Vibration Impact Assessment Manual* (2018) and shall include, at a minimum, the following elements:

- ▶ **Refined Impact Distances:** Using specific construction equipment lists and plans available at the time of development plan submittal, soil conditions, and receptor locations, the VCP shall identify equipment-specific impact distances where vibration levels would exceed the FTA human annoyance threshold of 80 VdB. These distances shall form the basis for determining where vibration controls are required.
- ▶ **Preconstruction Baseline Monitoring:** Establish baseline vibration levels at representative receptor locations.
- ▶ **Construction Monitoring:** Implement real-time vibration monitoring at the nearest vibration-sensitive receptors during use of high-vibration equipment (e.g., hoe-ram, vibratory roller, large dozer).
- ▶ **Response Thresholds:** If monitoring indicates vibration levels approaching 2 VdB below the applicable threshold, the contractor shall implement additional controls (e.g., substituting equipment, reducing operating speeds, or increasing buffer distances).
- ▶ **Temporary Setbacks or Phasing:** Schedule high-vibration activities to occur at greater distances from receptors or during daytime hours when human annoyance potential is lower.

Vibration-Reduction Measures

The plan shall incorporate feasible measures to ensure vibration levels remain below FTA criteria, which may include, but would not be limited to:

- ▶ Use of low-vibration equipment or alternate construction methods (e.g., static rollers instead of vibratory).
- ▶ Staging of equipment away from vibration-sensitive structures or land uses.
- ▶ Sequencing and coordination to avoid simultaneous operation of multiple high-vibration sources near the same receptor.
- ▶ Temporary vibration barriers or isolation trenches, where feasible, for near-structure work.

Reporting and Compliance

- ▶ The qualified vibration specialist shall prepare monitoring reports documenting compliance with FTA thresholds, corrective actions taken, and verification that vibration levels remained within acceptable limits.
- ▶ Any exceedance shall trigger immediate notification to the construction manager and implementation of corrective measures before resuming work.

Significance after Mitigation

Implementation of Mitigation Measure 3.6-2 would require a robust and comprehensive vibration control plan that would ensure the most appropriate and reasonable measures, including alternatives to traditional vibration-inducing activities, real-time monitoring and reporting, and a requirement to halt work if thresholds are likely to be exceeded. Incorporation of this mitigation measure would ensure that nearby homes are not exposed to disturbing levels of vibration, reducing this impact to a **less-than-significant** level.

Impact 3.6-3: Exposure of Existing Sensitive Receptors to Excessive Traffic Noise Levels

Project operation would result in an increase in traffic volumes along project-affected roadways, resulting in long-term permanent increases in traffic noise. Traffic noise modeling was conducted for the existing and the existing-plus-project conditions. Based on modeling conducted and applicable City of Roseville allowable noise increase standards, a substantial noise increase would occur on the segment of Blue Oaks Boulevard from the project site to Westbrook Boulevard as an increase of 10.7 dBA would occur with implementation of the project. This impact would be **significant**.

Vehicle trips associated with project operation would result in increased traffic volumes on the local roadway network immediately surrounding the project site and increased noise levels at land uses located along the affected roadway segments.

To analyze the impact of project-generated operational transportation noise sources, traffic noise levels under existing and existing-plus-project conditions were modeled for affected roadway segments. This was done using the Average Daily Traffic estimated in the transportation analysis conducted by Fehr & Peers. Refer to Appendix C for detailed information about the traffic noise modeling.

According to the City of Roseville General Plan 2035 standards, the acceptable transportation noise standard at the boundary of any sensitive residential receptor is 60 dB (L_{dn}). If existing noise levels exceed noise compatibility standards and a project results in a significant increase in noise (as defined below), then feasible methods of reducing noise to avoid a significant noise increase should be applied. Specifically, in cases where existing noise exceeds the City's noise compatibility standards, Policy N1.5 of the City of Roseville General Plan 2035 states:

- ▶ Where existing exterior noise is less than 60 dB, a ≥ 5 dB increase in noise is significant.
- ▶ Where existing exterior noise is between 60 and 65 dB, a ≥ 3 dB increase in noise is significant.
- ▶ Where existing exterior noise is greater than 65 dB a ≥ 1.5 dB increase in noise is significant.

Regarding long-term community noise levels, a community may experience two undesirable effects. First, increases in traffic noise may substantially increase noise levels above existing noise levels; this would be called a relative noise

impact. Evaluation of this effect compares new noise levels to the existing levels, and criteria for a relative noise impact evaluation are based on noise increases above existing levels. Second, a project may interfere with community activities independent of existing noise levels, called an absolute noise impact, which is expressed as a fixed level, not to be exceeded (FTA 2018). The City of Roseville's transportation noise standards apply these principles by defining a substantial increase in noise relative to existing conditions (see above) and establishing an absolute level of 60 dBA. Further, noise impacts would only occur where noise increases are likely to have adverse effects on sensitive receptors (e.g., outdoor activity areas, sleep disturbance) and conversely, if no sensitive receptors are located nearby, substantial increases in noise in and of themselves, would not generate impacts.

Table 3.6-13 summarizes the modeled change in traffic noise levels at the façade of the nearest sensitive receptor from the roadway centerlines under existing and existing plus project conditions and takes into consideration the sound attenuation of existing sound walls along these roads. Generally, a barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction (FTA 2018).

When traveling east from the project site along Blue Oaks Boulevard, the south side of the roadway contains no planned residential development, while the north side includes residential uses associated with the Creekview Specific Plan. At this location (north of Blue Oaks Boulevard toward Westbrook Boulevard), an existing soundwall was included in the noise model by applying a 5-dB reduction.

Table 3.6-13 Summary of Modeled Traffic Noise Levels under Existing and Existing-Plus-Project Conditions

Segment #	Roadway Segment	Existing (dBA L _{dn})	Existing Plus Project (dBA L _{dn})	Sound Wall Attenuation ¹	Change (dBA)	Applicable Increase Threshold (dB)	Exceeds Threshold
1	Blue Oaks Boulevard from Project Site to Westbrook Boulevard	49.3	60.0	Yes	+10.7	5.0	Yes
2	Blue Oaks Boulevard from Westbrook Boulevard North Hayden Parkway	57.6	59.9	Yes	+2.3	3.0	No
3	Blue Oaks Boulevard from North Hayden Parkway to Fiddymment Road	60.1	61.5	Yes	+1.4	1.5	No
4	Blue Oaks Boulevard from Fiddymment Road to Del Webb Boulevard	63.6	64.1	Yes	+0.4	1.5	No
5	Pleasant Grove from Market Street to Fiddymment Road	63.4	63.6	Yes	+0.2	1.5	No
6	Westbrook Boulevard from Blue Oaks Boulevard to Pleasant Grove Boulevard	54.4	56.8	Yes	+2.4	3.0	No
7	Hayden Parkway from Fiddymment Road to Blue Oaks Boulevard	56.7	56.7	Yes	+0.0	3.0	No
8	Hayden Parkway from Blue Oaks Boulevard to Crawford Parkway	57.0	56.8	Yes	-0.2	3.0	No
9	Fiddymment Road from Del Webb Boulevard Blue Oaks Boulevard	63.1	63.1	Yes	-0.1	1.5	No
10	Fiddymment Road from Blue Oaks Boulevard to Crawford Parkway	63.1	63.2	Yes	+0.1	1.5	No

Notes: dB = decibel; dBA = A-weighted decibels; CNEL= community noise equivalent level.

Bolded values represent an increase that exceeds the City of Roseville's noise standards.

¹ Typical sound wall has a noise attenuation of 5 dBA (FTA 2018).

Sources: FTA 2018; Noise levels modeled by Ascent in 2025.

The segments of Blue Oaks Boulevard from North Hayden Parkway to Fiddymment Road, Blue Oaks Boulevard from Fiddymment Road to Del Webb Boulevard, Pleasant Grove from Market Street to Fiddymment Road, and Fiddymment Road from Del Webb Boulevard to Blue Oaks Boulevard currently exceed the 60 dBA L_{dn} maximum noise limit at the boundary of sensitive receptors but would not surpass the increase standards based on existing noise levels of the City of Roseville General Plan.

As shown in Table 3.6-13, the project would not increase existing noise volumes on any segment from a level of 60 dB or less to a level above 60 dB, which is the acceptable noise volume for residential uses. For roadway segments already operating in excess of the acceptable noise threshold of 60 dB, the project would not result in a substantial increase in existing ambient noise. Thus, the project would not cause noise volumes to exceed the City of Roseville's standards for acceptable noise volumes or substantial increases in noise. However, in terms of noise perception, a 10-dB increase is perceived by the human ear as a doubling of a noise source. Thus, while the traffic noise increase on the segment of Blue Oaks Boulevard from the project site to Westbrook Boulevard would not exceed the City's noise standards, it would be substantial in terms of noise perception.

Although the project would not exceed the City's noise standards, existing residences on the segment of Blue Oaks Boulevard west of Westbrook Boulevard would experience a substantial increase (i.e., doubling) in noise perception compared to existing noise levels, which could result in increased annoyance at outdoor activity areas located directly adjacent to Blue Oaks Boulevard. This impact would be **significant**.

Mitigation Measures

As described in Chapter 4, "Cumulative Impacts," noise volumes along the segment of Blue Oaks Boulevard from the project site to Westbrook Boulevard were already anticipated to exceed 60 dB in the cumulative condition with or without the project. As demonstrated in the Creekview Specific Plan EIR, roadway noise along Blue Oaks Boulevard west of Westbrook Boulevard were anticipated to reach noise levels of 65.5 dBA L_{dn} in the cumulative condition with buildout of the Creekview Specific Plan (City of Roseville 2011: Table 5-42). All feasible mitigation was applied at the time the Creekview Specific Plan was approved, and the required mitigation has been completed. The existing subdivision north of Blue Oaks Boulevard and west of Westbrook Boulevard is set back 40 feet from the edge of Blue Oaks Boulevard, separated by a landscape buffer, and a 6-foot masonry sound wall was constructed. No additional feasible mitigation is available.

Significance after Mitigation

Residences along Blue Oaks Boulevard from the project site to Westbrook Boulevard would experience the relative noise impact of existing noise levels being perceived as doubling as a result of the project. Therefore, this impact would remain **significant and unavoidable**.

Impact 3.6-4: Long-Term Operational Non-Transportation Noise Levels

The project would include non-transportation stationary sources such as noise from HVAC units, trucks and loaders/forklifts at loading docks, and backup generators. Based on modeling conducted and reference noise levels for these noise sources, off-site noise-sensitive receptors would experience project-generated operational stationary noise levels that exceed the City's daytime and nighttime noise levels standards. This impact would be **significant**.

This impact analyzes potential exposure of existing and future planned sensitive receptors to noise generated by non-transportation aspects of project operation, which includes the residential uses proposed by the project. Based on project site plans, mechanical equipment associated with building operations, such as HVAC equipment, loading dock activities, and the emergency backup generators, would result in noise levels that would expose the nearby sensitive receptors to long-term operational noise during both daytime and nighttime. Anticipated noise levels from potential noise sources associated with the project are described below.

Building Mechanical Equipment

Implementation of the project would introduce new stationary noise sources associated with building mechanical equipment, primarily HVAC units. Detailed information regarding the stationary equipment to be installed is not available at this time because future tenants are not known. However, noise levels associated with air conditioning systems can reach levels of up to 78 dB at 3 feet (Lennox 2019). Applying this reference noise level as an hourly average (L_{eq}) and assuming a 50 percent usage rate, would result in a 75 dBA L_{eq} at 3 feet from the source.

Commonly installed building equipment, such as HVAC systems, can be located in the interior of the structure, on rooftops, or in direct line-of-sight to adjacent land uses. Based on the reference noise level for HVAC units of 78 dBA L_{max} and 75 dBA L_{eq} at 3 feet, and assuming typical attenuation rates, from distance alone, noise from HVAC units would reduce to 38.5 dBA L_{eq} and 41.5 dBA L_{max} at the nearest receptors located approximately 200 feet east. These levels would not exceed daytime or nighttime L_{eq} or L_{max} standards (i.e., 57 dBA L_{eq} or 77 dBA L_{max} during daytime hours and 52 dBA L_{eq} or 72 dBA L_{max} during nighttime hours), and noise levels at further distances would be even lower. Refer to Appendix C for detailed calculations.

Loading Dock Activity

Buildings constructed as part of the project would include loading docks or designated areas for receiving shipments by commercial trucks. Noise sources from truck activity associated with delivery areas are usually short-term and can include activities such as vehicle idling, engines revving, and the release of air brakes on heavy trucks. All these discrete activities occurring together combine to generate noise that is treated as a stationary noise source. Reference noise levels associated with these activities were obtained by an Ascent noise specialist during a site visit at the Anheuser Busch Santa Fe Springs Distribution Center at 12065 Pike Street, Santa Fe Springs, CA. (Although the proposed project does not include a distribution center use, the noise data collected at the Anheuser Busch Distribution Center is the most representative reference data available for the purpose of estimating noise levels from the implementation of the proposed innovation center.) The reference noise level captured trucks idling, brake noise, opening and raising the truck trailer doors, and loading and unloading activity noise (Ascent 2023) and therefore represents primary noise sources associated with loading docks. The noise specialist collected noise measurements during loading and unloading activities using a Larson Davis Laboratories LxT precision integrating sound level meter located 100 feet away from the center of the loading dock doors. The collective noise level measured during these activities was 59.3 dBA L_{eq} at 100 feet (Ascent 2023).

The project would include 18 loading docks located internally within the innovation and commercial area. Enclosed buildings typically yield 10 dBA of attenuation (Caltrans 2013b). Operational hours would vary based on future tenants but typical operational hours for the innovation and commercial area would be 6:00 a.m. to 8:00 p.m., 5 days per week. Thus, noise impacts associated with loading dock activity were evaluated against the City of Roseville sound level standards for sensitive receptors for daytime (i.e., 57 dBA L_{eq} 77 dBA L_{max}) and nighttime (i.e., 52 dBA L_{eq} 72 dBA L_{max}).

This analysis assumes the operation of two loading docks simultaneously based on the current placements found within the project site plans. The nearest sensitive receptors that would be potentially affected by loading dock noise would be the property line of the planned single-family housing area approximately 340 feet east. At this distance, noise from the loading dock activity would attenuate to 41.7 dBA L_{eq} and, thus, would not exceed the sound level limits for sensitive receptors of the Roseville Municipal Code (i.e., 57 dBA L_{eq} during daytime hours and 52 dBA L_{eq} during nighttime hours). In addition, noise generated by the loading dock activity would be lower than the existing average daytime and nighttime noise levels (i.e., 59.9 dBA L_{eq} and 47.7 dBA L_{eq} , respectively) at the nearest existing residential receptor. Therefore, the project would not result in a substantial increase in noise because existing noise levels at nearby receptors are higher than that of noise-generated from loading dock activity.

Diesel Generators

Backup diesel generators would be used to supply necessary power requirements to vital systems within the proposed buildings and would generally only be used on a temporary basis during emergency power outages or during routine maintenance. As backup generators only operate in the case of emergencies, and based on typical hours of operation for the commercial uses of the project (i.e., 5:00 a.m. to 10:00 p.m. seven days per week) and for the innovation center uses (i.e., 6:00 a.m. to 8:00 p.m. five days per week), the noise generated by backup generators

are compared to both the daytime and nighttime noise standards (i.e., 57 dBA L_{eq} and 77 dBA L_{max} during daytime hours and 52 dBA L_{eq} and 72 dBA L_{max} during nighttime hours). A reference noise level for a generator is 82 dBA L_{max} at 50 feet and considering that when a generator is in use to provide backup power it would be operating continuously, this level can also be applied as an L_{eq} (FTA 2018). Applying this reference noise level and typical attenuation rates, at the nearest potential sensitive receptor approximately 200 feet east, noise would attenuate to 70 dBA L_{eq} and 70 dBA L_{max} , which would exceed the City's daytime L_{eq} standard of 57 dBA L_{eq} but not the L_{max} standard of 77 dBA. In addition, these levels would exceed the City's nighttime standards of 52 dBA L_{eq} but not the 72 dBA L_{max} . Noise from a generator would attenuate to below the daytime standard beyond 900 feet and below the nighttime standard beyond 1,600 feet.

Parking Lot

The project would involve the installation and operation of a surface parking lot that would provide parking and circulation for the innovation and the commercial uses of the project. This parking lot would include 1,718 stalls (including standard, accessible, compact, and electrical vehicle-capable stalls). The use of parking lots generates various noise sources including vehicular traffic-related noise, car doors closing, people talking, horns honking, engines starting, engines idling, car alarms, and radios sounding. These noise sources are typically short and intermittent. In addition, noise levels associated with parking lots tend to increase as hourly or daily vehicular traffic increases and larger parking facilities typically generate more noise than smaller ones. Typical operational hours for the commercial uses of the project would be from 5:00 a.m. to 10:00 p.m., seven days per week and for the innovation center uses would be 6:00 a.m. to 8:00 p.m. five days per week. At these operational hours, the parking lot would be subject to the daytime and nighttime noise L_{eq} and L_{max} noise standards (i.e., 57 dBA L_{eq} and 77 dBA L_{max} during daytime hours and 52 dBA L_{eq} and 72 dBA L_{max} during nighttime hours).

Potential increases in noise levels associated with the proposed parking lot, as experienced at the nearest sensitive receptor, were modeled using Average Daily Traffic provided by Fehr & Peers. It is anticipated that the parking lot would result in noise levels of 64.4 dB L_{eq} at 50 feet. Based on this reference level, parking lot noise would attenuate to 56.1 dBA L_{eq} at the nearest sensitive receptor (i.e., the project's southern residential area) located approximately 130 feet east of the portion of the parking lot where transportation activity is expected. This would not exceed the City's daytime standard of 57 dBA L_{eq} ; however, it would exceed the nighttime standard of 52 dBA L_{eq} . Therefore, operation of the parking lot would result in a substantial noise increase.

Summary

Operational stationary noise sources would include HVAC equipment, noise at loading docks, backup generators, and parking lots. As discussed above, noise from HVAC units would attenuate to below both daytime and nighttime thresholds at the nearest sensitive receptors (i.e., the project's southern residential area), located approximately 200 feet from the commercial and innovation center and, therefore, would not expose sensitive receptors to noise levels in exceedance of applicable noise standards. Noise from loading activities would not exceed either the daytime or nighttime standards attenuating to 41.7 dBA L_{eq} to the nearest sensitive receptor approximately 340 feet east of the loading dock. Regarding noise from generators, the City's daytime L_{eq} standard of 57 dBA would be exceeded but not the L_{max} standard of 77 dBA. In addition, generators would exceed the City's nighttime standards of 52 dBA L_{eq} but not the 72 dBA L_{max} standard. Noise from an emergency generator would attenuate to below the daytime standards beyond 900 feet and below the nighttime standards beyond 1,600 feet. Because parking lot activities could exceed nighttime standards and backup generators noise levels are anticipated to exceed both daytime and nighttime standards, noise from parking lots and generators could result in a substantial permanent increase in noise. This impact would be **significant**.

Mitigation Measures

Mitigation Measure 3.6-4a: Reduce Generator Noise Exposure

The applicant shall hire a qualified acoustical specialist to prepare a noise minimization plan before approval of construction drawings that will identify design strategies and noise attenuation features to reduce noise generated by the project to below daytime noise (i.e., 57 dB L_{eq} and 77 dB L_{max}) and nighttime noise (i.e., 52 dB L_{eq} and 72 dB L_{max})

standards required by the Municipal Code for residential land uses in the vicinity of the project. The noise minimization plan shall include, but not be limited to, a combination of the following measures (or other measures demonstrated to be equally effective) to reduce the effect of noise levels generated by on-site operational noise sources to levels that are below the City's noise standards:

- ▶ Backup generators will be placed such that on-site buildings can obstruct line-of-site between the generators and sensitive receptors which can achieve a reduction 10-20 dB.; or
- ▶ If necessary to meet the noise standards, install acoustic enclosures for backup generators designed to reduce the noise levels up to 10 dB.

Measures identified in the noise minimization plan shall be incorporated into the project design and identified on the site plan. The City shall verify that these measures are included in the site plan before approval of the final site plan.

Mitigation Measure 3.6-4b: Reduce Parking Lot Noise Exposure

The applicant shall hire a qualified acoustical specialist to prepare a noise minimization plan before approval of construction drawings that will identify design strategies and noise attenuation feature to reduce noise generated by the proposed parking lot to below daytime (i.e., 57dB L_{eq} and 77 dBA L_{max}) and nighttime (i.e., 52 dB L_{eq} and 72 dBA L_{max}) standards required by the Municipal Code for residential land uses in the vicinity of the project. The noise minimization plan shall include, but not be limited to, a combination of the following measures:

- ▶ Separate the area where parking lot activity would occur with one or more walls. Generally, a barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction.
- ▶ Design the proposed wall between the project and adjacent residential uses, such that it serves as a sound barrier between all adjacent sensitive receptors and the facility. The wall must be constructed of solid material (e.g., brick, concrete). Scenic quality factors shall be taken into account during design, and the barriers shall be designed to blend into the landscape on the project site, to the extent feasible. Generally, a barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction.

Measures identified in the noise minimization plan shall be incorporated into the project design and identified on the site plan. The City shall verify that these measures are included in the site plan before approval of the final site plan.

Significance after Mitigation

The generators would require a reduction of 18 dBA to meet both the daytime and nighttime standards. Generators that are completely enclosed can achieve a 10-dB reduction. Further, in combination with on-site buildings obstructing the line-of-sight between generators and off-site receptors, another 10 to 20 dB reduction could be achieved, which would be sufficient to achieve daytime and nighttime L_{eq} standards of 57 dBA L_{eq} and 52 dBA L_{eq} , respectively. The parking lot would require a reduction of 4.1 dBA to meet nighttime noise standards. A barrier that breaks line of sight between a source and a receiver that is constructed of solid material (e.g., brick, concrete) typically results in at least a 5 dB noise reduction. Thus, implementing Mitigation Measures 3.6-4a and 3.6-4b, which would require the preparation of a site-specific noise minimization plan based on the specific specifications of the proposed stationary equipment, site design and building configuration, as well as proposed sound barriers, would reduce stationary noise sources below daytime and nighttime noise standards. This impact would be reduced to a **less-than-significant** level.