

4.12 NOISE

This section describes existing noise conditions, identifies associated regulatory requirements, evaluates potential project and cumulative impacts, and identifies mitigation measures for any significant or potentially significant impacts related to implementation of the Sustainability Policy and Regulatory Update of the County of Santa Cruz (County) General Plan and Local Coastal Program (LCP) and County Code (Sustainability Update or project). The analysis is based on review of existing data and studies, including roadway noise contours developed for the County General Plan/LCP Noise Element that was updated in 2020.

4.12.1 Environmental Setting

4.12.1.1 Acoustic Fundamentals

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature, and can vary substantially from person to person. Common sources of environmental noise and relative noise levels are shown in Table 4.12-1.

Table 4.12-1. Typical Noise Levels Associated with Common Activities

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet Flyover at 1,000 feet	110	Rock Band
Gas Lawn Mower at 3 feet	100	
Diesel Truck at 50 feet, 50 mph	90	Food Blender at 3 feet
Noisy Urban Area, Daytime	80	Garbage Disposal at 3 feet
Commercial Area	70	Vacuum Cleaner at 10 feet
Heavy Traffic at 300 feet	60	Normal speech at 3 feet
Quiet Urban Daytime	50	Large Business Office
Quiet Urban Nighttime	40	Dishwasher (in next room)
Quiet Suburban Nighttime	30	Theater, Large Conference Room (background)
Quiet Rural Nighttime	20	Library
	10	Bedroom at Night, Concert Hall (background)
	0	Broadcast/Recording Studio
Lowest Threshold of Human Hearing (Healthy)	0	Lowest Threshold of Human Hearing (Healthy)

Source: Caltrans 2020a. **Notes:** dBA = A-weighted decibels; mph = miles per hour.

A sound wave is initiated in a medium by a vibrating object (e.g., vocal cords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in Hertz (Hz), which is equivalent to one complete cycle per second.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and to have a more useable numbering system, the decibel (dB) scale was introduced. Sound level expressed in decibels (dB) is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure and the second pressure being that of the sound source of concern. For sound pressure in air, the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65-dB source of sound, such as a truck, when joined by another 65-dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100-fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted decibels (dBA). For this reason, the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation) such as automobiles, trucks, and airplanes, and stationary sources (non-transportation) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (e.g., walls, building façades, berms). Noise generated from mobile sources generally attenuate at a rate of 3 dB (typical for hard surfaces, such as asphalt) to 4.5 dB (typical for soft surfaces, such as grasslands) per doubling of distance, depending on the intervening ground type. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 dB to 7.5 dBA per doubling of distance for hard and soft sites, respectively.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, or intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise

level reduction or “shielding” provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as earthen berms, hills, or dense woods as well as built features such as buildings, concrete berms and walls may be effective barriers for the reduction of source noise levels.

4.12.1.2 Noise Descriptors

The intensity of environmental noise levels can fluctuate greatly over time and as such, several different descriptors of time-averaged noise levels may be used to provide the most effective means of expressing the noise levels. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment near the receptor(s). Noise descriptors most often used to describe environmental noise are defined as follows:

- **L_{max} (Maximum Noise Level):** The maximum instantaneous noise level during a specific period of time.
- **L_{min} (Minimum Noise Level):** The minimum instantaneous noise level during a specific period of time.
- **L_x (Statistical Descriptor):** The noise level exceeded “X” percent of a specific period of time. For example, L_{50} is the median noise level, or level exceeded 50% of the time.
- **L_{eq} (Equivalent Noise Level):** The average noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq} . In noise environments determined by major noise events, such as aircraft overflights, the L_{eq} value is heavily influenced by the magnitude and number of single events that produce the high noise levels.
- **L_{dn} (Day-Night Average Noise Level):** The 24-hour L_{eq} with a 10-dBA “penalty” for noise events that occur during the noise-sensitive hours between 10 p.m. and 7 a.m. In other words, 10 dBA is “added” to noise events that occur in the nighttime hours, and this generates a higher reported noise level when determining compliance with noise standards. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
- **CNEL (Community Noise Equivalent Level):** The CNEL is similar to the L_{dn} described above, but with an additional 5-dBA “penalty” added to noise events that occur during the noise-sensitive hours between 7 p.m. and 10 p.m., which are typically reserved for relaxation, conversation, reading, and television. When the same 24-hour noise data are used, the reported CNEL is typically approximately 0.5 dBA higher than the L_{dn} .
- **SEL (Sound Exposure Level):** The cumulative exposure to sound energy over a stated period of time; typically, the energy of an event, summed into a 1-second period of time.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent sound level (L_{eq}) which corresponds to the steady-state A-weighted sound level containing the same total energy as the time-varying signal over a given time period (usually 1 hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise. Use of these descriptors along with the maximum noise level occurring during a given time period provides a great deal of information about the ambient noise environment in an area.

4.12.1.3 Negative Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The majority of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustomed to, the less tolerable the new noise source will be to an individual.

With respect to how humans perceive and react to changes in noise levels, a 1-dBA increase is generally imperceptible outside of a laboratory environment, a 3-dBA increase is barely perceptible, a 6-dBA increase is clearly noticeable, and a 10-dBA increase is subjectively perceived as approximately twice as loud (Caltrans 2013). These subjective reactions to changes in noise levels were developed on the basis of test subjects' reactions to changes in the levels of steady-state, pure tones or broad-band noise and to changes in levels of a given noise source. Perception and reaction to changes in noise levels in this manner is thought to be most applicable in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels.

4.12.1.4 Vibration Fundamentals

Vibration is similar to noise in that it is a pressure wave traveling through an elastic medium involving a periodic oscillation relative to a reference point. Vibration is most commonly described in respect to the small movements of a structure or surface, such as in buildings or the ground. Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Sources of vibration 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 in nature (e.g., explosions, impacts). Vibration levels can be depicted in terms of amplitude and frequency; relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal, or the quantity of displacement measured from peak to trough of the vibration wave. RMS is defined as the positive and negative statistical measure of the magnitude of a varying quantity. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a period of one second. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration [FTA] 2018). PPV and RMS vibration velocity are nominally described in terms of inches per second (in/sec). As with airborne sound, vibration velocity can also be expressed using decibel notation as vibration decibels (VdB) with a reference quantity of 1 micro-inch per second. The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration and allow for the presentation of vibration levels in familiar terms.

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. Human response to vibration has been found to correlate well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and vehicles on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the elevated levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration relevant to this analysis occurs from approximately 60 VdB, which is the typical background vibration-velocity level; to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2018). Table 4.12-2 identifies some common sources of vibration, corresponding VdB levels, and associated human perception and potential for structural damage.

Table 4.12-2. Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level, VdB (re 1 μ -inch/sec, RMS)	Typical Events (50-foot setback)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment
—	95	Heavy tracked vehicles (bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	Commuter rail, upper range
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, occasional events	75	Commuter rail, typical bus or truck over bump or on rough roads
Residential annoyance, frequent events	72	Rapid transit, typical
Approximate human threshold of perception to vibration	65	Buses, trucks, and heavy street traffic
—	60	Background vibration in residential settings in the absence of activity
Lower limit for equipment ultra-sensitive to vibration	50	—

Source: FTA 2018.

Notes: μ -inch/sec = micro-inch per second; re = in reference to; RMS = root-mean-square; VdB = vibration

4.12.2 Existing Ambient Noise Environment

4.12.2.1 Introduction

The unincorporated areas of the county are characterized by a mix of developed and open space uses. The northern coastal area is rural in nature, with coastal bluffs and agricultural areas. Developed areas are limited to the town of Davenport and Bonny Doon. The Santa Cruz Mountains area consists of forested, open areas and rural development, primarily in and adjacent to the communities of Felton, Ben Lomond, Brookdale, and Boulder Creek. The southern portion of the county is dominated by rural agricultural areas. Residential communities are located adjacent to the City of Watsonville and La Selva Beach.

The urbanized areas within the County's Urban Services Line (USL) extends from the city limit of Santa Cruz to La Selva Beach. Single-family and multi-family residential uses are the predominant land use in the USL. Large-scale retail uses are focused on Soquel Avenue/Drive near the Highway 1 interchange, 41st Avenue at Soquel Drive, and Soquel Drive at State Park Drive. Smaller-scale retail uses are found near major intersections along Soquel Drive and near the intersection of major arterials in Live Oak. A cluster of medical uses is located at the western end of Soquel Drive, anchored by Dominican Hospital and the Sutter Surgery Center. The Cabrillo College campus occupies a large area on Soquel Drive south of Park Avenue. Industrial

uses are concentrated in an area surrounded by 41st Avenue, Highway 1, and Soquel Drive. There are also a few isolated sites of industrial uses in Live Oak.

4.12.2.2 Existing Sources of Noise

According to the County’s General Plan/LCP Noise Element, ambient noise levels vary throughout unincorporated Santa Cruz County and differ between urban and rural settings. Noise sources in the county are primarily associated with transportation facilities, including highways and roads, as well as limited rail noise and noise from airport operations. Other non-transportation-related noise generators are commonly referred to as “stationary,” “fixed,” “area,” or “point” sources of noise. These typically include noise generated by industrial uses, mining, agricultural operations, and commercial uses, as well as construction activities (County of Santa Cruz 2020).

Transportation-Related Noise Sources

Highway and Roadway Noise

The primary factors that determine roadway noise levels are traffic volume, the percentage of trucks and buses, average vehicle speed and the presence of noise attenuation features such as sound walls and terrain (County of Santa Cruz 2020). According to the County’s General Plan Noise Element, highways are a major noise source in many jurisdictions. Within Santa Cruz County, noise contours for the 60 CNEL can extend as far as 1,800 feet from Highway 1 between Soquel Drive and the Rio Del Mar Boulevard ramps. Figure 4.12-1 shows existing noise contours for highways and major roads within the county. The Noise Element further indicates that to address highway noise along long-established routes, the California Department of Transportation (Caltrans) has a priority program and a policy to put sound walls along freeways and highways located adjacent to residential areas. The majority of recently constructed sound walls have been along State Route 1 (Highway 1) within the cities of Santa Cruz and Capitola. Although sound walls reduce noise impacts, highway noise will remain an issue for noise-sensitive land uses, particularly for residential development (County of Santa Cruz 2020).

During peak travel hours, heavy travel volumes on unincorporated Santa Cruz County streets result in higher noise levels compared to noise levels during non-peak hours. The most heavily traveled roadways include the Soquel Avenue/Drive corridor, Freedom Boulevard, San Andreas Road, State Park Drive, Rio Del Mar Boulevard, Graham Hill Road, Capitola Road, Eaton Street, Portola Drive, 7th Avenue, 17th Avenue, 41st Avenue, East Cliff Drive, Airport Boulevard, Green Valley Road, and Holohan Road (County of Santa Cruz 2020). Figure 4.12-1 illustrates existing noise contours along major roads within the county.

Long-term noise measurements were taken adjacent to major roadways in 2017 as part of the County’s General Plan Noise Element. The results are shown on Table 4.12-3. Based on these noise measurements and noise modeling, future noise contours along highways and major roads in the county were developed for the year 2040 for the Noise Element update. Future noise contours are shown on Figure 4.12-2. Estimated future traffic noise increases were based on the Association of Monterey Bay Area Government’s adopted 2014 Regional Growth Forecast (0.4% per year) for the unincorporated county and the Caltrans

estimate of 1% growth per year on state highways. The estimates result in a projected increase in traffic noise of approximately 1 dB by the year 2040 over current levels (County of Santa Cruz 2020).

Table 4.12-3. General Plan/LCP Noise Element Noise Measurements

Location	Measured Noise Level
Location 1: Along Highway 17	DNL 77 dB at 100 feet from roadway centerline
Location 2: Along Highway 9	DNL 73 dB at 30 feet from roadway centerline
Location 3: Along Freedom Boulevard	DNL 72 dB at 25 feet from roadway centerline
Location 4: Along Soquel Drive	DNL 60 dB at 40 feet from roadway centerline
Location 5 Along Capitola Road	DNL 71 dB at 40 feet from roadway centerline
Location 6: Along 17 th Avenue	DNL 71 dB at 25 feet from roadway centerline
Location 1: Along Highway 1	DNL 77 dB at 102 feet from roadway centerline

Source: Charles M. Salter Associates 2017

Airport Noise

No commercial airports are located within unincorporated Santa Cruz County. The sole general aviation airport, Watsonville Municipal Airport, is located at the boundary of the unincorporated area within the City of Watsonville. Several private airports are located in Santa Cruz County at Monterey Bay Academy, Bonny Doon and Swanton. A heliport is located at Dominican Hospital. Aircraft traveling to and from airports in other counties also fly over the County of Santa Cruz. Thus, aircraft overflight noise is audible within the county. Flight paths are determined by the Federal Aviation Administration (FAA). The State of California uses the CNEL descriptor to describe land use compatibility with respect to aircraft noise exposures. The California airport noise compatibility criterion for residential land uses is 65 dB CNEL (County of Santa Cruz 2020). See Section 4.11, Land Use, in this Environmental Impact Report (EIR) for further discussion of airport plans. At the Watsonville Airport, the four runways (2-20 and 9-27) accommodate over 55,000 operations per year including an estimated 5,000 instrument approaches. The 2003 Watsonville Municipal Airport Master Plan identifies noise contours for both existing and forecasted operations for the year 2020 that show the 65 CNEL contour to be mostly within airport property, except for minor encroachment into certain residential areas located to the north (see Figure 4.12-3). The Watsonville Municipal Airport is currently updating the adopted 2003 Airport Master Plan.

Rail Noise

Noise associated with railroad operations is caused by diesel engines, rolling wheels, switching operations and whistles. Generally, trains operate at low speeds through urban areas as a safety precaution and noise levels are lower at slower speeds. Switching operations usually occur at stations or depots. Whistles are usually blown in advance of at-grade crossings (County of Santa Cruz 2020). The interaction of steel wheels and rails generates three types of noise: (1) rolling noise due to continuous rolling contact, (2) impact noise when a wheel encounters a discontinuity in the running surface, such as a rail joint, turnout or crossover, and (3) squeal generated by friction on tight curves. As speed increases, wheel-rail noise becomes the dominant noise source (over lower frequency rolling noise) (FTA 2018). Railroad noise exposure levels

depend upon train operating conditions, distance from the tracks, train speed, and the characteristics of the track.

Rail operations in Santa Cruz County consist of seasonal and recreational passenger rail service provided by the Santa Cruz Big Trees & Pacific Railway on the Felton Branch Rail Line and the Santa Cruz and Monterey Bay Railway on the Santa Cruz Branch Line that is owned by the Santa Cruz County Regional Transportation Commission (SCCRTC). These trains operate primarily during summer and year-end holidays (County of Santa Cruz 2020). Occasional freight rail service to San Lorenzo Valley also operates on the Felton Branch Line.

The Santa Cruz Branch Rail Line right-of-way is a 32-mile, continuous travel corridor that generally parallels Highway 1, extending from the unincorporated community of Pajaro in Monterey County to Davenport in Santa Cruz County. Passenger rail could potentially operate at some point in the future between Watsonville and Santa Cruz as described in Section 4.15, Transportation, of this EIR.

Non-Transportation-Related Noise Sources

Industrial and Commercial Land Uses

According to the County's General Plan Noise Element, noise generated by industrial and commercial operations, maintenance, manufacturing, truck traffic (loading docks), and warehousing can affect surrounding noise sensitive land uses. Industrial operations often involve use of mechanical equipment, generators and vehicles that contribute to noise levels at industrial sites, particularly for outdoor activities. However, Santa Cruz County contains few heavy commercial operations. The former CEMEX cement plant in Davenport ceased making cement in 2010, and it is not expected that any other heavy industrial use will occur as site reuse (County of Santa Cruz 2020).

Noise generated by light industrial, heavy/service commercial operations and office workplace areas can include sounds associated with maintenance, manufacturing, truck traffic (loading docks), and warehousing, and these can affect surrounding noise sensitive land uses. In Santa Cruz County, these types of uses primarily occur on properties located along the Soquel Avenue/Drive corridor and Upper 41st Avenue, as well as in southern portion of the county, both within and near agricultural areas. At some locations, residential areas exist adjacent to these commercial areas which requires careful attention to site planning, building design and operational conditions (County of Santa Cruz 2020).

Agricultural Operations

Noise perceived as disruptive by residents in proximity to existing agricultural operations may result from the operation of agricultural machinery and equipment, especially in the evening or early morning hours. In addition, operation of exterior exhaust and cooling system equipment typically used in greenhouse operations can be a source of noise that may affect surrounding land uses (County of Santa Cruz 2020).

Some of the more common noise sources associated with farming operations include tractors, harvesting equipment, spray equipment, aerial crop-dusters, and stationary power sources, including internal

combustion pump engines. Maximum noise levels generated by farm-related tractors typically range from 77 to 85 dB at a distance of 50 feet from the tractor, depending on the horsepower of the tractor and the operating conditions. Due to the seasonal nature of the agricultural industry, there are often extended periods of time when no noise is generated on properties that are actively being farmed, followed by short-term periods of intensive mechanical equipment usage and corresponding noise generation. Due to this high degree of variability of agricultural activities, it is not feasible to reliably quantify the noise generation of agricultural uses in terms of the daily or hourly noise standards commonly utilized to assess impacts of other noise sources. However, these uses may generate short-term periods of elevated noise during all hours of the day and night (Santa Cruz County Regional Transportation Commission 2013).

Residents living within agricultural areas are typically either involved with the agricultural industry or were informed of accepted the noise levels that would occur within agricultural areas when they elected to live in an agricultural area (County of Santa Cruz 2020). In Santa Cruz County, accommodation of the agricultural industry is a priority and residents are expected to accept the typical noise levels associated with commercial agricultural operations (County of Santa Cruz 2020).

Agricultural uses within Santa Cruz County are protected by the Santa Cruz County Code (Chapter 16.50, Agricultural Land Preservation and Protection Ordinance). The Ordinance is intended to support and encourage continued agricultural operations in the county and to forewarn prospective purchasers and residents of property adjacent to agricultural operations of the necessary sounds, odors, dust and hazardous chemicals that accompany agricultural operations. As stated in the ordinance, “no agricultural activity, operation, or facility or appurtenances thereof shall be or become a nuisance, public or private, if it has been conducted and maintained for commercial purposes, and in a manner consistent with proper and accepted customs and standards as established and followed by similar agricultural operations, and in a manner consistent with all applicable Federal, State and local laws, regulations, permits and approvals, and the conditions thereof, after it has been in operation for more than three years if it was not a nuisance when it began” [§ 16.50.010(C)]. Therefore, normal and usual agricultural operations creating elevated sound levels are not normally considered a nuisance.

In addition, noise generated by winery operations is subject to special standards in the Santa Cruz County Code (SCCC) Chapter 13.10, and noise generated by normal and customary farming operations on Commercial Agricultural properties is exempt from regulations in the SCCC Chapter 8.30 Noise Ordinance pertaining to unlawful noise (County of Santa Cruz 2020).

Mining Operations

Mining operations typically involve a range of noise-generating equipment, operations, and sometimes include blasting noise. Heavy equipment used in quarry and mining activities and blasting operations may generate noise levels that are incompatible with surrounding land uses. Off-site noise associated with the transportation of materials to and from the mining facility may also be generated. Santa Cruz County contains four active quarries (another three are in the process of reclamation and one other has completed reclamation); each is operating in accordance with conditions of approval of their mining plans which include restrictions on time of operations and other site-specific noise reduction strategies. Noise

generated by quarries and mining activities is subject to special standards in the SCCC Chapter 16.54 Mining Regulations. See Section 4.2, Agriculture, Forest, and Mineral Resources, of this EIR for further description of mining and mineral resources in the county.

Other Equipment and Amplified Sound

The motors, pumps and fans that cool and heat buildings produce point-source noise that most directly affects adjacent land uses. Frequently this equipment includes components of pure tone noise from the rotational frequency of motors. Although noise levels are generally low from these sources, the fact that such sources may operate continuously and may include pure tones that make them audible at a substantial distance creates potential for conflict (County of Santa Cruz 2020).

Portable power equipment, such as leaf blowers, lawn mowers, portable generators, electric saws and drills and other similar equipment frequently create noise during daylight hours. Such disruptions to the ambient sound environment are ubiquitous in the modern suburb and can, temporarily, produce very high noise levels at the location of the work (County of Santa Cruz 2020).

Amplified sound includes noise from personal or home audio equipment, automotive audio equipment, outdoor loudspeakers, such as those used for paging, and amplified sound at music or theatrical performances. Because this sound typically includes music or speech, it is potentially more detectable and annoying to some people and sensitive receptors than other sounds of the same noise level. Amplified music also may be used at special events and for temporary uses (County of Santa Cruz 2020).

Construction Noise

Construction noise typically generates the loudest noise events commonly experienced by residents and is associated with building demolition, grading, construction, large diesel engines, truck deliveries and hauling. Construction activity, although temporary at any given location, can be substantially disruptive to adjacent uses during the construction period. Some noise-generating activities, such as blasting or pile-driving as part of construction operations, may also result in excessive levels of groundborne vibration that may affect nearby land uses (County of Santa Cruz 2020).

4.12.2.3 Sensitive Receptors

Noise-sensitive receptors are residents or occupants of land uses that generally include those uses where exposure to noise would result in adverse effects, as well as uses where quiet is an essential element of the intended purpose. Residential dwellings are sensitive receptors of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Noise-sensitive land uses also include schools and hospitals. Other uses that may also include sensitive receptors can include those that are carefully planned and designed to ensure appropriate sound levels for the use, including churches, convalescent care facilities, and hotels (County of Santa Cruz 2020). These uses are found throughout the unincorporated county area, including along highways and major roadways.

Existing residential/sensitive receptors in close proximity to existing rail lines are currently exposed to minimal railroad noise and vibration due to the infrequent rail operations (County of Santa Cruz 2020).

4.12.3 Regulatory Framework

4.12.3.1 Federal Regulations

Federal Noise Control Act

The U.S. Environmental Protection Agency's (EPA's) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, the EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. 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, noise control guidelines and regulations contained in the EPA rulings in prior years are still adhered to by designated federal agencies where relevant. No federal noise regulations are applicable to the proposed project.

4.12.3.2 State Regulations

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation.

Governor's Office of Planning and Research General Plan Guidelines

The Governor's Office of Planning and Research (OPR) published the State of California General Plan Guidelines (OPR 2003), which provides guidance for the acceptability of projects within specific L_{dn} contours. Table 4.12-4 summarizes acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to help craft noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Generally, residential uses (e.g., single-family homes, mobile homes, etc.) are considered to be acceptable in areas where exterior noise levels do not exceed 60 dBA L_{dn} . Residential uses are normally unacceptable in areas exceeding 70 dBA L_{dn} and conditionally acceptable within 55 to 70 dBA L_{dn} . Schools are normally acceptable in areas up to 70 dBA L_{dn} and normally unacceptable in areas exceeding 70 dBA L_{dn} . Commercial uses are normally acceptable in areas up to 70 dBA L_{dn} . Between 67.5 and 77.5 dBA L_{dn} , commercial uses are conditionally acceptable, depending on the noise insulation features and the noise reduction requirements.

Table 4.12-4. Summary of Land Use Noise Compatibility Guidelines

Land Use Category	Community Noise Exposure (dBA L _{dn})			
	Normally Acceptable ¹	Conditionally Acceptable ²	Normally Unacceptable ³	Clearly Unacceptable ⁴
Residential—Low-Density Single-Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential—Multifamily	<65	60–70	70–75	75+
Transient Lodging—Motel, Hotel	<65	60–70	70–80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	<70	60–70	70–80	80+
Auditoriums, Concert Halls, Amphitheaters	—	<70	65+	—
Sports Arena, Outdoor Spectator Sports	—	<75	70+	—
Playgrounds, Neighborhood Parks	<70	—	67.5–75	72.5+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	<75	—	70–80	80+
Office Building, Business Commercial, and Professional	<70	67.5–77.5	75+	—
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	—

Source: OPR 2003.

Notes: dBA = A-weighted decibels; L_{dn} = day-night average noise level.

- 1 Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
- 2 New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
- 3 New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.
- 4 New construction or development should generally not be undertaken.

California Department of Transportation Vibration Damage Potential Threshold Criteria

There are no state standards for vibration; however, Caltrans compiled a synthesis of research on the effects of vibration with thresholds ranging from 0.08 in/sec PPV to 4.0 in/sec PPV for “fragile historic buildings” and “structures of substantial construction,” respectively. Based on the synthesis of research, Caltrans developed recommendations for guideline threshold criteria of 0.5 in/sec PPV for new residential structures, 0.3 in/sec PPV for older residential structures and 0.25 in/sec PPV for historic buildings and some old buildings exposed to continuous/frequent intermittent sources. For extremely fragile historic buildings, ruins, and ancient monuments, Caltrans recommends a threshold of 0.08 in/sec PPV (Caltrans 2020b).

The Caltrans Transportation and Construction Vibration Guidance Manual does not contain specific definitions for the categories used within their guidance threshold criteria. However, based on the terminology and definitions contained within the research papers that they summarize, the term “new residential structures” is likely referring to modern construction techniques (e.g., timber frame, reinforced joists, gypsum wallboard, wood or stucco siding), while “older residential structures” is interpreted to refer

structures constructed with obsolete building methods and materials (e.g., plaster and lath, asbestos). “Historic and some old buildings” is interpreted to refer to historically significant buildings or older buildings in significant disrepair. While the majority of structures within the county would fall within the new residential structure category, this analysis will rely on the more conservative older residential structure category threshold criteria of 0.3 in/sec PPV.

4.12.3.3 Local Regulations

County of Santa Cruz General Plan/Local Coastal Program

The County of Santa Cruz General Plan/LCP Noise Element, Chapter 9 was updated in 2020 and contains goals, objectives, and policies intended to protect citizens from exposure to excessive noise. The Noise Element establishes standards and policies to promote compatible noise environments for new development or redevelopment projects and to control excessive noise exposure of existing land uses.

Noise Element Objective 9.2 seeks to minimize exposure of existing noise-sensitive land uses and receptors to excessive, unsafe or disruptive noise that may be generated by new land uses and development projects. The General Plan/LCP Noise Element requires preparation of acoustical studies for all new development projects that may affect sensitive land uses and receptors and that may not conform to the Normally Acceptable Noise Exposure levels identified in the General Plan/LCP (see Table 4.12-5 in this EIR). Noise limits for stationary noise sources also are identified as shown on Table 4.12-6. Existing policies also identify potential mitigation strategies where noise impacts are identified. Relevant policies are further reviewed in Section 4.12.3.3.

Santa Cruz County Code

The Noise Element provides general standards for new development and various sections of the County code include separate standards for specific type of land uses such as wineries and quarries, and areas around the Watsonville Municipal Airport. The SCCC contains additional guidance with the intent to control noise, to promote and maintain the health, safety and welfare of its citizens. Chapter 8.30 of the SCCC enumerates general standards, limitations and exemptions pertaining to noise within the county. Santa Cruz County Code Chapter 13.15 implements the Noise Element by applying noise policies and standards in the land use permitting process (County of Santa Cruz 2020). While the Noise Ordinance provides the Sheriff with tools to address the thousands of noise-related complaints received annually, it is the responsibility of the Planning Department to ensure that new development is located and designed to be compatible with the existing and future noise environment and that new development does not cause significant degradation of the existing noise environment (County of Santa Cruz 2020). Chapter 13.15 institutes “Noise Planning,” which codifies General Plan/LCP policies and aids in regulating noise throughout the county through land use planning and permitting.

Table 4.12-5. Acceptable through Unacceptable Ranges of Noise Exposure by Land Use

Land Use		Community Noise Exposure DNL or CNEL dB(A)					
		55	60	65	70	75	80
A	Residential/Lodging – Single Family, Duplex, Mobile Home, Multi Family						
B	Schools, Libraries, Religious Institutions, Meeting Halls, Hospitals						
C	Outdoor Sports Arena or Facility, Playgrounds, Neighborhood Parks						
D	Office Buildings, Business Commercial and Professional						
E	Industrial, Manufacturing, Utilities, Agriculture						
	Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements, and can meet the indoor noise standards.						
	Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design to meet interior and exterior noise standards, where applicable.						
	Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design to meet interior and exterior noise standards, where applicable.						
	Unacceptable: New construction or development should generally not be undertaken.						

Source: County of Santa Cruz 2020, Table 9-2.

Note: Outdoor noise exposure measured at the property line of receiving land use.

Table 4.12-6. Maximum Allowable Noise Exposure Stationary Noise Sources¹

Noise Metric	Daytime ⁵ (7:00 a.m. to 10:00 p.m.)	Nighttime ^{2,5} (10:00 p.m. to 7:00 a.m.)
Hourly L_{eq} – average hourly noise level, dB ³	50	45
Maximum Level, dB ³	70	65
Maximum Level dB – Impulsive Noise ⁴	65	60

Source: County of Santa Cruz 2020, Table 9-3.

Notes: dB = decibel; L_{eq} = equivalent noise level (time-averaged sound level).

- ¹ As determined at the property line of the receiving land use. When determining effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers or other property line noise mitigation measures.
- ² Applies only where the receiving land use operates or is occupied during nighttime hours.
- ³ Sound of the measurements shall be made with “slow” meter response.
- ⁴ Sound level measurements shall be made with “fast” meter response.
- ⁵ Allowable levels shall be raised to the ambient noise level were the ambient level exceeds the allowable levels. Allowable levels shall be reduced five dBA if the ambient hourly L_{eq} is at least 10 dBA lower than the allowable level.

Chapter 8.30, Noise

SCCC Chapter 8.30 defines and prohibits offensive noise. The ordinance includes standards that provide the County Sheriff with criteria to assess noise complaints and enforce excessive noise violations. The regulations provide that no person shall cause offensive noise and defines offensive noise as any noise that is loud, boisterous, irritating, penetrating, or unusual, or that is unreasonably distracting in any other manner such that it is likely to disturb people of ordinary sensitivities in the vicinity of such noise. The ordinance directs that factors such as the offensive noise during evening hours, noise clearly discernible at a distance of 150 feet from the property line of the property from which it is broadcast; or noise in excess of 75 decibels at the edge of the property line of the property from which the sound is broadcast (or in excess of 60 dB at 100 feet during night hours) as unacceptable. Other factors include pitch, duration, the necessity of the noise being generated, and proximity to any building used for sleep.

Chapter 13.15, Noise Planning

The purpose of this chapter is to recognize the relationship between noise and noise-sensitive land uses and the public health concerns associated with noise. The intent of the County is to reasonably regulate noise generation and noise exposures by applying standards through land use planning and permitting, incorporating mitigation into project design to prevent unhealthful conditions, and enforcement to address violation of permit conditions. The chapter specifies when sound level assessments or measurements are required, identifies types of uses that are exempt, and includes exterior and interior noise standards. Section 13.15.050 indicates that no use shall be permitted that does not conform to the noise parameters in the General Plan/LCP (Tables 4.12–5 and 4.12-6 above) and also sets requirements for use of backup emergency generators.

Uses that are exempt, include but are not limited to, noise sources associated with construction, specified special events, emergency work, and agricultural operations. Noise sources normally and reasonably associated with construction, repair, remodeling, or grading of any real property, provided a permit has been obtained from the County as required, and provided said activities take place between the hours of 8:00 a.m. and 5:00 p.m. on weekdays unless the Building Official has in advance authorized said activities to start at 7:00 a.m. and/or continue no later than 7:00 p.m. Such activities shall not take place on Saturdays unless the Building Official has in advance authorized said activities, and provided said activities take place between 9:00 a.m. and 5:00 p.m. and no more than three Saturdays per month. Such activities shall not take place on Sunday or a federal holiday unless the Building Official has in advance authorized such work on a Sunday or federal holiday, or during earlier morning or later evening hours of a weekday or Saturday.

Section 13.15.070 requires acoustic studies for new commercial and industrial development that would increase noise levels above the normally acceptable range in Table 9-2 or the levels in Table 9-3 of the Santa Cruz County General Plan Noise Element to determine the noise reduction requirements to be included as conditions of approval. Noise levels shall not exceed the standards in Table 9-3, and require, as conditions of approval, site design and sound reducing measures would be required if the project would:

- Increase the noise level at existing noise-sensitive receptors or areas by five (5) dB L_{dn} or more, where the post-project L_{dn} would remain equal to or below 60 dB.
- Increase the noise level at existing noise-sensitive receptors or areas by three (3) dB L_{dn} or more, where the post-project L_{dn} would exceed 60 dB.

The standards in this section shall not limit the ability of the County to impose conditions of approval on projects that increase noise levels at existing noise-sensitive receptors or areas by any amount.

4.12.4 Impacts and Mitigation Measures

4.12.4.1 Thresholds of Significance

The thresholds of significance used to evaluate the impacts of the proposed project related to noise are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines and, if applicable, other agency standards, as listed below. A significant impact would occur if the project would:

- NOI-1 Result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- NOI-2 Result in excessive groundborne vibration or groundborne noise levels.
- NOI-3 Expose people residing or working in the project area to excessive noise levels in 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 2 miles of a public airport or public use airport.

In analyzing noise and vibration impacts associated with the proposed project, pertinent noise standards introduced in the County of Santa Cruz General Plan/LCP and SCCC, discussed above, have been considered and utilized to develop the following quantified significance criteria for NOI-1 and NOI-2 above.

- NOI-1. The proposed project would result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in the following cases:
 - For temporary construction activities on the project site, a significant impact would result if construction noise exceeds 60 dBA between 10 p.m. and 8 a.m. or 75 dBA between 5 p.m. and 10 p.m. Between the hours of 8 a.m. to 5 p.m. on weekdays, construction noise is not limited, based on SCCC section 8.30.10.
 - For construction and operational traffic noise associated with the proposed project, a significant impact would result if traffic noise results in an increase of 3 dB to 5 dB L_{dn} or more above existing conditions, based on SCCC section 13.15.070.
 - For operational noise, General Plan/LCP Noise Policy 9.2.2 indicates that a significant impact would occur if there is an increase in the noise level at existing noise-sensitive receptors or areas by 5 dB or more, where the post-project CNEL or DNL will remain equal to or below 60 dB or an increase by 3 dB or more, or where the post-project CNEL or DNL would exceed 60 dB.

- NOI-2. The proposed project would result in the generation of a substantial temporary groundborne noise or vibration levels in the project vicinity if it would:
 - Result in groundborne noise or vibration levels exceeding the Caltrans guidance that suggests 0.3 in/sec PPV as a threshold level for potential architectural damage to older residential structures (Caltrans 2020b).
 - Result in groundborne noise or vibration levels exceeding the Caltrans threshold for fragile historic structures of 0.08 in/sec PPV (Caltrans 2020b).

4.12.3.2 Analytical Methods

Potential Growth Assumptions

Adoption and implementation of the proposed Sustainability Update would not directly result in new development or growth. However, the proposed General Plan/LCP amendments could lead to future development, indirectly resulting in potential impacts related to noise. The proposed project includes the following components that could lead to development; the proposed County Design Guidelines component of the proposed project does not include guidelines related to noise:

- Amendments to the General Plan/LCP include policies that support new development, redevelopment, and potential intensified development, primarily within the USL.
- Amendments to the SCCC that include changes to permitted/allowed uses in some zone districts, including encouraging opportunities for higher-density residential development and allowing new agricultural tourism, education, special events and weddings, and homestay uses in agricultural and some residential zone districts.
- Amendments to General Plan/LCP land use and/or zone district maps for 23 specified parcels.

As described in Section 4.0, Introduction to Analyses, this EIR estimates the potential to accommodate approximately 4,500 housing units throughout the county over existing conditions as shown on Table 4.0-2, with approximately 75% projected to occur within urban areas. This EIR also estimates the potential to accommodate approximately 6,210,000 square feet of non-residential uses as shown on Table 4.0-3, with approximately 60% expected to occur within urban areas. These forecasts provide an estimate of potential growth that could occur as a result of adoption and implementation of the proposed Sustainability Update for the purpose of evaluation in this EIR. This estimate of growth may or may not occur, and this estimate does not establish a limit to development, Annual limits for residential units are set annually by the County pursuant to Measure J and SCCC provisions as explained in Section 4.13, of this EIR, Population and Housing. Additionally, some of this projected development and growth would occur under the existing General Plan/LCP without the proposed project.

Proposed Roadway Improvements

As indicated in Chapter 3, Project Description, the proposed Access + Mobility Element retains some of the planned roadway improvements that are in the existing General Plan/LCP, but deletes others that have

been completed or are no longer being considered. Table 3-5 and Figure 3-4 in Chapter 3 summarize proposed improvements that are considered part of the proposed project. The proposed transportation improvements include roadways and intersection improvements that have been identified as needing operational improvements to maintain the function of the overall roadway system and accommodate growth over the life of the General Plan/LCP. The proposed improvements include several new streets to improve connectivity and walkability, primarily in the Live Oak and Aptos areas.

Noise Impact Analysis Methods

Potential noise and vibration impacts associated with the proposed project are evaluated based on information contained in the Noise Element of the County General Plan/LCP, established noise level reference data, and proposed project information.

Traffic noise modeling involved an initial evaluation of the baseline conditions as included in the Noise Element of the County General Plan/LCP and 2040 proposed project traffic volumes, developed as part of the traffic impact analysis prepared for the project (Kimley-Horn 2021). Traffic noise levels for select roadway segments were then calculated based on the FHWA traffic noise prediction algorithms (FHWA 1998). Modeling outputs for the 2040 plus project scenario were evaluated against the baseline conditions to determine the potential for an increase of traffic noise levels and exceedance of applicable noise level criteria.

To determine existing L_{dn} traffic noise levels in the project vicinity, the PM peak hour traffic volumes were calculated for roadways of key interest and used as inputs to the noise model. Traffic data was provided in the form of peak-hour intersection turning movements, with a “K-factor” which is a constant/multiplier used to convert PM peak-hour to average daily traffic volumes provided by the project traffic consultant. Standard assumptions for diurnal traffic patterns and vehicle classifications (i.e., small automobiles, medium trucks, heavy trucks, motorcycles, and buses) were used as inputs to the traffic noise model. Traffic noise modeling data can be found in Appendix H.

Construction-related noise effects were assessed based on reference noise level data and usage-factors compiled by the FHWA Roadway Construction Noise Model and FTA. Noise levels from typical types of construction equipment are provided in Table 4.12-7. Construction noise levels were assumed to attenuate (drop off/attenuate) at a rate of 6 dB per doubling of distance.

Groundborne vibration impacts were qualitatively assessed based on existing reference documentation (e.g., vibration levels produced by specific construction equipment operations), through the application of Caltrans methodology outlined within the Transportation and Construction Vibration Guidance Manual and the relative distance to potentially sensitive receptors from a given vibration source. Table 4.12-8 provides an overview of representative vibration levels for construction equipment.

Table 4.12-7. Construction Equipment Noise Emission Levels

Equipment Description	Acoustical Use Factor (%)	L _{max} at 50 feet (dBA, slow) ¹
Auger Drill Rig	20	85
Backhoe	40	80
Blasting ²	N/A	94
Compactor (ground)	20	93
Compressor (air)	40	80
Concrete Mixer Truck	40	85
Concrete Pump Truck	20	82
Concrete Saw	20	90
Crane	16	85
Dozer	40	85
Dump Truck	40	80
Excavator	40	85
Flat Bed Truck	40	84
Front End Loader	40	80
Generator	50	82
Grader	40	85
Jackhammer ²	20	85
Mounted Impact Hammer (hoe ram) ²	20	90
Pavement Scarafier	20	85
Paver	50	85
Pneumatic Tools	50	85
Pumps	50	77
Rock Drill	20	85
Roller	20	85
Scraper	40	85
Tractor	40	84
Vacuum Excavator (Vac-truck)	40	85

Source: DOT 2006; FTA 2018.

Notes: L_{max} = maximum noise level; dBA = A-weighted decibels; N/A = not applicable.

¹ All equipment fitted with a properly maintained and operational noise control device, per manufacturer specifications.

² Impulsive/impact device.

Table 4.12-8. Representative Vibration Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec) ^{1,3}	Approximate Lv (VdB) at 25 feet ²
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Heavy-duty Trucks (Loaded)	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Notes:

1. Where PPV is the peak particle velocity.
2. Where Lv is the RMS velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.
3. Vibration levels can be approximated at other locations and distances using the above reference levels and the following equation: $PPV_{equip} = PPV_{ref} (25/D)^{1.5}$ (in/sec); where “PPV ref” is the given value in the above table, “D” is the distance for the equipment to the new receiver in feet.

Source: FTA 2018.

EIR Notice of Preparation Comments

Public and agency comments were received during the public scoping period in response to the Notice of Preparation (NOP), which is included in Appendix A. A summary of the comments received during the scoping period for this EIR, as well as written comments received, are included in Appendix B. Comments related to noise included the following:

- Noise from existing automotive-related businesses (i.e., dealerships and car repair), as well as delivery trucks from Safeway and Home Depot, is disruptive to residents of Soquel and recreationalists at Anna Jean Cummings Park.
- A comment questioned what noise impacts would occur to the residents of Soquel Highlands if a new automotive-related business (e.g., car dealership) were established at the corner of 41st Avenue and Soquel Drive.
- A comment requested that a description be provided of how noise travels and is amplified from the 41st Avenue/Soquel Drive intersection to the Soquel Highlands neighborhood.
- Special uses such as event centers, wineries, and breweries, should not be allowed in rural areas because they generate excessive noise.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to CEQA and/or are raised by responsible agencies, they are identified and addressed within this EIR.

4.12.4.3 Project Impact Analysis

Impact NOI-1: Substantial Permanent Increase in Ambient Noise Levels (Significance Threshold NOI-1).

Adoption and implementation of the proposed Sustainability Update would not result in generation of a substantial permanent or temporary increase in ambient noise levels. (*Less than Significant*).

The proposed project would not directly result in new development, but could indirectly lead to future development and redevelopment throughout the county, primarily within urban areas within the County's USL. Development on underutilized properties could be redeveloped at higher densities and/or land use intensities, particularly along transportation corridors, such as Soquel Drive and Portola Drive. The proposed project does not include amendments to the General Plan/LCP or SCCC that would introduce new industrial or heavy commercial uses into new areas. The project includes proposed General Plan land use map or zone district amendments for 23 parcels, but about half of these properties are located within developed urban areas consisting of existing residential, commercial or mixed uses. The remaining parcels would include amendments to make zoning districts consistent with existing General Plan land use designations or long-term land uses.

New development or redevelopment has the potential to increase ambient noise levels of the existing environment. However, the existing General Plan/LCP Noise Element includes policies to protect sensitive receptors from permanent noise effects of new development with requirements for preparation of acoustical studies and implementation of mitigation or sound-reducing measures if needed. These policies are summarized in Table 4.12-9. These requirements are largely incorporated into the SCCC (Chapter 13.15), which would ensure that noise-generating land uses would not result in noise levels that would exceed County standards. Where the expected noise increase from a proposed development would be substantial, appropriate noise mitigation measures would need to be developed, as feasible. Also, if a proposed use or development includes fixed noise sources that are subject to noise limits in the County Code, then noise impacts and appropriate mitigation will be identified and incorporated into project design to reduce noise to meet those limits and reduce noise as perceived by nearby sensitive receptors (County of Santa Cruz 2020).

Development resulting from the proposed project could also generate increased noise levels from increased vehicular traffic, including development of new roads in the county's urban area, special events, and construction of individual projects, which are further reviewed below. It is also noted that the proposed project does not modify policies or regulations related to mining or industrial land uses, and thus, no intensification of use and resulting noise increases would be expected.

Table 4.12-9. Existing General Plan/LCP Policies that Avoid/Minimize Potential Impacts Related to Noise Increases

Potential Impact	Policies
<p>Generate substantial permanent or temporary noise</p>	<ul style="list-style-type: none"> • Require noise reduction design elements recommended by a site-specific acoustical study where noise sensitive developments would be exposed to noise levels that exceed those considered “normally acceptable.” (Noise Policy 9.1.2) • Noise levels in common outdoor use areas in multi-unit residential development should not exceed DNL 60. dB. Where this cannot be met by reasonable measures, such as strategic site layout and noise barriers, DNL 65 dB might be considered acceptable. (Noise Policy 9.1.3) • Require acoustical studies for new development that may affect existing noise environment affecting sensitive land uses and receptors or don’t conform to accept noise exposure standards. (Noise Policy 9.2.1) • Require site-design and noise reduction measures for any project, including transportation projects, that would cause significant degradation of the noise environment with 3-5 dB increase. (Noise Policy 9.2.2) • Incorporate noise considerations into the site plan review process related to access, parking, loading, and refuse collection areas.(Noise Policy 9.2.3) • Require best available control technologies for new commercial and industrial developments that would increase noise levels above the normally acceptable standards in Table 9-3 in the General Plan. (Noise Policy 9.2.4) • Require noise mitigation strategies that are preferable to construction of conventional masonry noise barriers where these strategies are a feasible option to reduce impacts on sensitive uses. (Noise Policy 9.2.5) • Require mitigation and/or best management practices to reduce construction noise as a condition of project approvals if noise levels would exceed 75 dB at sensitive land uses or if construction would occur for more than 7 days. (Noise Policy 9.2.6) • Enforce the County of Santa Cruz Noise Ordinance (County Code Chapter 8.30) to ensure that unlawful noise-generating activities and offensive noise are subject to enforcement. (Noise Policy 9.6.2)
<p>Noise generated by special uses and special events</p>	<ul style="list-style-type: none"> • Sound limitations specified for wineries. (Noise Policy 9.3.1) • Construct, maintain and operate facilities and equipment associated with mining operations in compliance with conditions of permit approval; noise level measured at the property boundaries shall not be greater than 60 dB for a cumulative period of 15 minutes during any hour of operation. (Noise Policy 9.3.3) • For permits for special or periodic uses or activities that will generate noise not typical for the context of the proposed location, impose conditions of approval that limit the maximum noise level, extent, duration, timing, operating hours, frequency, location or other aspect of the use and may require special monitoring may be imposed. (Noise Policy 9.3.4)
<p>Traffic-related noise</p>	<ul style="list-style-type: none"> • Use speed limit controls on local streets to minimize vehicle traffic noise. (Noise Policy 9.4.1) • Continue to consider noise concerns in evaluating all proposed development decisions related to roadway Noise Policy 9.2) and other transportation projects. (Noise Policy 9.3)

Traffic-Related Noise Increases

The proposed project could lead to future development, primarily in the county’s urban areas and along road corridors, which could result in traffic-related noise increases. The County’s Noise Element includes predicted road noise contours in the year 2040 as shown on Figure 4.12-2. Estimated traffic volumes with the project (2040 with project) were compared to traffic levels estimated for the Noise Element road noise contours (baseline).

For the proposed project to result in a +3 dB increase in traffic noise, the traffic associated with the proposed project would need to be more than double the traffic volumes (a 100% increase) used for the General Plan/LCP Noise Element 2040 scenario. Of the evaluated roadway segments, the largest increase would occur on Soquel Avenue, east of Capitola Road, with an increase of +2.5 dB. Traffic noise levels along all other roadway segments would experience changes of less than 1 dB. Detailed inputs to the traffic noise model, predicted noise levels and noise level contour distances are provided in Appendix H

In addition, the proposed Sustainability Update includes several new local roads in some neighborhoods in the Live Oak, Soquel, and Aptos areas that would serve future development and provide connectors in local neighborhoods. These local facilities would be typical of other local neighborhood roads in their respective areas, with low traffic volumes and equally low traffic noise contributions to the existing environment. Furthermore, the General Plan/LCP policies shown in Table 4.12-9 require consideration of measures to further reduce traffic-related noise.

Noise Generated by Special Events

The Sustainability Update includes proposed revisions to the SCCC to address community events and fundraisers on private residential property and commercial weddings in specified rural and agricultural properties (RA, RR, CA, and A zone districts). The proposed sections establish permit requirements and standards, while ensuring that the size, frequency, location and operation of such events are compatible with the primary use on the parcel and with adjacent land uses as explained in Section 3.5.2.2 in Chapter 3, Project Description.

However, special events would be controlled through a permit process with restrictions on amplified noise if needed. In particular a community event or fundraiser with 100 or more guests would be allowed only once per year without amplified music at a given property and up to two events per year with approval of a Minor Use Permit. Standards for events are proposed including, notification to owners and occupants of properties within 500 feet, restrictions on hours of amplified music, and establishment of maximum number of guests based on site size, access and other physical characteristics. Similarly, the proposed SCCC revisions would limit the use of property for commercial weddings and could include restrictions or limitations on amplified music. Thus, these types of events would not be expected to result in generation of substantial permanent or temporary noise increases with the limits and restrictions that would be imposed by permit.

Construction-Related Noise

Future development would result in temporary increases in ambient noise levels due to construction activities. Construction-related noise levels would vary throughout the day, depending on the type of equipment in use at any one time and the distance to the receptors, and noise impacts from construction may vary greatly depending on the duration and complexity of the project. However, construction-related noise impacts are temporary and often of a short-term duration. Noise generated during construction could be considered a nuisance to some residents and/or employees in the proximity to such construction.

Potential equipment includes, but is not limited to, that used for excavation, site grading, and construction of structures. Construction equipment can be either stationary or mobile. Stationary equipment operates in one location for one or more days at a time, with either a fixed power operation (pumps, generators, compressors) or a variable/intermittent noise operation (pile drivers, pavement breakers). Mobile equipment moves around the construction site with power applied in cyclic fashion (bulldozers, loaders), or to and from the site (trucks). As a result of the equipment mix for any given project, each phase has its own noise characteristics; some have higher continuous noise levels than others, some have high impact noise levels. Table 4.12-7 shows typical noise levels associated with different types of construction equipment at a representative distance of 50-feet, along with their typical usage factors (percentage of time typically actively operating). As shown, the maximum reference noise levels generated by individual pieces of construction equipment can range from 77 to 90 dBA L_{max} , with blasting noise levels reaching 94 dBA L_{max} at 50-feet. These noise levels would decrease with distance from the construction operation at a rate of approximately 6 dBA per doubling of distance (Caltrans 2013).

The existing regulations in the SCCC set decibel limits for sounds levels during the day, evening, and night, which would be applicable to future development projects, and provide an exemption for construction activities during daytime hours. Additionally, Policy 9.2.6 of the Noise Element requires the use of mitigation or best management practices to reduce construction noise as a condition of approval. Therefore, with compliance with County policies and regulations, future temporary increases in noise levels due to construction of individual development projects would not be considered substantial, and impacts would be *less than significant*.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact NOI-2: Excessive Groundborne Vibration or Noise (Significance Threshold NOI-2). Adoption and implementation of the proposed Sustainability Update would not directly or indirectly result in excessive groundborne vibration or groundborne noise levels. (*Less than Significant*)

The proposed Sustainability Update would not directly result in the generation of groundborne noise or vibration levels; however, construction of projects allowed under the General Plan/LCP, certain commercial and industrial operations, and some roadway traffic have the potential to generate groundborne noise and

vibration. The proposed project does not directly include project elements that would generate long-term/permanent operational groundborne noise and vibration; therefore, this is not discussed further.

Construction activities resulting from future development could result in varying degrees of temporary groundborne vibration or noise, depending on the specific construction equipment used and operations involved. Representative groundborne vibration levels for various types of construction equipment, developed by FTA, are summarized in Table 4.12-8. Heavier pieces of construction equipment, such as a bulldozer and excavator equipped with a hoe-ram have been documented to generate peak particle velocities of approximately 0.089 in/sec. PPV or less at a reference distance of 25 feet (FTA 2018).

Groundborne vibration attenuates rapidly, even over short distances. The attenuation of groundborne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in FTA and Caltrans guidance. Using standard FTA vibration attenuation formulas, non-pile driving construction activities would exceed the Caltrans recommended threshold of significance of 0.3 in/sec. PPV at a distance of approximately 11 feet. It is unlikely that the center of operations for heavy construction equipment would operate within 11 feet of sensitive receptors/structures based on the mandatory buffers set forth by the SCCC (e.g., setbacks, buffers, easements, rights-of-way, etc.), which would result in structures typically separated by at least 12 feet, and thus construction activities would not be anticipated to generate groundborne noise and vibration levels in excess of the Caltrans guideline threshold criteria of 0.3 in/sec PPV. As such, vibration impacts are considered *less than significant*.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact NOI-3: Airport Noise (Significance Threshold NOI-3). Adoption and implementation of the proposed Sustainability Update would not directly or indirectly expose people residing or working within two miles of the Watsonville Airport, a public airport or public use airport. (*Less than Significant*)

As previously discussed, there are no commercial airports located within the county. Watsonville Municipal Airport is a general aviation airport, located adjacent to the boundary of the county unincorporated areas, within the City of Watsonville. The proposed project would not directly or indirectly result in changes to airport operations, flightpaths, or noise contours.

Due to the location of the Watsonville Municipal Airport within the county, there is potential for future development to be located within the 2-mile buffer established by significance threshold NOI-3. The Noise Element policies limit the adverse effects of airport-related noise through land use planning and the establishment of noise level thresholds for residential and non-residential land uses within the 60 dBA CNEL/L_{dn} noise level contour.

Additionally, as indicated in Section 4.9.2, Regulatory Setting, SCCC Chapter 13.12, Airport (AIA) Combining District, identifies allowed and prohibited uses, densities and other standards for development within six

safety zones established in the two-mile area surrounding the Watsonville Municipal Airport. The purpose of the district is to prevent any exposure to safety issues with the airport and prevent any incompatible land uses from being developed adjacent to the airport. The proposed Sustainability Update does not include any land use changes within the AIA Combining District; the AIA Combining District is shown on Figure 4.9-1 in Section 4.9, Hazards and Hazardous materials. Furthermore, the County’s existing General Plan/LCP Noise Element includes policies to ensure that future development is sited and designed to avoid exposure to excessive aircraft noise, as shown in Table 4.12-9. Further, the proposed Sustainability Update includes a number of policies in the Built Environment Element that would serve to protect residents from public safety hazards from aircraft, as summarized in Table 4.9-4. Therefore, with implementation of proposed and existing policies and compliance with other federal and state regulations regarding airports, the proposed project would not result in a significant safety hazard related to location near airports, and the impact would be *less than significant*.

Table 4.12-10. Existing General Plan/LCP Policies that Avoid/Minimize Potential Impacts Related to Aircraft Noise

Potential Impact	Policies
Airport Noise	<ul style="list-style-type: none"> Limit single-family residential development to no more than one dwelling and an Accessory Dwelling Unit on an existing parcel or lot of record where the existing or future aircraft noise exceeds 65 CNEL or L_{dn} (see Figure 9-4 in the General Plan/LCP). (Noise Policy 9.5.1) Require all residential and non-residential development proposed within the 60 CNEL or L_{dn} aircraft noise contour (see Figure 9-4 in the General Plan/LCP) to mitigate interior noise to 45 (CNEL or L_{dn}) or less, and to limit the maximum A-weighted noise level of single aircraft overflights to 50 dB or less. (Noise Policy 9.5.2)

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.12.3.4 Cumulative Impact Analysis

Potential cumulative development that could result in or be affected by noise includes development and growth within the incorporated cities and at the University of California at Santa Cruz (UCSC); see Section 4.0.3 regarding cumulative growth and development. Cumulative development within cities generally would occur within city limits, although some properties may be adjacent to unincorporated county areas, including Live Oak (cities of Santa Cruz and Capitola), the Carbonera planning area adjacent to the City of Scotts Valley, and the Pajaro Valley planning area adjacent to the City of Watsonville.

Noise impacts are generally site-specific, and future growth and development within the county and cities would be required to comply with the policies and thresholds of the General Plan and codes of those

jurisdictions. Future site-specific development at UCSC would not be in proximity to other development within the county. Therefore, cumulative development throughout the county would not combine with noise from other cumulative developments and is not expected to result in a significant cumulative impact related to generation of permanent or temporary operational or construction noise. Furthermore, each jurisdiction has policies and regulations that would be implemented as part of development review to regulate new uses that may result in new sources of operational noise, which would generally require mitigation on a case-by-case development project basis.

Cumulative development would result in potentially increased vehicular traffic generated by development projects both in the county and in neighboring cities and at UCSC, which could cumulatively add to noise levels along county streets and roads. However, cumulative traffic would result in traffic noise increases of less than 1 dB, based on a comparison of the baseline and cumulative traffic volumes, and therefore, would not result in a significant cumulative impact related to traffic-related noise increases. Cumulative traffic noise levels and associated input data are provided in Appendix H. Cumulative development would result in short-term vibration from construction; however, due to the fast attenuation rate, vibration from multiple commercial developments would not combine to generate a significant cumulative impact regarding groundborne noise or vibration.

Therefore, cumulative development and growth, including the proposed project, would not result in significant cumulative impacts related to noise and vibration .

4.12.5 References

- California Department of Transportation (Caltrans). 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. Prepared by R. Hendriks, B. Rymer, D. Buehler, and J. Andrews. Sacramento: Caltrans. September 2, 2013. Accessed September 2, 2021 at <https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf>.
- Caltrans. 2020a. *Technical Noise Analysis Protocol*. For New Highway Construction, Reconstruction, and Retrofit Barrier Projects. Division of Environmental Analysis. Sacramento: Caltrans. April 2020. Accessed September 2, 2021 at <https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/traffic-noise-protocol-april-2020-a11y.pdf>
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4.12.6 Figures

Figure 4.12-1. Existing Highway and Local Roadway Noise Contours

Figure 4.12-2. Future (2040) Estimated Highway and Local Roadway Noise Contours

Figure 4.12-3. Airport Noise Contours

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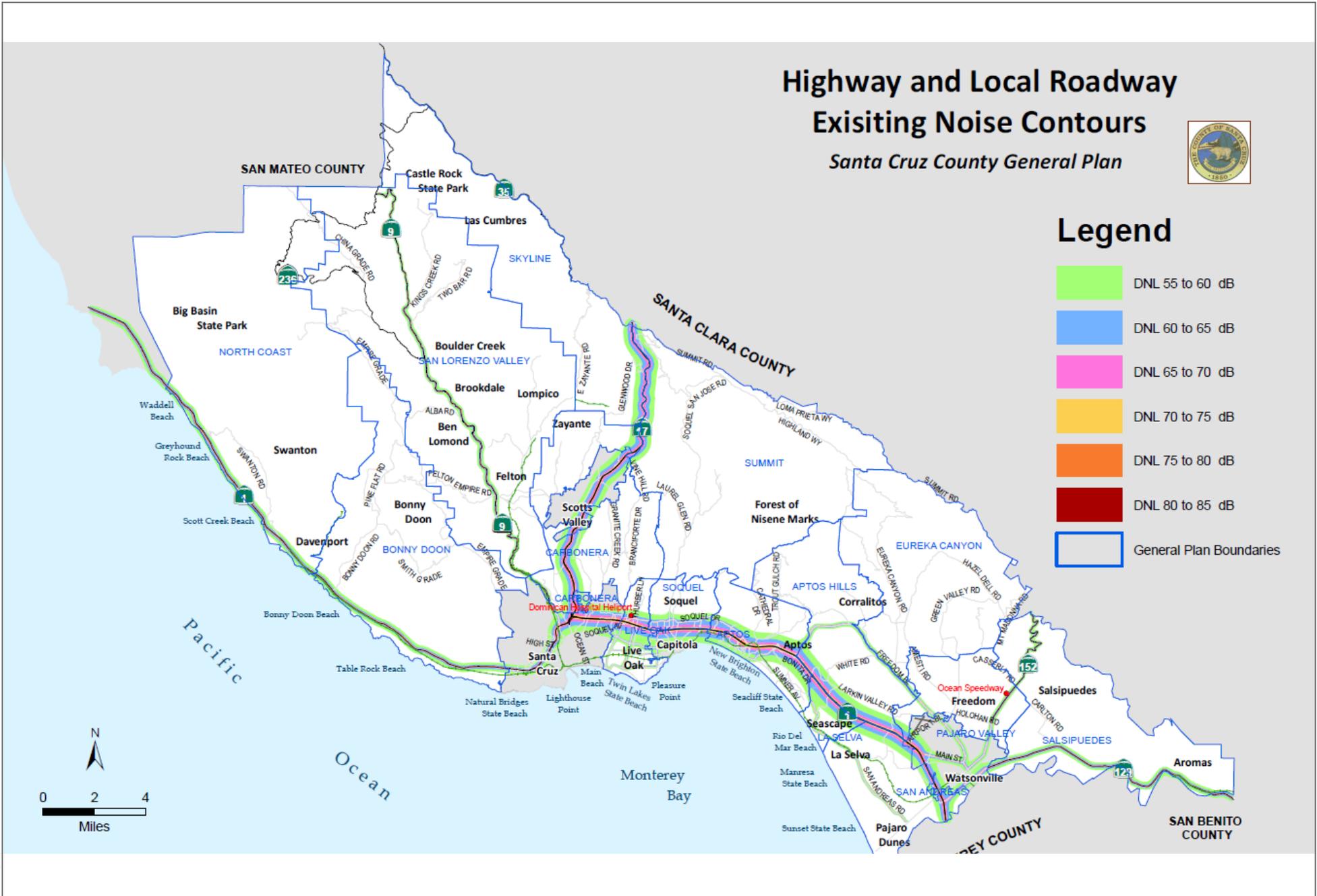
Highway and Local Roadway Existing Noise Contours

Santa Cruz County General Plan



Legend

- DNL 55 to 60 dB
- DNL 60 to 65 dB
- DNL 65 to 70 dB
- DNL 70 to 75 dB
- DNL 75 to 80 dB
- DNL 80 to 85 dB
- General Plan Boundaries



SOURCE: County of Santa Cruz 2021

FIGURE 4.12-1
Existing Highway and Local Roadway Noise Contours
County of Santa Cruz Sustainability Policy and Regulatory Update

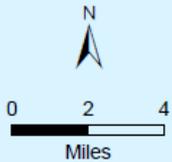
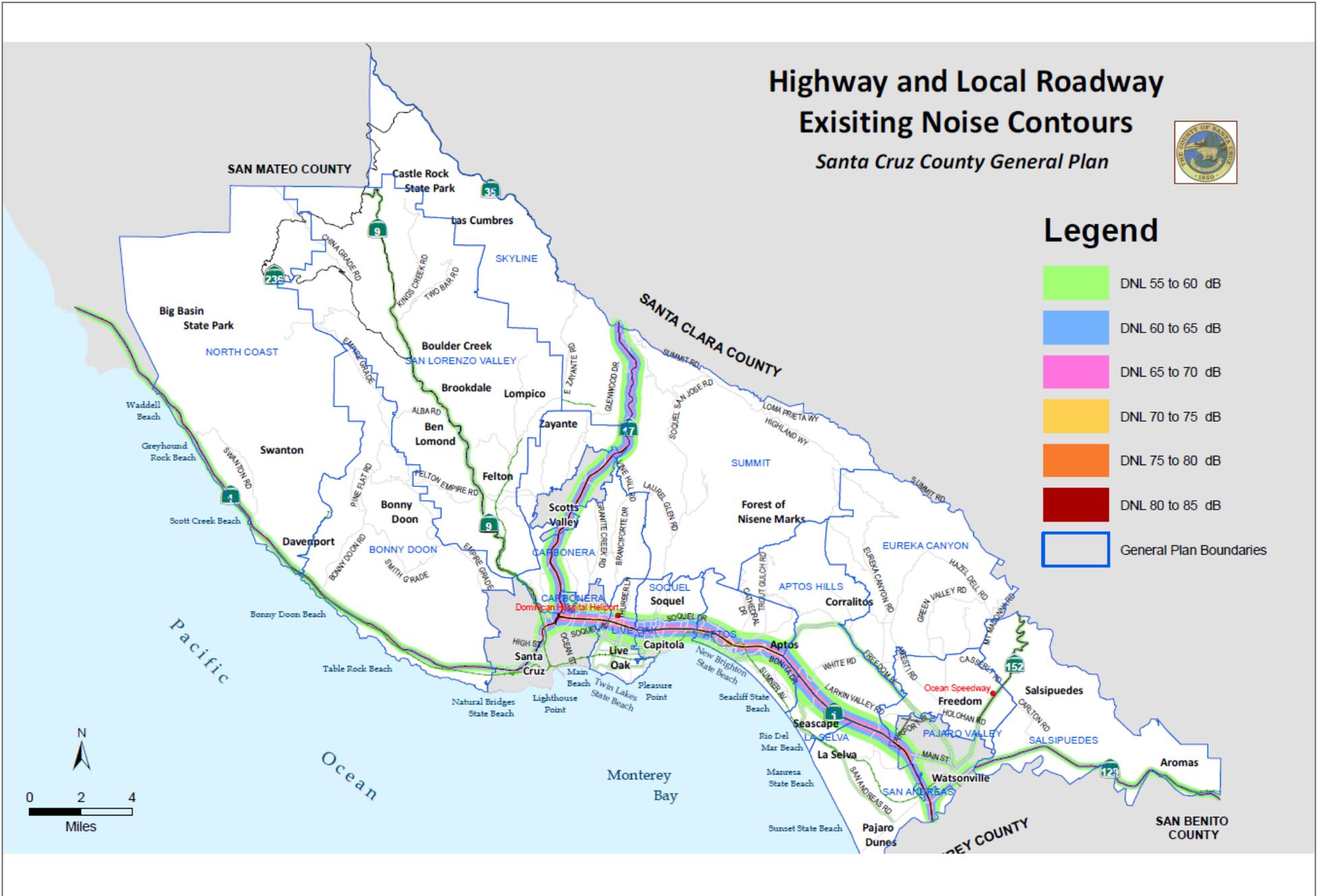
Highway and Local Roadway Existing Noise Contours

Santa Cruz County General Plan



Legend

- DNL 55 to 60 dB
- DNL 60 to 65 dB
- DNL 65 to 70 dB
- DNL 70 to 75 dB
- DNL 75 to 80 dB
- DNL 80 to 85 dB
- General Plan Boundaries

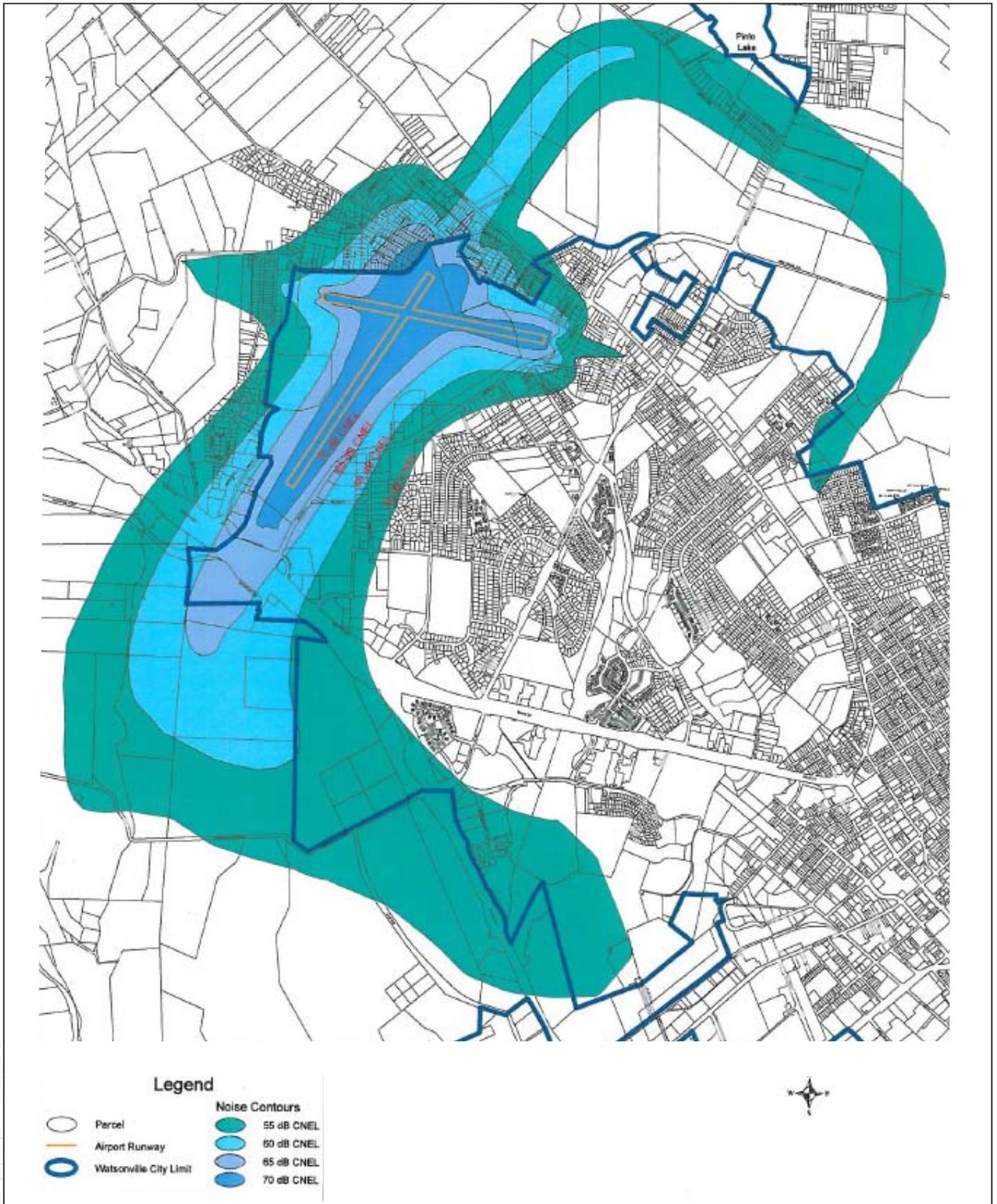


SOURCE: County of Santa Cruz 2021

FIGURE 4.12-2

Future (2040) Estimated Highway and Local Roadway Noise Contours

County of Santa Cruz Sustainability Policy and Regulatory Update



SOURCE: County of Santa Cruz 2021

FIGURE 4.12-3

Airport Noise Contours

County of Santa Cruz Sustainability Policy and Regulatory Update

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