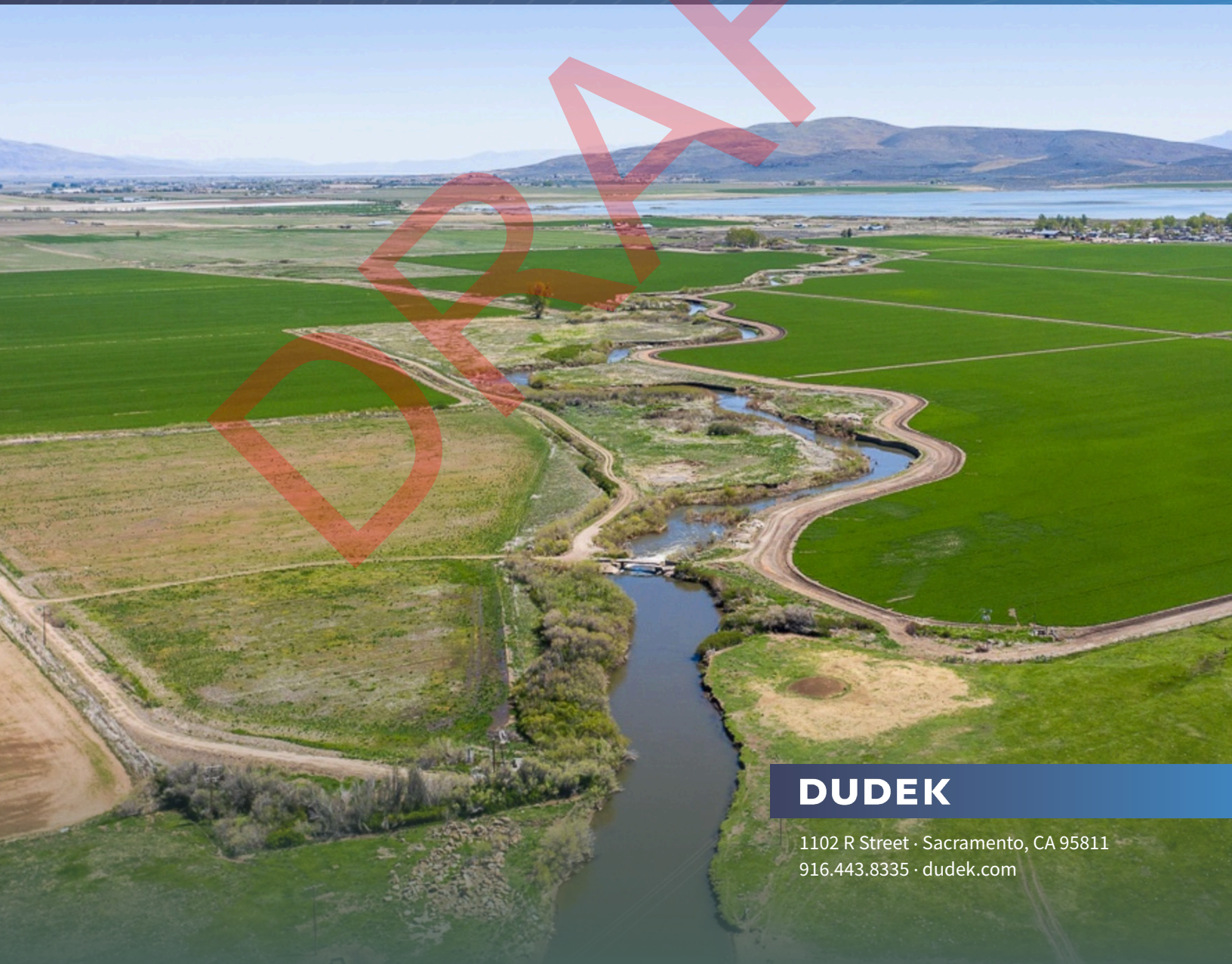


Lassen County Noise Element

JULY 2021



DUDEK

1102 R Street • Sacramento, CA 95811
916.443.8335 • dudek.com

CONTENTS

INTRODUCTION	3
RELATIONSHIP TO OTHER GENERAL PLAN ELEMENTS.....	4
UNDERSTANDING NOISE.....	4
DEFINITIONS	6
EXISTING CONDITIONS	7
NOISE IN LASSEN	8
Noise-Sensitive Land Uses.....	8
Noise-Generating Land Uses	8
NOISE REGULATIONS	9
PRINCIPAL NOISE SOURCES	10
TRANSPORTATION-RELATED NOISE	12
Highway Noise.....	12
Local Roadway Traffic Noise	13
Railroad Noise	14
Airport Noise	15
Stationary Source Noise	16
Construction Noise.....	16
NOISE COMPATIBILITY.....	17
Land Use	17
Temporary Uses and Nuisances.....	14
GOALS, POLICIES, AND IMPLEMENTATION MEASURES.....	15
GOAL N1.....	15
Policy N1.1 – Noise Generation Standards.....	15
Policy N1.2 – Noise Mitigation and Attenuation	16
Policy N1.3 – Existing Land Use Incompatibilities.....	16
GOAL N2.....	17
Policy N2.1 – Land Use Planning	17
Policy N2.2 – Airport Noise and Highway Noise	18
REFERENCES	21
<hr/>	
FIGURES	
1. COMMON NOISE SOURCES	5
2. LAND USE NOISE COMPATIBILITY STANDARDS	17
TABLES	
1. DEFINITIONS OF ACOUSTICAL TERMINOLOGY	6
2. PRINCIPAL NOISE SOURCES	11
3. HIGHWAY NOISE LEVELS	12
4. LOCAL AND REGIONAL ROADWAY NOISE LEVELS	13
5. AIRPORT AND HELIPORT NOISE LEVELS IN LASSEN COUNTY	15
6. STATIONARY SOURCE NOISE LEVELS IN LASSEN COUNTY	16
7. COMMUNITY NOISE EQUIVALENT LEVEL STANDARDS FOR RECEIVING LAND USES	24

INTRODUCTION

DRAFT

PURPOSE

This Noise Element identifies the County of Lassen's (County) approach to controlling environmental noise and limiting community exposure to excessive noise levels. The fundamental goals of a Noise Element are as follows (OPR 2017):

- Identify and analyze the major noise sources in the community.
- Provide data and guidance to inform a pattern of land uses that minimizes exposure of community residents to excessive noise.
- Protect quiet areas of a community from noise.
- Develop implementation measures and strategies to address existing and foreseeable noise problems.

RELATIONSHIP TO OTHER GENERAL PLAN ELEMENTS

Noise levels are addressed in the Lassen County Land Use Element to avoid direct conflicts between neighboring uses and to establish patterns of land uses that minimize noise exposure for noise-sensitive uses such as residences, lodging facilities, and hospitals. Policies in the Circulation Element of the Lassen County General Plan related to road location and design, and non-motorized transportation can affect traffic noise levels. Development and implementation of policies in the Noise Element are also closely related to the topics of housing, open space, and environmental justice.

UNDERSTANDING NOISE

Noise is commonly understood as annoying or unwanted sound. Sound can be described by scientists and engineers in two characteristics: amplitude and pitch. Amplitude is driven by the energy content in sound waves and results in the loudness of sounds, which are described as "sound pressure level" or simply "sound level." Amplitude is measured in decibels (dB), which use a logarithmic scale. Pitch is the frequency of sound waves and results in how "high" or "low" a sound is. Pitch is measured in hertz. The most common weighting that is used in noise measurements is an A-weighted decibel (dBA), which is a composite representation of sounds at pitches that can be heard by the human ear.

Because sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dB increase in the noise level. Changes in a community noise level of less than 3 dB are not typically noticed by the human ear. Changes from 3 to 5 dB may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dB increase is readily noticeable (EPA 1973). The human ear perceives a 10 dB increase in sound level as a doubling of the sound level (e.g., 65 dBA sounds twice as loud as 55 dBA to a human ear).

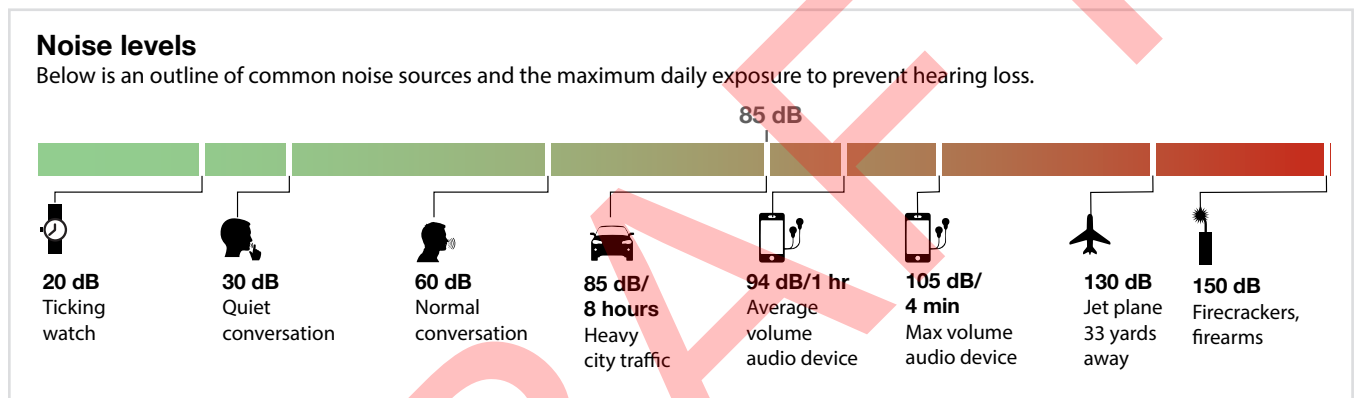


Bieber

Community noise is generated by many sources that change throughout the day. Two metrics are commonly used to describe average noise levels in a community: Day/Night Noise Level (L_{dn}) and Community Noise Equivalent Level (CNEL). L_{dn} and CNEL are 24-hour averages that add a penalty to night time noises because communities are most sensitive to noise at night. CNEL, unlike L_{dn} , also penalizes evening noises (see Table 1).

Noise levels that occur over short periods of time, such as construction noise or concerts, are not well-measured by CNEL. For these temporary events, an Equivalent Continuous Sound Level (L_{eq}) is established to address appropriate noise limits for avoidance of noise nuisance for nearby noise-sensitive land uses. An L_{eq} measures the average sound pressure over the duration of the event and is appropriate for application to noise sources that are scheduled, temporary, and louder than the community noise standards allow. In addition to L_{eq} , the maximum instantaneous sound level (L_{max}) can be employed to prevent excessive sound levels that could be particularly disruptive, or even harmful.

Figure 1 Common Noise Sources



Westwood

DEFINITIONS

Table 1 Definitions of Acoustical Terminology

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level (dBA)	A-weighted decibels, referring to decibels weighted to the “A scale.” A-weighted decibels represent the sound level containing a range of frequencies weighted in a manner representative of the ear’s response.
Community Noise Equivalent Level (CNEL)	The average A-weighted sound level during a 24-hour day, obtained after addition of 5 decibels (dB) to the average hourly sound levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 dB to the average hourly sound levels during the night between 10 p.m. and 7 a.m.
Day/Night Noise Level (L_{dn})	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 dB to the hourly average noise levels measured during the night between 10 p.m. and 7 a.m.
Decibel (dB)	A unit of measurement (dB) on a logarithmic scale that describes the magnitude of a particular quantity of sound pressure or power with respect to a standard reference sound pressure of 20 μ Pascals.
Equivalent Sound Level (L_{eq})	Energy equivalent level, which is the equivalent steady-state sound level that, in a stated period of time, contains the same acoustical energy as a time-varying sound during the same time period. An L_{eq} level is computed by summing the noise energy over the stated time period using mathematical integration. It is commonly also referred to as the “average sound level.”
Frequency (hertz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 and 20,000 hertz.
Maximum or Minimum Sound Level (L_{max}, L_{min})	The maximum and minimum A-weighted sound level during the measurement period.
Noise	Unwanted sound.
Noise Contour	A line on a map that represents equal levels of noise exposure, and also the boundary or limit for sound exposure of that level. Noise contours are generally provided in 5 dBA CNEL increments, which means the area between a 60 dBA CNEL contour and a 65 dBA CNEL contour has noise exposure ranging between 60 and 65 dBA CNEL.
Noise Impacted Areas	Areas with existing or projected exterior noise levels exceeding 65 dBA L_{dn} /CNEL.
Noise-Sensitive Land Uses	Any property where frequent exterior human use occurs and where a lowered noise level would be beneficial. In Lassen County these are land uses that are designated for residential, recreation, religious worship, schools, libraries, and short-term lodging.
Noise-Generating Land Uses	Any property where noise may be generated at such a level that noise beyond its property boundary could exceed established CNEL levels.
Yard Area	A 50-foot-radius around a residential structure when the lot size exceeds the boundary of such radius.

EXISTING CONDITIONS

DRAFT

NOISE IN LASSEN COUNTY

Lassen County has a rural, outdoor character consisting of large tracts of open space land separating well-established small communities, offering year-round recreational opportunities and agriculture. Many of Lassen County's most important places, including outdoor recreation areas and homes, are unique in part because of the lack of urban noise, while many of Lassen County's economic drivers, such as agriculture and natural resource management (e.g., logging and surface mining), are noise generators. Balancing the needs of quiet places in Lassen County while supporting the growth and development of industry is the primary goal of this Noise Element and the Lassen County Noise Ordinance (Lassen County Code, Chapter 9.65). A list of **noise-sensitive land uses** that are protected by standards of the Noise Element and the Noise Ordinance, as well as **noise-generating land uses** regulated by standards of the Noise Element and the Noise Ordinance, are presented below.

NOISE-SENSITIVE LAND USES

Land uses, such as homes, school, and parks that should be protected from loud noises to preserve quality of life.

NOISE-GENERATING LAND USES

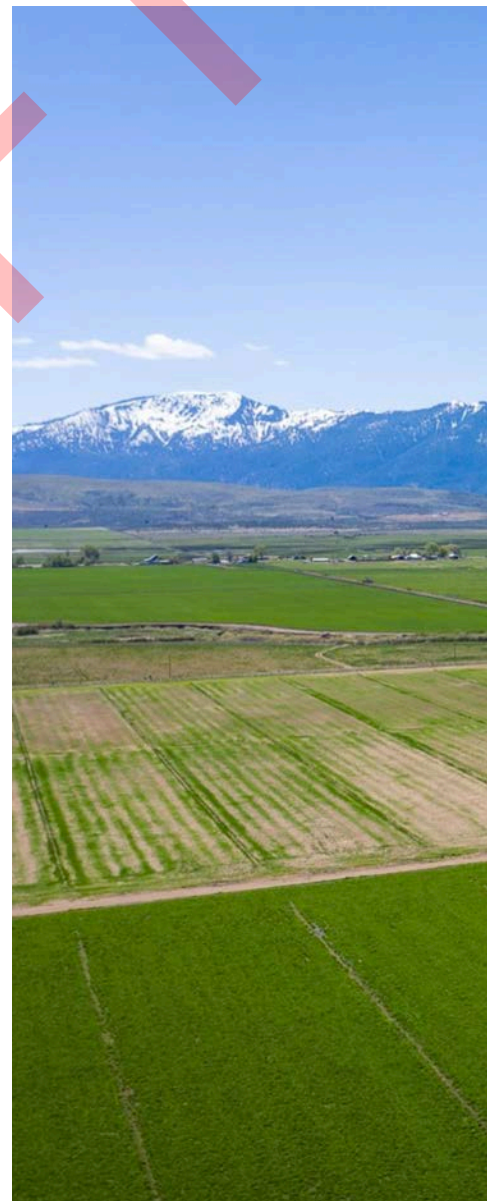
Land uses such as mining or freeways that cause loud noises.

Noise-Sensitive Land Uses

- Residential
- Visitor lodging
- Schools
- Libraries
- Places of religious worship
- Hospitals
- Assisted living facilities
- Formal recreation areas

Noise-Generating Land Uses

- Public roads and highways
- Airports
- Railroads
- Agriculture
- Surface mining
- Logging
- Materials recovery (recycling)



Lassen County

NOISE REGULATIONS

The following provides the federal, state, and local framework for regulating noise in Lassen County.

Federal

AIRPORT NOISE COMPATIBILITY PLANNING (CODE OF FEDERAL REGULATIONS PART 150)

Part 150 of the Code of Federal Regulations identifies the compatibility of various land uses with airport-related noise exposure levels. These regulations serve as a guideline for local jurisdictions because the federal government does not have local land use control.

AIR INSTALLATION COMPATIBLE USE ZONES STUDY (U.S. DEPARTMENT OF DEFENSE)

Air Installation Compatible Use Zone studies are U.S. Department of Defense documents that establish land use strategies and noise and safety recommendations to prevent the encroachment of incompatible land uses from degrading the operational capability of military air installations. Although Amadee Army Airfield would meet the definition of a military air installation, as of 2020, an Air Installation Compatible Use Zone had not been adopted for this facility.

State

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) considers generation of excessive noise an environmental impact. Implementation of CEQA ensures that during the decision-making stage of development review, County officials and the public will be informed of any potentially excessive noise levels and available mitigation measures to reduce these to acceptable levels for any proposal subject to discretionary action in Lassen County. CEQA applies to discretionary projects (such as use permits or parcel maps) and does not apply to ministerial permits (such as building permits).

AIRPORT LAND USE PLANS/LAND USE COMPATIBILITY PLANS (CALIFORNIA PUBLIC UTILITIES CODE, SECTION 21670 ET SEQ.)

Originally identified as Airport Land Use Plans (ALUPs) and more recently renamed Airport Land Use Compatibility Plans, these plans help maintain the nation's air transportation infrastructure by protecting airports from encroachment by incompatible land uses that could restrict their operation or cause a hazard to the public. With regard to noise, ALUPs and Airport Land Use Compatibility Plans regulate development within airport planning boundaries to minimize exposure of receptors to airport noise. As of 2020, the Amadee Army Airfield is the only airport facility within Lassen County that has an adopted Airport Land Use Compatibility Plan. However, Herlong, Spalding, Bieber, and Ravendale Airports are included in a combined ALUP from 1988 (County of Lassen 1988), and Susanville Municipal Airport is addressed by an adopted ALUP from 1987 (County of Lassen 1987).

CALIFORNIA AIRPORT NOISE STANDARDS (CALIFORNIA CODE OF REGULATIONS, TITLE 21)

Title 21 of the California Code of Regulations establishes that 65 dBA CNEL is the maximum acceptable level of aircraft noise exposure for residents affected by airport operations. A noise contour map addressing aircraft operations at each public airport is generally the basis of determining whether residences exist within the boundary of the 65 dBA CNEL noise level associated with an airport.

CALIFORNIA NOISE INSULATION STANDARDS (CALIFORNIA CODE OF REGULATIONS, TITLE 24)

Title 24 of the California Code of Regulations (California Building Standards Code) establishes residential insulation standards to be implemented during the building permit and construction processes. Title 24 establishes an interior noise standard of 45 dBA for multiple-unit residential structures and hotel/motel structures.

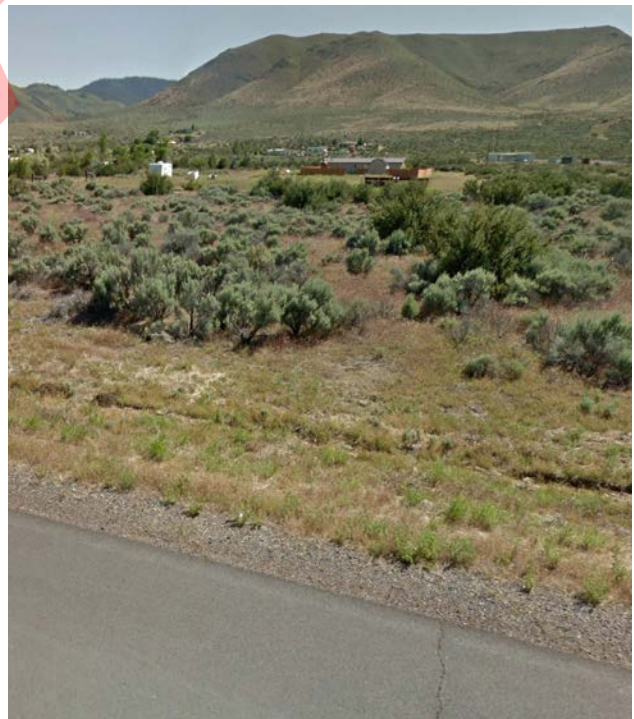
Local

NOISE ORDINANCE (LASSEN COUNTY CODE, CHAPTER 9.65)

The Lassen County Noise Ordinance defines limits for excessive noise and sets noise-level limits to protect noise-sensitive land uses. In general, noise levels within commercial and industrial areas are given a higher allowance, but noise from all sources is limited to no greater than 65 dBA CNEL at noise-sensitive land use receiver sites.

PRINCIPAL NOISE SOURCES

Table 2 lists communities within Lassen County and their principle noise sources, including roads, airports, railroads, and stationary sources. To characterize the noise levels associated with these sources, various methods were used. For road noise, the approach consisted of sound-level measurements and the use of a standard traffic noise model. For airports, the approach involved evaluating any physical alterations to each airport facility and then determining whether intensification of airport operations could result in higher noise levels (compared to current operations and mapped noise contours represented in Airport Land Use Plans and Airport Land Use Compatibility Plans). Railroad noise was assessed based on the analysis presented in the 1989 Lassen Noise Element, adjusted for changes in rail operations frequency (as confirmed with the rail operators). Information for stationary sources identified in the 1989 Noise Element (and still operational) was carried forward from the 1989 Noise Element, and more recently introduced stationary sources were addressed with sound level measurements. Please refer to the Noise Element background technical report for a detailed discussion of the various methods employed, and for field data and modeling results (Dudek 2020). **Tables 3 through 7** summarize the results of community noise measurements conducted in spring 2019 for selected transportation-related and stationary noise sources in the incorporated, unincorporated, and rural areas of Lassen County. Not included in the inventory were noises from persons, pets and livestock, industrial equipment, and construction sites. The Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) contains noise level contours for state highways, selected County roads, County airports, and other prominent stationary sources.



Doyle

EXISTING CONDITIONS

Table 2 Principal Noise Sources in Lassen County

Community	Roads	Airports	Railroads	Stationary Sources
Bieber	Highway 299 Susanville Road	Bieber Airport CAL FIRE Helipad	Burlington Northern Santa Fe	Big Valley Lumber
Doyle	Highway 395	None	Union Pacific Railroad	None
Eagle Lake	Eagle Lake Road Mahogany Way	Spalding Airport	None	None
Hallelujah Junction	Highway 70	None	Union Pacific Railroad	None
Herlong	Herlong Access Road Garnier Road	Herlong Airport Amadee Army Airfield	Union Pacific Railroad	
Janesville	Highway 395 Main Street	None	None	None
Johnstonville	Highway 395 Johnstonville Road Center Road	Susanville Municipal Airport	None	Industrial Area (Johnstonville Road)
Leavitt Lake	Center Road	None	None	High Desert State Prison California Correction Center Ward Lake Pit
Litchfield	Highway 395	None	None	None
Little Valley	Little Valley Road	None	Burlington Northern Santa Fe	None
Madeline	Highway 395	None	None	None
Milford	Highway 395	None	None	Honey Lake Motocross
Nubieber	Highway 299	None	Burlington Northern Santa Fe	None
Ravendale	Highway 395	Ravendale Airport	None	None
Standish	Highway 395 Standish-Buntingville Road	None	None	Standish Gravel Pit
Susanville	Eagle Lake Road Highway 36 Highway 44 Highway 139 Highway 395 Johnstonville Road Richmond Road Skyline Road Gold Run Road Wingfield Road	Lassen Community Hospital Heliport	None	Diamond Mountain Speedway Banner Lassen Hospital Heliport Sierra Pacific Mills
Wendel	Highway 395		Union Pacific Railroad	HL Power Plant
Westwood	Highway 36 Mooney Road	None	Burlington Northern Santa Fe	Ultra Power

Note: Bold text indicates noise measurement locations
CAL FIRE = California Department of Forestry and Fire Protection

TRANSPORTATION-RELATED NOISE

Highway Noise

Highways are a major noise source in many jurisdictions, and they are the primary means of circulation throughout Lassen County. Lassen County is primarily subject to noise impacts from State Routes 395, 139, 299, 44, 36, and 70. As explained in more detail in the Noise Element Background Technical Report (Dudek 2020), short-term sound-level measurements and manual traffic counts were performed for highway segments in representative areas of Lassen County to allow the prediction of existing and Year 2040 traffic noise levels (expressed as CNEL). **Table 3** presents the results of the traffic noise modeling and identifies the distance from the center of the highway to the boundary of the 65 dBA CNEL contour. The distance to the 65 dBA CNEL contour is of interest because it represents the setback distance that should be considered when siting any new noise-sensitive use to avoid exposure in excess of the recommended maximum level of 65 dBA CNEL. The Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) provides noise contour maps for highways within representative communities throughout Lassen County. The traffic noise modeling assumes flat ground adjacent to the highway, with no terrain or obstructions. Elevation can amplify or dampen noise levels; for example, noise from a lower-elevation highway, such as in a valley, will be reflected upward, while noise from an elevated highway may dissipate. On flat ground, buffers such as sound walls or dense vegetation can be implemented to limit noise from escaping to surrounding areas. To address freeway noise along state roads, the California Department of Transportation (Caltrans) sometimes installs sound walls when new construction or widening is proposed to lessen noise impacts on proximate receptors. Sound walls can be costly and aesthetically unappealing, and they are only recommended when appropriate distance setbacks to noise-sensitive receivers, dense landscaping, landscaped berms, or other attenuation techniques cannot mitigate the noise exposure below levels required by the Lassen County Noise Ordinance (Section 9.65.040). In Lassen County, Caltrans has not pursued sound wall construction along existing highways.

Table 3 Highway Noise Levels

Location	Highways	Measured CNEL	Existing Distance to 65 dBA CNEL (feet)	Year 2040 Distance to 65 dBA CNEL (feet)
Bieber	Highway 299	65 dBA	35	30
Doyle	Highway 395	71 dBA	70	120
Hallelujah Junction	Highway 70	67 dBA	35	50
Janesville	Highway 395	70 dBA	55	70
Johnstonville	Highway 395	77 dBA	120	200
Madeline	Highway 395	67 dBA	30	35
Nubieber	Highway 299	65 dBA	35	30
Ravendale	Highway 395	68 dBA	50	70
Susanville	Highway 36	75 dBA	70	100
	Highway 44	70 dBA	70	85
	Highway 139	61 dBA	25	50
	Highway 395	67 dBA	50	70
Wendel	Highway 395	67 dBA	50	70
Westwood	Highway 36	70 dBA	21	28

CNEL = Community Noise Equivalent Level; dBA = A-weighted decibel

Local Roadway Traffic Noise

The total number of vehicles, traffic speed, and the percentage of semi-truck traffic primarily dictates the level of traffic noise along a given segment of roadway. The primary source of noise from automobiles is high-frequency tire noise, which increases with vehicle speed. Trucks, motorcycles, and older automobiles also generate increased engine and exhaust noise, and semi-trucks generate increased wind noise. Generally, during peak hours, traffic along roadways causes higher noise levels compared to noise levels during non-peak hours, unless congestion is present (which reduces the average vehicle speed). As explained in more detail in the Noise Element Background Technical Report (Dudek 2020), short-term sound-level measurements and manual traffic counts were performed for roadway segments in representative areas of Lassen County to allow the prediction of existing and Year 2040 traffic noise levels (expressed as CNEL).

Table 4 presents the results of the traffic noise modeling, and identifies the distance from the center of the roadway to the boundary of the 65 dBA CNEL contour. The distance to the 65 dBA CNEL contour is of interest because it represents the setback distance that should be considered when siting any new noise-sensitive use to avoid exposure above the recommended maximum level of 65 dBA CNEL. The Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) provides noise contour maps for roadways within representative communities throughout Lassen County.

Table 4 Local and Regional Roadway Noise Levels

General Location ¹	Road	Measured CNEL ¹	Existing Distance to 65 dBA CNEL (feet)	Year 2040 Distance to 65 dBA CNEL (feet)
Bieber	Susanville Road	65 dBA	35	30
Eagle Lake	Eagle Lake Road ²	54 dBA	Within ROW	Within ROW
	Mahogany Way	47 dBA	Within ROW	Within ROW
Herlong	Herlong Access Road	67 dBA	27	27
	Garnier Road	64 dBA	Within ROW	Within ROW
Janesville	Main Street	70 dBA	23	23
	North Main Street	65 dBA	23	23
Johnstonville	Johnstonville Road	61 dBA	24	24
	Center Road	75 dBA	105	105
California Corrections Center	Rice Canyon Road	75 dBA	105	105
Standish	Standish-Buntingville Road	66 dBA	50	50
Susanville	Eagle Lake Road ²	63 dBA	23	23
	Johnstonville Road	74 dBA	37	37
	Richmond Road	69 dBA	35	35
	Skyline Road	70 dBA	55	55
	Gold Run Road	61 dBA	Within ROW	Within ROW
	Wingfield Road	59 dBA	Within ROW	Within ROW
Westwood	Mooney Road	65 dBA	Within ROW	Within ROW

CNEL = Community Noise Equivalent Level; dBA = A-weighted decibel; ROW = right of way

¹ The exact location where measurement was taken can be found in Noise Element Background Technical Report (Dudek 2020).

² Eagle Lake Road is also identified as William McIntosh Highway or Route A-1 on some maps.

Railroad Noise

Union Pacific Railroad (UPRR) and Burlington Northern Santa Fe (BNSF) railroad operate rail lines that traverse Lassen County, each carrying freight trains. The UPRR line extends from the Herlong vicinity, southwest through Doyle, and Hallelujah Junction before exiting Lassen County. The BNSF railroad line is a north/south corridor from Westwood through Nubieber to Modoc County. Table 2, Principal Noise Sources in Lassen County, provides a list of all communities that are affected by the above-mentioned railways.

Although train noise is intermittent, it is a significant source of noise due to its magnitude and associated vibration effects. Train noise is composed of the sounds of the locomotive engine, wheel-on-rail noise, and train whistles near at-grade roadway crossings. Federal law, which can be found in Title 49 Part 222 of the Code of Federal Regulations, requires locomotive engines to sound the train's horn 0.25 miles in advance of crossings, and to continue to sound the horn until the train arrives at the crossing. For train horns to be an effective warning device for motorists, they must provide a sound level capable of initiating a response from



Susanville Railroad Depot

the driver as the train approaches the crossing. Therefore, train horns create a significant and bothersome noise level due to the sound level required to achieve this response.

The 1989 Lassen County Noise Element determined that, with the low frequency of rail operations on each line (averaging two to three rail operations per week), the boundary of the 60 dBA CNEL contour would remain within the rail right-of-way. Officials with UPRR did not respond to requests for information regarding current rail operations on its lines within Lassen County, but a Caltrans assessment of abandoned rail corridors indicates that only approximately 25 miles of the UPRR rail corridor in Lassen County remains (Caltrans 2005). As such, UPRR operations are assumed to remain at two to three operations per week, and the 60 dBA CNEL contour should remain within the UPRR right-of-way. Officials at BNSF confirmed that rail operations on its lines run approximately six to eight trains per day. With the worst-case frequency of eight train operations per day, the boundary of the 65 dBA contour extends approximately 100 feet from the center of the tracks. Therefore, a 100-foot setback from the BNSF rail lines is reasonable for planning purposes to avoid elevated noise exposure levels for noise-sensitive land uses. The Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) provides figures illustrating the location of rail lines in Lassen County communities. Noise contours have not been developed for the UPRR lines because the 60 dBA CNEL contour would be contained within the rail right-of-way; the extent of the 65 dBA CNEL contour is mapped along the BNSF rail lines.

Airport Noise

As shown in **Table 5**, there are five public use airports, one army airfield, and two heliports located in Lassen County. The five public use airports are Susanville Municipal, Herlong, Spalding, Bieber, and Ravendale Airports. The City of Susanville is the operator of the Susanville Municipal Airport, and the remainder are operated by the County. Airport Land Use Plans have been adopted by the Lassen County Airport Land Use Commission for each of the airports listed above. As part of the Airport Land Use Plan preparation, noise exposure contours (on a CNEL basis) were prepared for the Susanville Municipal Airport and County-owned airports, as required by the California Administrative Code, Title 21. Airport noise depends on the type of aircraft and the frequency and direction of flights. As explained in more detail in the Noise Element Background Technical Report (Dudek 2020), current and future predicted operations at each airport were compared against levels used for preparation of the Airport Land Use Plan noise contours to determine if adjustments needed to be made to noise contour boundaries.

In 2016, the Amedee Army Airfield Airport Land Use Compatibility Plan was adopted by the County (County of Lassen 2015). Noise contour maps were also prepared for the plan, and because of the recent date of adoption, these noise contour maps are considered current and appropriate for planning purposes. For the California Department of Forestry and Fire Protection (CAL FIRE) helipad in Bieber and for the Banner Lassen Hospital heliport in Susanville, noise exposure contours were not previously developed.

Table 5 Airport and Heliport Noise Levels in Lassen County

Location	Facility Name	Existing Distance to 65 dBA CNEL (feet)	Year 2040 Distance to 65 dBA CNEL (feet)
Bieber	Bieber Airport	60	50
Herlong	Herlong Airport	30	25
Ravendale	Ravendale Airport	30	25
Spalding	Spalding Airport	60	50
Susanville	Susanville Municipal Airport	100–400	180
Wendel	Amedee Army Airfield	500	280
Susanville	Banner Lassen Hospital Heliport	250	250
Bieber	CAL FIRE Helipad	250	250

CNEL = Community Noise Equivalent Level; **dBA** = A-weighted decibel; **CAL FIRE** = California Department of Forestry and Fire Protection



Susanville Municipal Airport

For this Noise Element, published noise levels from similar helipad and heliport facilities were used to develop noise contours, as further explained in the Noise Element Background Technical Report (Dudek 2020). The Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) provides noise contour maps for each of the airport and heliport facilities in Lassen County.

Stationary Source Noise

Noise from industrial businesses and large stationary sources varies, but can contribute significant impacts on adjacent uses depending on the nature of industrial operations. Industrial operations often involve the use of mechanical equipment, generators, and vehicles that contribute to noise levels at industrial sites, particularly if operations occur outdoors. Historically, many communities in Lassen County have been in proximity to industrial uses, such as those associated with the production and storage of lumber products or aggregate materials. Diamond Mountain Speedway and local prisons are also stationary noise sources in Lassen County. **Table 6** provides a summary of the distance from each identified stationary source to the boundary of the 65 dBA CNEL boundary. Major stationary sources identified in the 1989 Noise Element were analyzed in 2019 and compared with the 1989 noise data. More recent stationary noise sources were addressed with sound-level measurements. The Noise Element Background Technical Report (Dudek 2020) provides a description of the methodology used and supporting data.

Table 6 Stationary Noise Levels in Lassen County

Location	Stationary Source	Distance to 65 dBA CNEL (feet)
Bieber	Big Valley Lumber	Within facility property
Herlong	Sierra Army Depot	At facility property boundary
	Federal Corrections Institution	Within facility property
Johnstonville	Industrial Area Johnstonville Road (Recyclers/Auto Dismantlers)	75 to 150 feet
Leavitt Lake	High Desert State Prison/California Correction Center	At facility property boundary
	Ward Lake Pit	700 feet (primarily within facility boundary)
Milford	Honey Lake Motocross Track	1,200 feet
Standish	Standish Gravel Pit	At facility property boundary
Susanville	Diamond Mountain Speedway	225 feet
	Banner Lassen Hospital (Helipad)	250 feet
	Sierra Pacific Mills	Within facility property
Wendel	HL Power Plant	900 feet
Westwood	Ultra Power	Within facility property

Construction Noise

Construction noise typically involves the loudest common urban noise events, including noise associated with building demolition, grading, construction, large diesel engines, and truck deliveries and hauling. Construction activity can create a substantial increase in noise volumes to adjacent receptors, but it is temporary (i.e., does not result in permanent changes to the ambient noise environment). As such, daytime construction noise is exempt from regulation under the Lassen County Noise Ordinance (Lassen County Code, Chapter 9.65).

NOISE COMPATIBILITY

Land Use

New development projects should be evaluated for noise impacts based on a comparison of the noise compatibility standards in provided in **Figure 2**. Generally, new noise-generating sources should not be placed in locations where the additional noise would raise noise levels above those presented in Figure 2, and new noise-sensitive uses should not be located in areas where exterior noise levels currently exceed the standards presented in Figure 2. New development can achieve these standards by either avoiding locating near incompatible land uses, or abating noise impacts through typical noise mitigation techniques, such as barriers or sound walls between noise-generating sources and exterior use areas, dense vegetation placed between noise generating-sources and adjacent exterior use areas, and/or increased building shell sound insulation to prevent elevated exterior noise levels from intruding into interior living areas.

A standard construction wood frame house reduces noise transmission by 15 dBA with windows open and 20 dBA with windows closed. Because interior noise levels for residences are not to exceed 45 dBA CNEL, the maximum exterior noise level for residences is 65 dBA CNEL without requiring additional insulation. If a proposed new noise-generating use will cause external noise levels at the property line of residential uses

Figure 2 Land Use Noise Compatibility Standards

		Land Use Interpretation for CNEL (or Ldn) value				
		50 - 60	61 - 70	71 - 80	81 - 90	91+
Land Use Category	Maximum Interior Noise Levels	Land Use Interpretation for CNEL (or Ldn) value				
		50 - 60	61 - 70	71 - 80	81 - 90	91+
Residential	45	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Recreational/Open Space		Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Institutional*	45	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Commercial/Retail	50	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Industrial		Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Agriculture		Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Resource Extraction		Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Public Right-of-Way		Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable

*This includes uses such as: schools, libraries, nursing homes, etc.

to exceed 65 dBA CNEL, buffers or other noise mitigation techniques are required to be implemented by the sponsor of the new noise-generating use. If new unplanned residential or other noise-sensitive development is proposed to be located in an area with noise levels exceeding 65 dBA CNEL, it is incumbent upon the new noise-sensitive development to reduce interior noise levels to 45 dBA CNEL.

Temporary Uses and Nuisances

Appropriate standards for short-term noise levels intended to be regulated by the L_{eq} or L_{max} metrics vary with the type of land use and time of day. Acceptable daytime levels in industrial areas are typically based on a combination of health and nuisance considerations, and typically are restricted not to exceed 85 dBA L_{eq} . In residential areas, standards are typically established to avoid annoyance or nuisance, such as noise levels that could interfere with normal conversation. Noise levels above 65 dBA L_{eq} require raised voices in order for participants in a conversation to be heard at a distance of 3 feet. Indoor noise levels between 50 and 60 dBA L_{eq} can disturb sleep.

The perception of nuisance and annoyance varies depending on loudness, duration, and pitch. The perception of nuisance and annoyance also depends on the character of the sound, familiarity and predictability, and the attitude of the listener. In simpler terms, a person moving into a residence on a busy street may be initially annoyed at the elevated traffic noise, but once they become acclimated to the traffic noise level, recognize daily patterns, and understand that the roadway is a necessity for transportation within the community, their annoyance is likely to lessen over time. CNEL and L_{eq} are typically the basis for making nuisance determinations, but other factors may be considered. For example, an annual community event or parade may exceed residential noise levels but might not be deemed a nuisance given the celebratory nature of the event, community traditions and feelings surrounding these community-oriented activities, and the one-day nature of the event.



Milford

GOALS, POLICIES, AND IMPLEMENTATION ACTIONS

DRAFT

This chapter presents the goals, policies, and implementation measures of the Noise Element. A goal is an end statement of what the County's noise environment will be like once the Noise Element is implemented. A **policy** is how the County will achieve these goals. An **action** is a specific implementation measure that the County will take to implement the policy.

Goal 1: A quiet and healthful environment with minimal noise intrusion.

Policy 1.1: Noise Generation Standards: Minimize the impact of noise generators by applying clear and appropriate standards during permit review and subsequent monitoring.

Action 1.1a: Enforce Stationary Noise Source Levels. Enforce maximum and average noise level limits on permitted stationary sources based on their impact on the property line of the nearest noise-sensitive receptor as outlined in the Lassen County Noise Ordinance (Lassen County Code, Section 9.65.040). Where the noise-sensitive receptor involves a residence on a parcel with zoning or land use designation of "agriculture," the noise impact shall be evaluated at the boundary of the yard area or property line of the residence, whichever is closer to the residence.

Action 1.1b: Enforce Temporary Event Permit Noise Standards. In accordance with the Lassen County Noise Ordinance (Lassen County Code, Section 9.65.070[a][3]), review event permits (use permit or license) on a case-by-case basis and provide appropriate attenuation guidance that is clear to follow and implement without the need for noise monitoring, such as the following:

- Placement of noise sources or amplifiers, such as mechanical equipment or speakers
- Orientation of sound system speakers
- Hours of operation

Action 1.1c: Noise monitoring may be required if determined to be necessary by the Director of Lassen County Department of Planning and Building Services or his/her designee, or if determined to be necessary by the Planning Commission or Board of Supervisors through the use permit process.

Action 1.1d: Ensure Construction Occurs During Accepted Times of Day. Ensure that noise-generating construction work occurs during the accepted times of day, not between the hours of 7 p.m. and 7 a.m., pursuant to Standard N-4. Lassen County Noise Ordinance Section 9.65.070(a)(9) exempts construction work from noise regulation between 7 a.m. and 7 p.m.

Policy 1.2: Noise Mitigation and Attenuation Mitigate the effect of noise from new industrial or commercial uses, project-generated traffic, and short-term/ temporary events on residential and other noise-sensitive land uses by applying feasible noise mitigation measures.

Action 1.2a: Attenuate Project-Related Stationary Source Noise Impacts. As part of the environmental review process, the County shall work with project applicants to attenuate stationary-source noise impacts. Projects shall be designed to avoid long-term noise impacts or reduce those impacts to meet the applicable CNEL limits presented in Standard N-1.1 Noise impacts can be reduced using the following methods, or similar methods, as appropriate:

1 Standard N-1, Table 7, presents allowable noise generation limits in terms of CNEL. These noise generation limits are translated into hourly average (L_{eq}) limits in Lassen County Code, Section 9.65.040. Proposed new stationary noise sources must comply with both Standard N-1 and Section 9.65.040.

- Create a distance buffer between stationary mechanical equipment and noise-sensitive receivers by placing parking lots, storm drain facilities, and landscaping between major stationary equipment and adjacent receivers.
- Provide sound barriers or enclosures for equipment with significant sound-generation.
- Where possible, place on-site buildings between major noise-generating equipment and the location of the closest adjacent noise-sensitive land use.
- Where possible, locate/orient/direct/face/position noise-generating uses in such a way that minimizes noise for noise-sensitive receivers.
- Use facility perimeter sound barriers (e.g., solid walls) or landscaped berms to reduce noise levels at immediately adjacent noise-sensitive uses.

Action 1.2b: Require Noise Studies for Discretionary Projects. When a discretionary project has the potential to generate noise levels that exceed the standards presented in Standard N-11 (as identified through the California Environmental Quality Act [CEQA] process), a noise study and acceptable noise attenuation techniques to ensure compliance with Standard N-1 shall be required. For such discretionary projects, the environmental review process required by CEQA shall be employed to identify the required analysis and determine appropriate mitigation, as described in Standard N-2. The noise study shall be prepared in accordance with the requirements set forth in Standard N-3.

Action 1.2c: Attenuate Project-Related Traffic Noise Impacts Near Sensitive Uses. Proposed discretionary developments that may result in an increase in traffic on roadways near existing noise-sensitive uses above levels allowed in the General Plan should include, as appropriate and feasible, traffic-calming design, low-noise pavement surfaces, sound barriers, or vegetated berms to minimize motor vehicle traffic noise.

Action 1.2d: Traffic-calming design could include the following:

- Narrowing lane widths
- Digital speed monitors
- Flashing crosswalk beacons
- Curb bulb-outs
- Reduced speed limits

Policy 1.3: Existing Land Use Incompatibilities. Help mitigate noise levels among existing incompatible land uses, as feasible, to enhance quality of life for noise-impacted residents and other sensitive receptors.

Action 1.3a: Mitigate Stationary-Source Noise Impacts on Existing Residential and Other Sensitive Uses as Feasible. Upon receiving noise complaints, County Planning staff shall, in accordance with Departmental policy, investigate the noise source associated with the complaint to determine if a violation of Ordinance-specified noise limits is occurring. Such investigation may include the direct measurement of sound levels using a sound-level meter or requiring the operator of the sound source to retain an acoustical professional to complete such measurements and analysis, as dictated in Standard N-4. Where sound levels exceed Noise Ordinance limits for stationary sound sources (Lassen County Code Section 9.65.040), the operator shall be required to install controls or alter operations in order to achieve compliance with the Noise Ordinance limits. Where sound levels investigated as the result of a complaint are in compliance, County Planning staff or the retained acoustical consultant may provide recommendations for reducing sound-level annoyance in exterior or interior areas of the property for which the complaint has been submitted. The recommendations may be followed on a voluntary basis, but cannot be used to compel the noise generator into reducing sound levels to less than those required in the Noise Ordinance.

Action 1.3b: Support Attenuation of Highway Noise The County should support efforts to reduce traffic noise levels on Highway 395, Highway 299, Highway 139, Highway 70, Highway 44, and Highway 36, along sections in proximity to concentrated residential development through prioritized roadway surface maintenance; use of noise-reducing surface treatments; traffic-safe tree or shrub plantings; or, in cases of significant noise exposure, use of lower speed limits and construction of sound walls. The County should also encourage enforcement of California Vehicle Code sections relating to adequate mufflers and modified exhaust systems.

Goal 2: A pattern of land uses that protects residents and other sensitive receptors from excessive noise.

Policy 2.1: Land Use Planning. Create General Plan land use and zoning patterns that prevent or buffer community residents and other sensitive receptors from incompatible land uses.

Action 2.1a: Consider Noise Compatibility in Land Use Planning. The County shall consider the compatibility of proposed land uses and the noise environment when preparing or revising General Plan, Community Plan, and zoning documents, and when reviewing development proposals. Noise levels for proposed land uses shall be consistent with the noise levels presented in Noise Standard N-1. These standards regarding noise exposure for noise-sensitive receivers (e.g., residences) do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

Action 2.1b: Prohibit or Attenuate New Sensitive Uses in Noise-Impacted Areas. Prohibit new development of residential or other sensitive land uses in noise-impacted areas (as generally depicted by the limit of the 65 dBA CNEL contours illustrated in the Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) unless the project design includes effective noise-attenuation measures that reduce exterior noise to 65 dBA Ldn/CNEL or less in exterior activity areas, and 45 dBA Ldn/CNEL or less in interior spaces with windows and doors closed by using the best available noise-reduction technology, which may include the following techniques:

- Increase the distance between noise generators and noise-sensitive uses through the use of increased building setbacks and/or the dedication of noise easements.
- Place noise-tolerant land elements of the site plan, such as parking lots, maintenance facilities, and utility areas, between vicinity noise generators and on-site receivers.
- Use noise-tolerant structures, such as garages or carports, to shield noise-sensitive areas.
- Orient buildings so that the noise-sensitive portions of a project, including outdoor areas, are shielded from noise sources.
- Use berms and heavy landscaping to reduce noise levels.
- Use sound-attenuating architectural design and building features, such as the following:
 - Courtyards
 - Oriented openings and windows away from roadways
 - Double- and triple-paned windows
 - Additional layers of plywood and drywall in the exterior building shell construction

With regard to building construction to achieve adequate noise attenuation, the County shall enforce the State Noise Insulation Standards (California Code of Regulations, Title 24).

Action 2.1c: Enforce Right to Farm Ordinance. Continue to enforce the Right to Farm Ordinance as codified in the Lassen County Municipal Code Chapter 6.02. For new residential development proposed adjacent to agricultural uses, support educational opportunities to inform potential property owners and residents on the implications of the Right to Farm Ordinance.

Policy 2.2: Airport Noise and Highway Noise. Minimize vehicular and aircraft noise exposure for residents and occupants of noise-sensitive uses by planning land uses compatible with transportation corridors and airports, and applying noise attenuation designs and construction standards.

Action 2.2a: Consult Airport Noise Contours. Noise contour lines illustrate the boundary or extent of an area subject to a given CNEL noise exposure and are generally provided in 5 dBA increments. For example, a receiver located between a 60 dBA CNEL and 65 dBA CNEL contour could be exposed to noise levels in the 60–65 dBA CNEL range. The 20-year projected airport noise contours in the Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) (or any Airport Land Use Compatibility Plan adopted more recently than this Noise Element) shall be used to indicate where special sound insulation measures may apply, consistent with Standard N-1. To avoid noise-related land use incompatibility, proposed noise-sensitive land uses should not be located within the 65 dBA CNEL contour associated with any of the airports in Lassen County.

Action 2.2b: Consult Highway Noise Contours. The 20-year projected highway noise contours in the Master Noise Exhibit (LassenCountyCommunityNoiseLevels.kmz, link) shall be used to identify the location of the 65 dBA CNEL contour relative to a given highway segment. To avoid noise-related land use incompatibility, proposed noise-sensitive land uses should not be located within the 65 dBA CNEL contour associated with any highway within Lassen County. For new noise-sensitive uses proposed within the 65 dBA contour (where noise levels up to 70 dBA CNEL could exist), site design may need to include placement of exterior use areas behind proposed structures or the construction of a sound wall along the perimeter of the exterior use area.

STANDARDS

Standards are the effective noise regulations that enforce this Noise Element consistent with the Lassen County Noise Ordinance (Lassen County Code, Chapter 9.65).

Standard N-1. CNEL Standards by Land Use Category

New noise-generating land uses may not exceed the following standards (as presented in **Table 7**) at the property line for the parcel containing said noise-generating use. For noise-sensitive uses in a project's vicinity, exterior noise standards shall be measured at the property line of the receiving noise-sensitive use (or at the yard boundary for residences on agriculture land), and interior noise standards shall be measured with all doors and windows closed.

Table 7 Community Noise Equivalent Level Standards for Receiving Land Uses

Land Use Category	Interior Noise Standard (dBA)	Exterior Noise Standard (dBA)*
Residential	45	65
Recreational/Open Space	N/A	65
	45	65
Commercial/Retail	50	75 ^b
Industrial	N/A	90 ^b
Agriculture	N/A	90
Resource Extraction	N/A	90 ^b
Public Right-of-Way	N/A	90

^a These noise generation limits are translated into hourly average (L_{eq}) limits in Lassen County Code, Section 9.65.040. Proposed new stationary noise sources must comply with both Standard N-1 and Section 9.65.040

^b Noise levels generated from these sources are also subject to the land use noise standard of the receiving properties, where such a standard imposes a lower noise limit. For instance, while commercial noise levels of up to 75 dBA CNEL are allowed within a commercially zoned property, this commercial noise source must not exceed 65 dBA CNEL at any residential property boundary in the vicinity. The limit is applied at the receiving land use property line or (for residences in agriculture zones) at the boundary of the yard area.

Standard N-2. Environmental/Development Review Process

When noise-sensitive or noise-generating land uses, as defined in the Noise Ordinance (Lassen County Code, Chapter 9.65), are proposed and require a discretionary permit, the environmental review process required by CEQA shall be used to generate the required analysis and determine the appropriate mitigation per General Plan and state standards. For the purpose of completing CEQA review, future noise levels shall be predicted for a period of at least 10 years from the beginning of the environmental document review process. Adherence to mitigation required to address significant noise impacts (as identified in the CEQA review document) shall be ensured via incorporation of mitigation measures in a required Mitigation Monitoring and Reporting Program (MMRP), to be adopted concurrent with approval of discretionary permits for the project. Adherence to mitigation shall also be ensured through conditions of approval.

Standard N-3. Noise Study Requirements

When a discretionary project has the potential to generate noise levels in excess of N-1 standards, a noise study and acceptable plans to ensure compliance with the standards shall be required. The noise study shall measure or model the following, as appropriate: CNEL, L_{eq} , and L_{max} levels at property lines and, if feasible, receptor locations. Noise studies shall be prepared by qualified individuals using calibrated equipment under currently accepted professional standards, and include an analysis of the characteristics of the project in relation to noise levels, all feasible mitigations, and projected noise impacts. Noise studies shall do the following:

- Be the responsibility of the applicant, but accepted by the Department of Planning and Building Services.
- Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.
- Estimate existing and projected (10 years) noise levels in terms of CNEL standards in Table 7 or the standards found in Lassen County Noise Ordinance Section 96.040, and compare predicted noise levels against such standards.
- Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element and Noise Ordinance.

- Predict noise exposure at the property line after the prescribed mitigation measures have been implemented (quantify the noise reduction achieved by the mitigations). If the project does not comply with the adopted standards of the Noise Element and Noise Ordinance, the analysis must provide acoustical information for a statement of overriding considerations for the project.

Standard N-4. Noise Complaint Investigation

When a noise complaint is submitted, authorized County personnel shall investigate the noise source associated with the complaint to determine if a violation of Noise Ordinance limits is occurring. If the noise level from the offending source is clearly audible over the background noise levels at the property line of the complainant, an investigation would assume to be warranted. Such investigation may include the direct measurement of sound levels by County staff using a sound-level meter or requiring the operator of the sound source to retain an acoustical professional to complete such measurements and analysis. The investigation shall include the following:

- Completion of sound level measurements using a sound-level meter meeting American National Standards Institute (ANSI) Type 1 or Type 2 specifications.
- A measurement location at the property line of the receiving property located closest to the noise source associated with the complaint.
- For residences located on agriculture parcels (agriculture zoning or land use designation), the measurement shall be located at the boundary of the yard area (presumed to extend not more than 50 feet from the residence) or the parcel boundary, whichever is closest to the noise source.
- Measurements for an appropriate duration to assess compliance with the applicable standard (for Leq based standard, the measurement shall be no less than 1 hour while the noise source is operating; for the CNEL standard, the sound measurement shall be not less than 24 hours in duration). Periodic measurements for temporary events or non-standard operating circumstances may be warranted to ensure compliance.
- Reporting that includes Leq and Lmax values, as well as calculated CNEL levels (where appropriate) associated with the noise measurements, and comparison of these noise levels with the Noise Element Policy and Noise Ordinance Standards.
- Recommendations for the operator of the noise source to achieve compliance (if a violation is occurring), or guidance for the receiving property to reduce noise exposure (if the noise is within allowable limits). The County can provide good neighbor policies to the noise-generating properties, but if the noise is within allowable limits, these suggestions shall not be enforceable.

REFERENCES

DRAFT

REFERENCES

- Caltrans (California Department of Transportation). 2005. Rail Right-of-Way and Abandoned Corridors Study Final Report. March 2005.
- County of Humboldt. 2017. "Noise Element." In Humboldt County General Plan. Adopted October 23, 2017. Accessed May 2019. <https://humboldt.gov/205/General-Plan>.
- County of Lassen. 1987. Susanville Municipal Airport Land Use Plan, Lassen County Airport Land Use Commission. March 26, 1987.
- County of Lassen. 1988. Airport Land Use Plan for Airports at Herlong, Spaulding, Bieber, Ravendale, Lassen County Airport Land Use Commission. April 28, 1988.
- County of Lassen. 2015. Amedee Army Airfield Airport Land Use Compatibility Plan. Prepared for Lassen County. December 2015. Adopted November 15, 2016. <http://www.kanwehelp.com/Amedee%20Army%20Airfield%20Area%20Land%20Use%20Compatibility%20Plan%20-2016.htm>.
- Dudek. 2020. Lassen County General Plan Noise Element Update 2020 Technical Background Report. December 2020.
- EPA (U.S. Environmental Protection Agency). 1973. Public Health and Welfare Criteria for Noise. July 27, 1973.
- OPR (Governor's Office of Planning and Research). 2017. State of California General Plan Guidelines: 2017 Update. Accessed April 2019. <http://opr.ca.gov/planning/general-plan/guidelines.html>.
- World Health Organization. 2015. Hearing Loss due to Recreational Exposure to Loud Sounds: A Review. Accessed May 2019. https://apps.who.int/iris/bitstream/handle/10665/154589/9789241508513_eng.pdf;jsessionid=2420F38BD389D11BCE037D718CA78D02?sequence=1.