This section of the Draft Environmental Impact Report (Draft EIR or DEIR) describes terminology used to discuss noise and discusses and analyzes the ambient noise environment of the proposed City of Chico General Plan Update Planning Area. Construction noise, traffic noise, operational noise, and other noise impacts associated with implementation of the proposed General Plan Update are analyzed.

4.7.1 EXISTING SETTING

TECHNICAL BACKGROUND

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound is mechanical energy transmitted in the form of a wave because of a disturbance or vibration. Sound levels are described in terms of both amplitude and frequency. Amplitude is defined as the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic scale. 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). Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3 dB change in amplitude as the minimum audible difference perceptible to the average person.

The frequency of a sound is defined as the number of fluctuations of the pressure wave per second. The unit of frequency is the Hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to sound of different frequencies. For instance, the human ear is more sensitive to sound in the higher portion of this range than in the lower, and sound waves below 16 Hz or above 20,000 Hz cannot be heard at all. To approximate the sensitivity of the human ear to changes in frequency, environmental sound is usually measured in what is referred to as "A-weighted decibels" (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA (USEPA, 1971). Common community noise sources and associated noise levels, in dBA, are depicted in **Figure 4.7-1**.

Noise can be generated by a number of sources, including mobile sources, such as automobiles, trucks and airplanes, and stationary sources, such as construction sites, machinery, and industrial operations. Noise generated by mobile sources typically attenuates at a rate between 3.0 to 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Mobile transportation sources, such as highways, hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3.0 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance from the source. Noise generated by stationary sources typically attenuates at a rate of approximately 6.0 to 7.5 dBA per doubling of distance from the source (USEPA, 1971).

NOISE DESCRIPTORS

The intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are used. The three most commonly used descriptors are L_{eq}, L_{dn}, and CNEL. The energy-equivalent noise level, L_{eq}, is a measure of the average energy content (intensity) of noise over any given period. Many communities use 24-hour descriptors of noise

levels to regulate noise. The day-night average noise level, L_{dn}, is the 24-hour average of the noise intensity, with a 10-dBA "penalty" added for nighttime noise (10:00 p.m. to 7:00 a.m.) to account for the greater sensitivity to noise during this period. CNEL, the Community Noise Equivalent Level, is similar to L_{dn} but adds an additional 5-dBA penalty for evening noise (7:00 p.m. to 10:00 p.m.). Another descriptor that is commonly discussed is the single-event noise exposure level (SENEL), also referred to as the sound exposure level (SEL). The SENEL/SEL describes a receiver's cumulative noise exposure from a single noise event, which is defined as an acoustical event of short duration (0.5 second), such as a backup beeper, the sound of an airplane traveling overhead, or a train whistle, and involves a change in sound pressure above a defined reference value (usually approximately 40 dBA). Noise analyses may also depend on measurements of L_{max}, the maximum instantaneous noise level during a specific period of time, and L_{min}, the minimum instantaneous noise level during a specific period. Common noise level descriptors are summarized in **Table 4.7-1**.

TABLE 4.7-1
COMMON ACOUSTICAL DESCRIPTORS

Descriptor	Definition
Energy Equivalent Noise Level (L_{eq})	The energy mean (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 (in dBA) is calculated.
Minimum Noise Level (L_{min})	The minimum instantaneous noise level during a specific period of time.
Maximum Noise Level (L_{max})	The maximum instantaneous noise level during a specific period of time.
Day-Night Average Level (DNL or L_{dn})	The 24-hour L_{eq} with a 10 dBA "penalty" for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours to account for increases sensitivity to noise during these hours.
Community Noise Equivalent Noise Level (CNEL)	The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA "penalty" added to noise events that occur between the hours of 7:00 p.m. to 10:00 p.m. The calculated CNEL is typically approximately 0.5 dBA higher than the calculated L_{dn}.
Single Event Noise Level (SEL)	The level of sound accumulated over a given time interval or event. Technically, the sound exposure level is the level of the time-integrated mean square A-weighted sound for a stated time interval or event, with a reference time of one second.
Percent Exceeded Noise Level (L_n)	The level exceeded for *n* percent of the time. For instance, L_{10} is the level exceeded for 10% of the time. The commonly used values of n for the n-percent exceeded level, L_n, are 2, 10, 50, and 90.

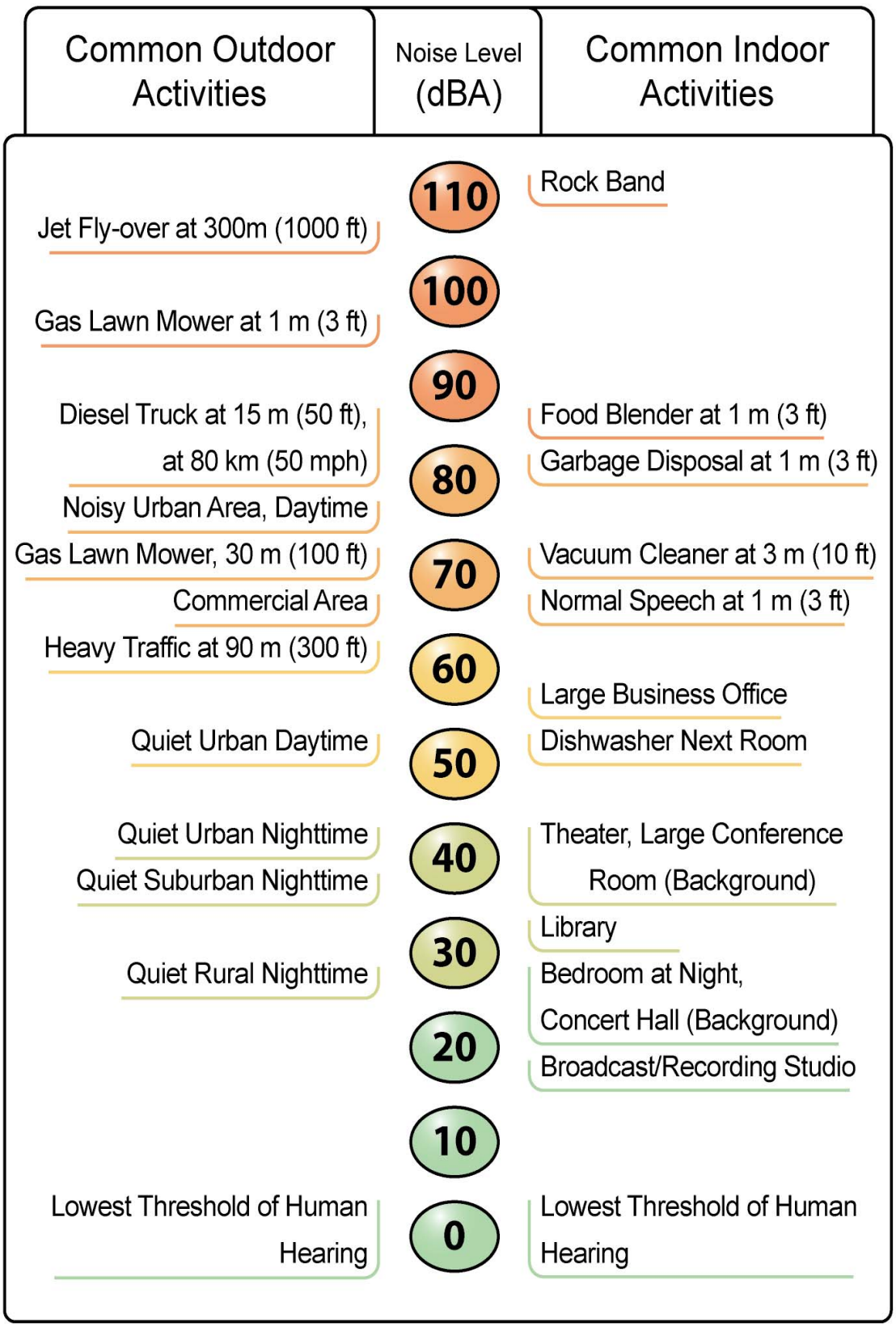

Figure 4.7-1
Common Noise Levels

HUMAN RESPONSE TO NOISE

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases. The acceptability of noise and the threat to public well-being are the basis for land use planning policies preventing exposure to excessive community noise levels.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted: the so-called "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged. Regarding increases in A-weighted noise levels, knowledge of the following relationships will be helpful in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans;
- Outside of the laboratory, a 3 dB change is considered a just-perceivable difference;
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected. An increase of 5 dB is typically considered substantial;
- A 10 dB change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

When evaluating noise impacts, based on the above relationships, it is generally recognized that an increase of greater than 3 dBA is considered potentially significant. However, increases in ambient noise levels need to also take into account the existing noise environment.

NOISE REDUCTION

Various methods can be employed to reduce noise levels, including enclosures, barriers, and sound-dampening materials. The methods employed are dependent on various factors, including source and receptor characteristics as well as environmental conditions. With regard to typical community noise sources, noise reduction techniques typically focus on the isolation or shielding of the noise source from nearby noise-sensitive receptors. The more common methods include the use of buffers, enclosures, and barriers. In general, these techniques contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver. Buildings, concrete walls, and berms can all act as effective noise barriers. Wooden fences or broad areas of dense foliage can also reduce noise but are less effective than solid barriers. Changes in design specifications and use of equipment noise control devices (e.g., mufflers and silencers) are also commonly employed to reduce stationary-source (i.e., non-

transportation) noise levels. Additional noise control techniques commonly used for transportation noise sources include traffic control, such as prohibiting heavy-duty trucks and reducing speed limits along primarily affected corridors. However, an approximate 20 mile per hour reduction in speed would typically be required to achieve a noticeable decrease in noise levels. In some instances, the use of noise-reducing pavements, such as rubberized asphalt, has also been used to reduce traffic noise.

EXISTING CONDITIONS

AMBIENT NOISE LEVELS

Several sources of noise that could affect the local community were identified within the City of Chico. These sources include noise generated from stationary activities (e.g., commercial and industrial uses), aircraft operations, and traffic on major roadways and highways. Short-term (10-minute) noise level measurements were conducted on November 6 and 7, 2007, for the purpose of documenting and measuring the existing noise environment in various areas in and around the City of Chico. Measurements were conducted using a Larson Davis model 820 sound-level meter placed at a height of approximately 4.5 feet above the ground surface. Ambient noise measurement locations and corresponding measured values (i.e., L_{eq}, L_{min}, and L_{max}) are summarized in **Table 4.7-2**. Noise measurement locations and corresponding hourly-average daytime and nighttime ambient noise levels are depicted in **Figure 4.7-2**. Based on the monitoring conducted, hourly-average daytime noise levels (in L_{eq}) within the city generally range from the low 50s to the low 70s, dependent primarily on distance from area roadways. Ambient noise levels during the quieter nighttime hours are typically 5 to 10 dBA less than daytime noise levels. Average-daily noise levels at measurement locations range from approximately 56 to 77 dBA CNEL.

NOISE-SENSITIVE LAND USES

Noise-sensitive land uses are generally considered to include those uses that would result in noise exposure that could cause health-related risks to individuals. Places where quiet is essential are also considered noise-sensitive uses. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Other land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. School classrooms, places of assembly, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

TABLE 4.7-2
AMBIENT NOISE LEVELS

Location		Monitoring Period	Noise Level (dBA)		
			L_{eq}	L_{max}	Calculated CNEL
1	Boeing Ave., 150′ Cohassett Rd. from near travel lane centerline of Cohasset Rd.	10:40 a.m. – 10:50 a.m.	61.4	72.6	65
		12:05 a.m. – 12:15 a.m.	52.6	71.5	
2	Innsbrook Ave., 50′ from near travel lane centerline of Esplanade	11:05 a.m. – 11:15 a.m.	64.8	74.5	68
		12:30 a.m. – 12:40 a.m.	57.1	68.1	

Location		Monitoring Period	Noise Level (dBA)		
			L_{eq}	L_{max}	Calculated CNEL
3	E. Lassen Ave. and Floral Ave.	10:15 a.m. – 10:25 a.m.	51.2	63.2	56
		11:40 p.m. – 11:50 p.m.	47.9	65.2	
4	Henshaw Avenue, 50′ from near travel lane centerline of Esplanade	11:30 a.m. – 11:40 a.m.	66.4	73.5	70
		12:55 a.m. – 1:05 a.m.	59.2	71.2	
5	Ceres Avenue, 50′ from near travel lane centerline of East Avenue	3:10 p.m. – 3:20 p.m.	59.6	67.6	63
		11:45 p.m. – 11:55 p.m.	52.7	68.2	
6	Marigold Elementary School, 75′ from near travel lane centerline of East Ave.	11:55 a.m. – 12:05 a.m.	59.8	71.2	63
		1:20 a.m. – 1:30 a.m.	51.4	68.1	
7	Hooker Oak Recreation Complex, 75′ from near travel lane centerline of Manzanita Ave.	9:45 a.m. – 9:55 a.m.	56.9	67.0	60
		11:15 p.m. – 11:25 p.m.	48.5	62.8	
8	Jordans Place, 50′ from near travel lane centerline of Nord Avenue	12:35 p.m. – 12:45 p.m.	65.1	74.4	68
		1:45 a.m. – 1:55 a.m.	55.8	69.8	
9	W. 5th Avenue, 35′ from near travel lane centerline of Esplanade	4:10 p.m. – 4:20 p.m.	65.4	74.8	69
		12:15 a.m. - 12:25 a.m.	58.5	72.4	
10	Oak Way Park, 25′ from near travel lane centerline of Oak Way	12:50 p.m. – 1:00 p.m.	59.8	78.2	63
		12:40 a.m. – 12:50 a.m.	50.5	57.8	
11	Gateway Lane, 50′ from near travel lane centerline of W. Sacramento Ave.	1:40 p.m. – 1:50 p.m.	54.6	64.7	58
		1:10 a.m. – 1:20 a.m.	47.7	65.4	
12	Chico High School, 45′ from near travel lane centerline of Esplanade	2:10 p.m. – 2:20 p.m.	64.3	70.5	68
		10:40 p.m. – 10:50 p.m.	57.1	71.3	
13	E. 4th Street, 35′ from Near Travel Lane Centerline of Main Street	2:35 p.m. – 2:45 p.m.	66.1	71.8	70
		11:10 p.m. – 11:20 p.m.	57.9	70.9	
14	W. 5th Street, 50′ from near travel lane centerline of Walnut St.	1:15 p.m. – 1:25 p.m.	64.2	82.3	67
		10:15 p.m. – 10:25 p.m.	53.8	76.5	
15	Silver Dollar Way, 50′ from near travel lane centerline of Martin Luther King Jr. Parkway.	8:20 a.m. – 8:40 a.m.	58.9	67.2	63
		10:05 p.m. – 10:15 p.m.	51.6	68.1	
16	Village Center, 90′ from near travel lane centerline of SR 99	8:45 a.m. – 8:55 a.m.	73.1	78.0	77
		10:30 p.m. – 10:40 p.m.	67.8	76.2	
17	Hartford Dr., 25′ from near travel lane centerline of Forest Ave.	7:50 a.m. – 8:00 a.m.	53.4	73.5	57
		9:40 p.m. – 9:50 p.m.	48.4	72.4	

Location		Monitoring Period	Noise Level (dBA)		
			L_{eq}	L_{max}	Calculated CNEL
18	151 Via Mission Drive, 50' from near travel lane centerline of Bruce Rd.	9:15 a.m. – 9:25 a.m.	59.4	71.2	63
		10:55 p.m. – 11:05 p.m.	53.4	68.4	

Note: Ambient noise monitoring locations correspond with those noted in Figure 4.7-2. Ambient noise measurements were conducted on November 6 and 7, 2007, using a Larson Davis model 820 sound-level meter placed at a height of approximately 4.5 feet above the ground surface. CNEL noise levels were calculated based on measured daytime and nighttime noise levels.

NOISE SOURCES

Noise issues associated with stationary and transportation sources in the Planning Area are discussed below.

Stationary Sources

Stationary noise sources include industrial and commercial land uses. Many industrial processes produce noise, even when the best available noise control technology is applied. Noise exposures within industrial facilities are controlled by federal and state employee health and safety regulations (i.e., regulations of the Occupational Safety and Health Administration of the U.S. Department of Labor [OSHA] and the California Division of Occupational Safety and Health [Cal/OSHA]). Exterior noise levels that affect neighboring parcels are typically subject to local standards. Commercial, recreational, and public facility activities can also produce noise that may affect adjacent noise-sensitive land uses. These noise sources can be continuous or intermittent and may contain tonal components that are annoying to individuals who live nearby. For instance, emergency-use sirens and backup alarms are often considered nuisance noise sources, but may not occur frequently enough to be considered incompatible with noise-sensitive land uses. In addition, noise generation from fixed noise sources may vary based upon climate conditions, time of day, and existing ambient noise levels.

From a land use planning perspective, fixed-source noise control issues focus on two goals: (1) preventing the introduction of new noise-producing uses in noise-sensitive areas; and (2) preventing encroachment of noise-sensitive uses upon existing noise-producing facilities. The first goal can be achieved by applying noise performance standards to proposed new noise producing uses. The second goal can be met by requiring that new noise-sensitive uses near noise-producing facilities include mitigation measures to ensure compliance with noise performance standards. Each of these goals stresses the importance of avoiding the location of new uses that may be incompatible with adjoining uses.

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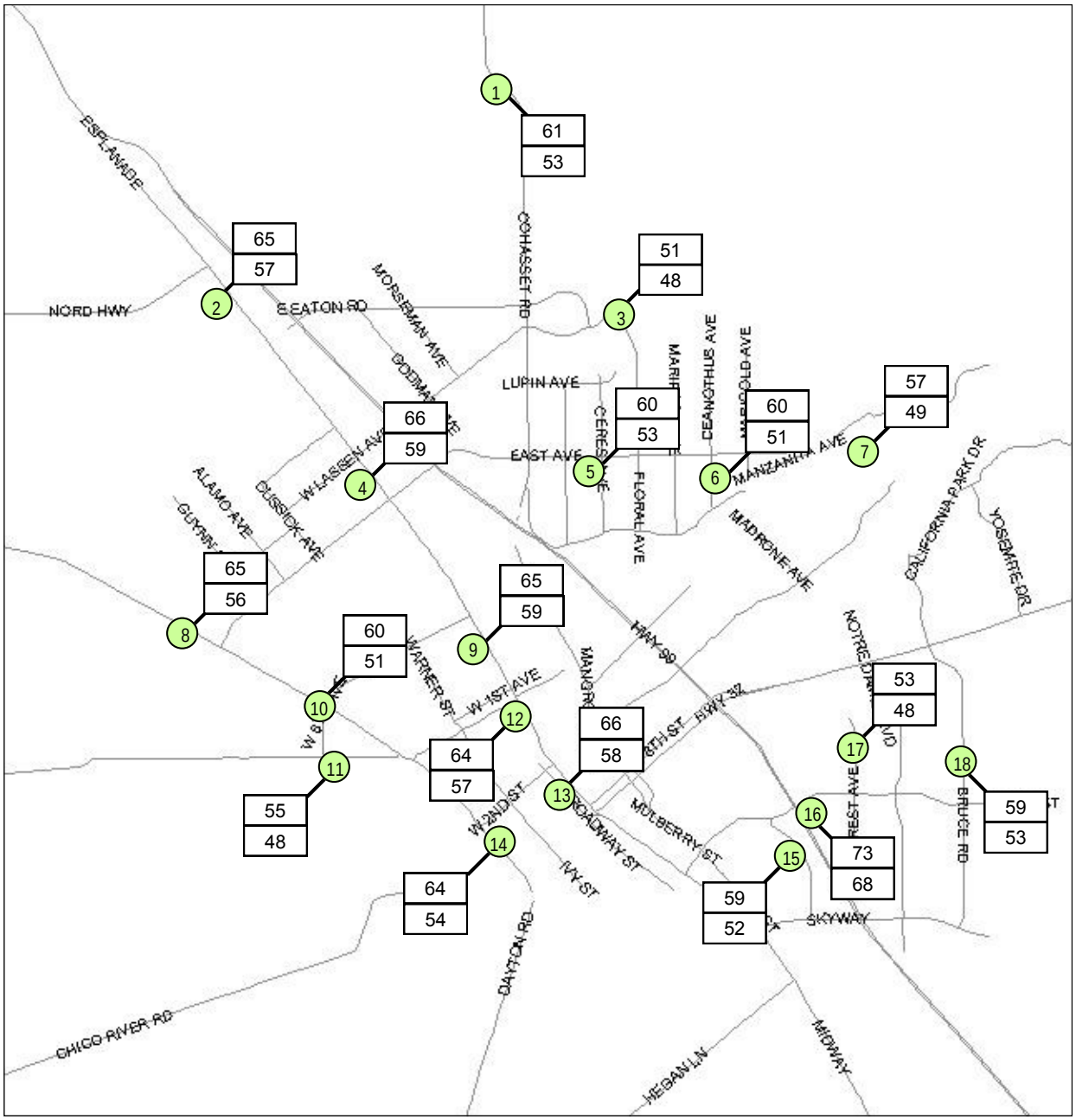

Ambient Noise Monitoring Locations

dBA, L_{eq} Daytime Average-Hourly Noise Level

dBA, L_{eq} Nighttime Average-Hourly Noise Level

Source: City of Chico, 2009

Not to scale

N

Figure 4.7-2
Existing Noise Measurement Surveys

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Commercial and Industrial Uses

Noise sources commonly associated with commercial and industrial uses often include the operation of power tools, material handling equipment (e.g., forklifts), and stationary equipment (e.g., compressors, compactors, etc.), as well as noise associated with the loading and unloading of materials from delivery trucks. Noise levels from commercial and industrial uses are dependent on numerous factors and can vary substantially, depending on the specific activities conducted. For instance, noise associated with neighborhood commercial activities may be indiscernible from the ambient noise level, whereas noise levels associated with major industrial activities involving the use of heavy off-road equipment can generate intermittent levels of up to approximately 90 dBA at 50 feet. For this reason, noise generated by commercial and industrial uses and impacts to nearby noise-sensitive land uses should be evaluated on a project-by-project and site-specific basis.

Within the City of Chico, commercial and industrial land uses are located primarily along major roadway corridors. Industrial land uses are largely located within the northern portion of the city along the Esplanade, Cohasset Road, and in the Airport Industrial Park, as well as along 20th Street, and within the southwest portion of the city near Park Avenue and Hegan Lane. Noise sources commonly associated with these land uses include truck traffic, loading dock activities, heavy-equipment operation, banging of metal on metal, and HVAC systems.

Silver Dollar Speedway

The Silver Dollar Speedway is a quarter-mile high-banked clay oval track located at the Silver Dollar Fairgrounds. The track hosts various race divisions include Sprint Cars, Dirt Modifieds, Street Stocks, Pure Stocks, Late Models, Midgets, and Super Stocks. Racing events typically occur Friday through Sunday, during the months of March through October. Racing typically begins at approximately 6:30 p.m. and ends by 11:00 p.m. (Silver Dollar Speedway, 2009).

Noise levels associated with racing events can vary, depending primarily on the race division and site conditions. The speedway was not operating at the time noise surveys were conducted for this project. However, based on measurements conducted for similar facilities, predicted average-hourly noise levels associated with the various race divisions can range from approximately 55 to 65 dBA L_{eq} at 500 feet from the track centerline. At this same distance, maximum intermittent noise levels can reach levels of approximate 80 dBA L_{max}. Based on these noise levels, the predicted 60, 55, and 50 dBA L_{eq} noise contours would extend to distances of approximately 880, 1,300, and 2,375 feet, respectively. Depending on background noise levels, it is not uncommon to detect noise from racing events at distances beyond the projected noise contours

Recreational Events

Recreational events involving large spectator crowds, particularly those involving the use of amplified sound systems, can result in substantial temporary or periodic increases in ambient noise levels. Outdoor events that include the use of an amplified sound system and involve relatively small spectator crowds can generate noise levels of approximately 70 to 80 dBA L_{eq} at 50 feet from the stage area/speaker locations. Based on these noise levels, the predicted 60 dBA L_{eq} noise contour for such uses would extend to a distance of approximately 525 feet. Noise levels generated by such sources are primarily a function of the type of performance being provided and can vary substantially depending on the use.

For stadiums that draw large spectator crowds and are equipped with multi-speaker amplified sound systems, predicted exterior noise levels can range from approximately 57 to 72 dBA L_{eq} at approximately 500 feet during recreational events. Outdoor musical and band performances, such as marching band performances during half-time and pre-game shows, have measured approximately 57 to 76 dBA L_{eq} at 500 feet. Predicted noise levels at stadiums are dependent on various factors including stadium design and orientation, the activities conducted, spectator crowd size, and type of public address (PA) amplification system installed, as well as speaker placement. Depending on such factors, the predicted 60 dBA L_{eq} noise contour for larger stadiums could extend to distances ranging from approximately 370 to 3,100 feet (SAUSD, 2005.)

Automotive Maintenance & Repair

Typical automotive maintenance and repair activities often include the use of pneumatic tools, air compressors, and power generators. Other equipment operations, such as the use of power hand tools (e.g., sanders, drills, grinders), typically generate a lesser degree of noise. The use of air compressors, power generators, and pneumatic tools can generate noise levels of up to approximately 85 dBA at 50 feet. Noise levels generated by the use of handheld tools such as sanders, drills, and grinders typically average between 63 and 87 dBA at 3 feet. Simultaneous use of multiple hand tools, such as grinders being used on metal, can generate levels of 87 to 97 dBA L_{eq} at 3 feet (EPA, 1971). Noise levels associated with these facilities would be dependent on the specific activities performed and source/facility characteristics. Assuming an exterior operational noise level of 97 dBA L_{eq} at 3 feet, the 60 dBA L_{eq} noise contour would extend to a distance of approximately 225 feet.

TRANSPORTATION SOURCES

Chico Municipal Airport

The Chico Municipal Airport is used primarily for business and general aviation, including commercial aviation, general aviation, and air cargo operations and maintenance. Airline service at this time is limited to commuter aircraft, and air cargo service is generally limited generally to small single- and twin-engine aircraft. The California Division of Forestry (Cal-Fire) also operates a firefighting base at the Chico Municipal Airport.

The number of aircraft based at the Chico Municipal Airport has not changed significantly since 1980 and the trend has not shown significant increase. As the population grows, the potential exists for an increase in based aircraft, but that increase within the next 20 years is not forecast to exceed 50 percent of the current based aircraft population, which would increase the total based aircraft to approximately 225. By the year 2020 it is estimated that the total number of operations would range between 80,000 and 100,000 per year. The seasonal activity of Cal-Fire aircraft at this airport varies depending on the location, frequency, intensity, and duration of wildfires (City of Chico, 2002).

Noise concerns typically associated with airports include increased levels of annoyance and interference with personal activities such as sleeping, conversing, relaxing, or watching television. While individual responses to noise can vary, various methods and noise descriptors have been developed in an attempt to correlate aircraft noise levels with land use compatibility and community reaction.

Noise that emanates away from airports and airplane flight paths is typically represented by concentric noise contours around the airport. The contours delineate zones where land use is restricted, protecting the citizens on the ground from the detrimental effects of exposure to

excessive aircraft noise. The contours are constructed using noise samples from around the airport, combined with specific computer noise models which indicate the location of each contour line. These noise contours take into account the flight path and the number, time of day, and frequency of aircraft operations, as well as variations in monthly and seasonal flight schedules. The result is a 24-hour day/night average noise contour, depicted in CNEL. Because the CNEL noise metric is time weighted to take into account noise events that occur during the more noise-sensitive periods of the day, this metric is typically used for the analysis of land use compatibility with aircraft operations.

Projected and projected future (year 2018) noise contours (in CNEL) for Chico Municipal Airport were obtained from the City of Chico Airport Master Plan EA/DEIR (2002) and are depicted in **Figure 4.7-3** and **Figure 4.7-4**, respectively (City of Chico, 2002). Year 2010 contours are not currently available for the airport. However, year 2008 noise contours are anticipated to be generally representative of existing conditions, given that operational activities at the airport would not be expected to have changed substantially over the last two years. Noise contours (in CNEL) for average and maximum day Cal-Fire aircraft operations are depicted in **Figure 4.7-5** and **Figure 4.7-6**, respectively. The predicted noise contours do not take into account shielding or reflection of noise from existing structures. As a result, the noise contours should be considered to represent bands of similar noise exposure, rather than absolute lines of demarcation. Actual noise levels will vary from day to day, dependent on a number of factors, including traffic volumes, shielding from existing structures, variations in attenuation rates due to changes in surface parameters, and meteorological conditions.

Depending on factors such as the proximity of nearby noise-sensitive land uses to aircraft overflight areas and the distribution or types of aircraft operated, use of the CNEL noise descriptor, while considered adequate for general land use planning purposes, may be insufficient for the full assessment of noise impacts on individual land use projects. For the analysis of noise impacts of limited duration, such as aircraft overflights, the Single Event Level (SEL) is typically used. To date, criteria regarding acceptable SEL are typically based on physiological effects, such as speech or sleep interference, rather than land use compatibility. The Federal Aviation Administration (FAA) has suggested that the threshold for speech interference is 60 dBA. However, the FAA has not provided guidance indicating what number or duration of events exceeding this threshold should be considered significant. Similarly, studies prepared on behalf of the Federal Interagency Committee on Aviation Noise have provided estimates of the percentage of people expected to be awakened when exposed to specific single-event noise levels inside a home. However, no determination has been made as to what frequency of disturbance would be considered acceptable. The noise threshold at which sleep disruption occurs is considered higher than for speech interference, with only 10 percent of people awakened at 80 dBA SEL (Caltrans, 2002a).

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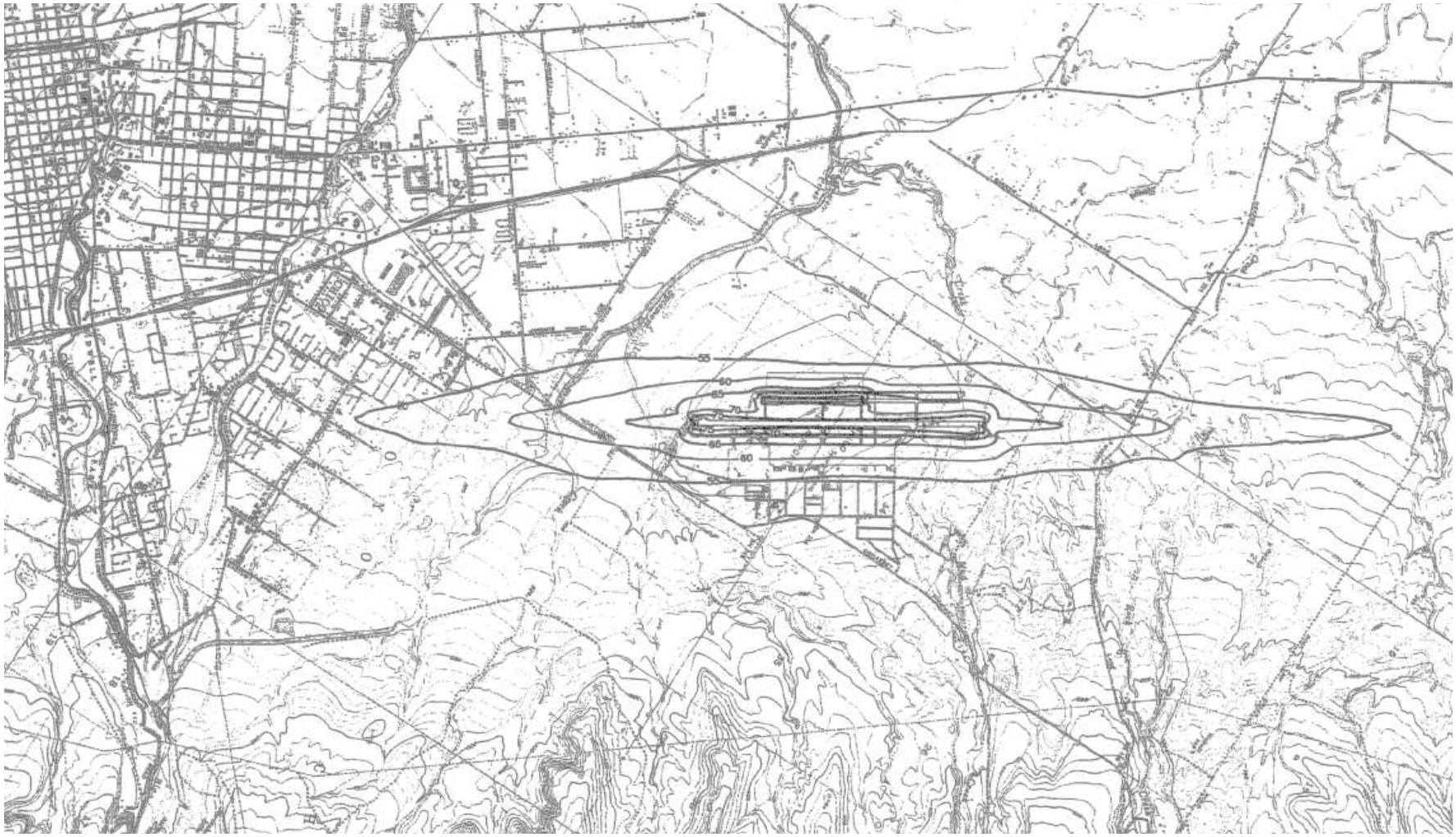

Source: City of Chico, 2002

Figure 4.7-3

Chico Municipal Airport Existing Noise Contours

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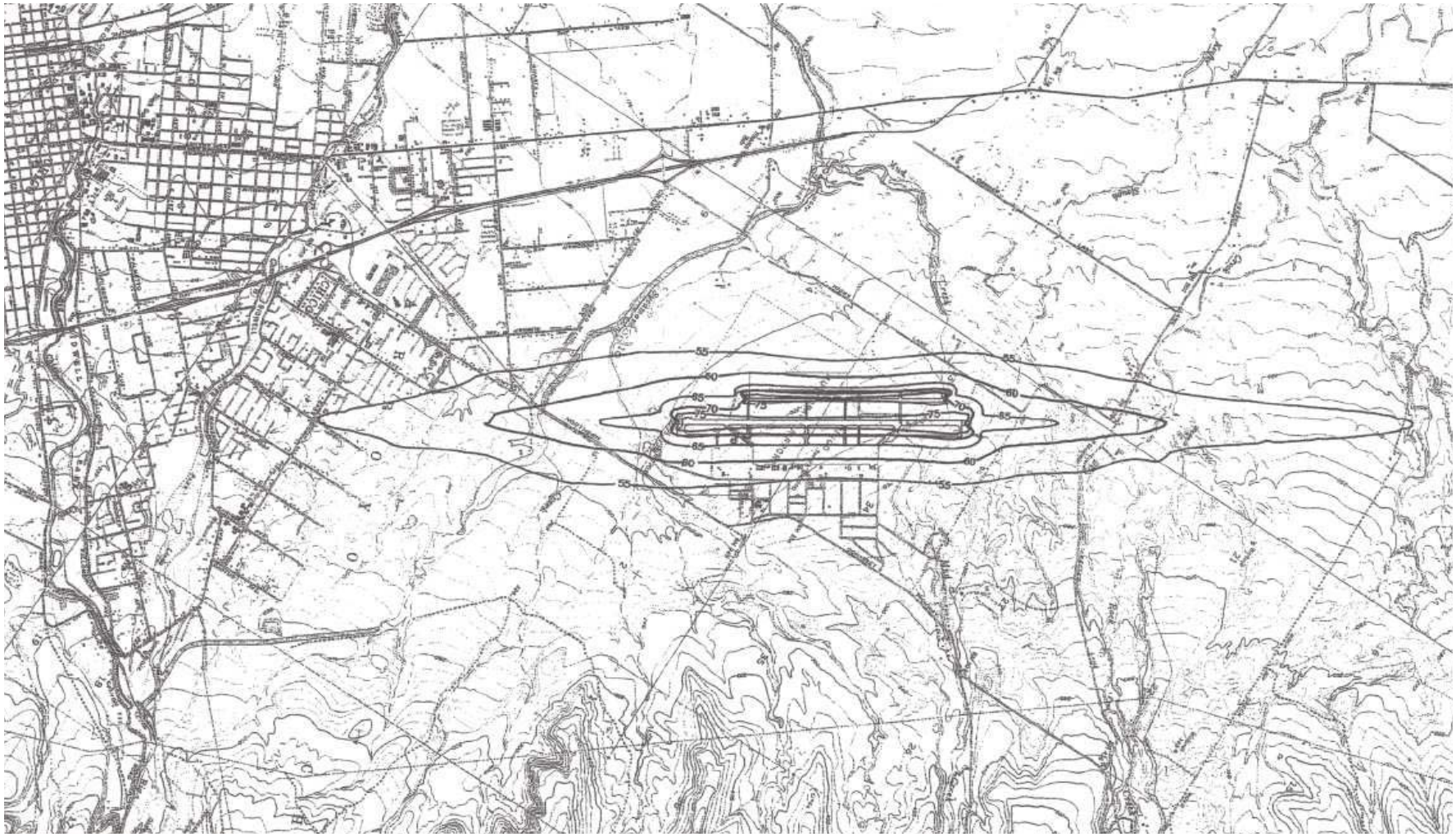

Source: City of Chico, 2002

Figure 4.7-4

Chico Municipal Airport Noise Contours for Year 2018

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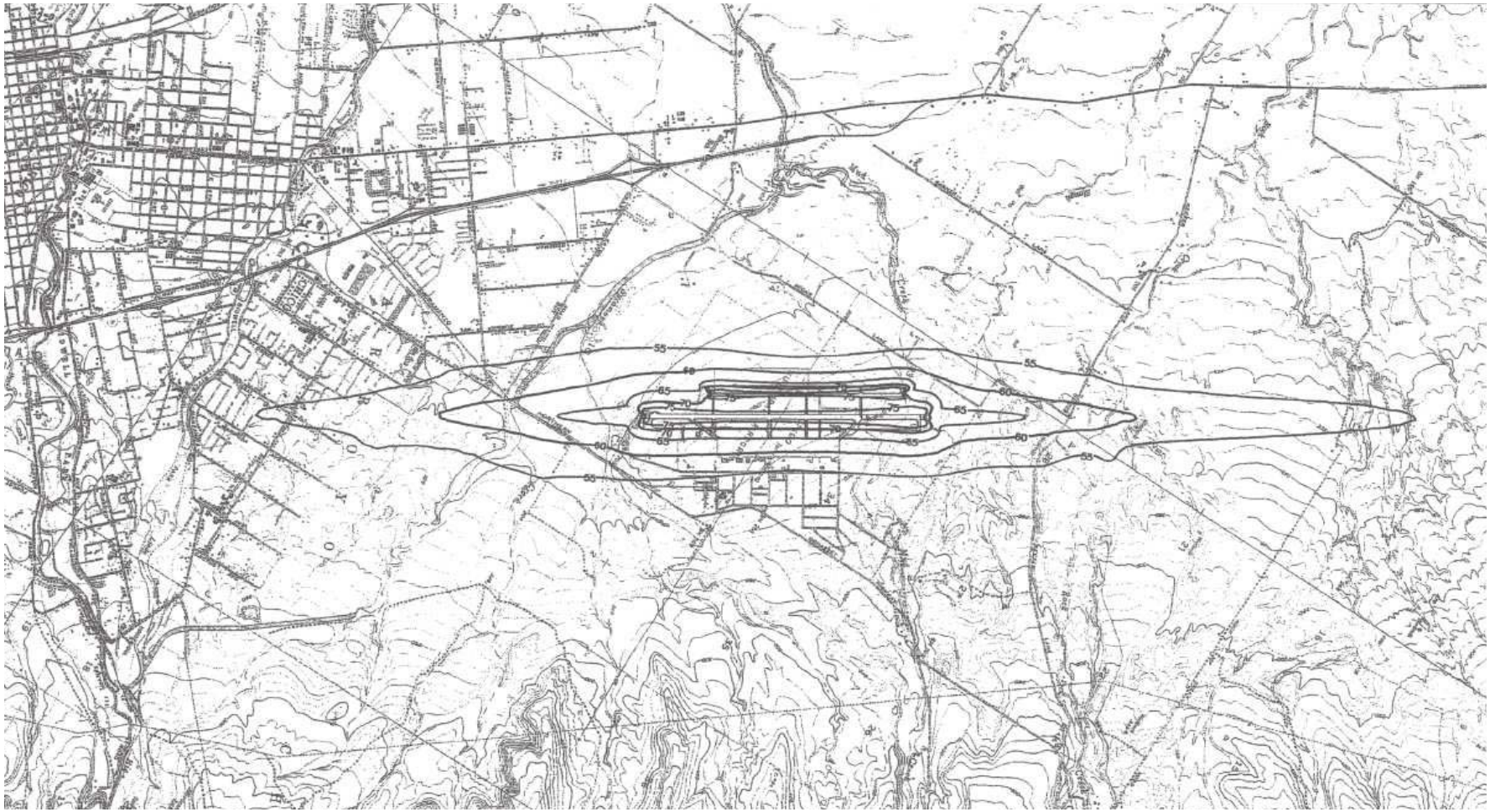

Source: City of Chico, 2002

Figure 4.7-5

Chico Municipal Airport Noise Contours for Cal-Fire Average Day Operations

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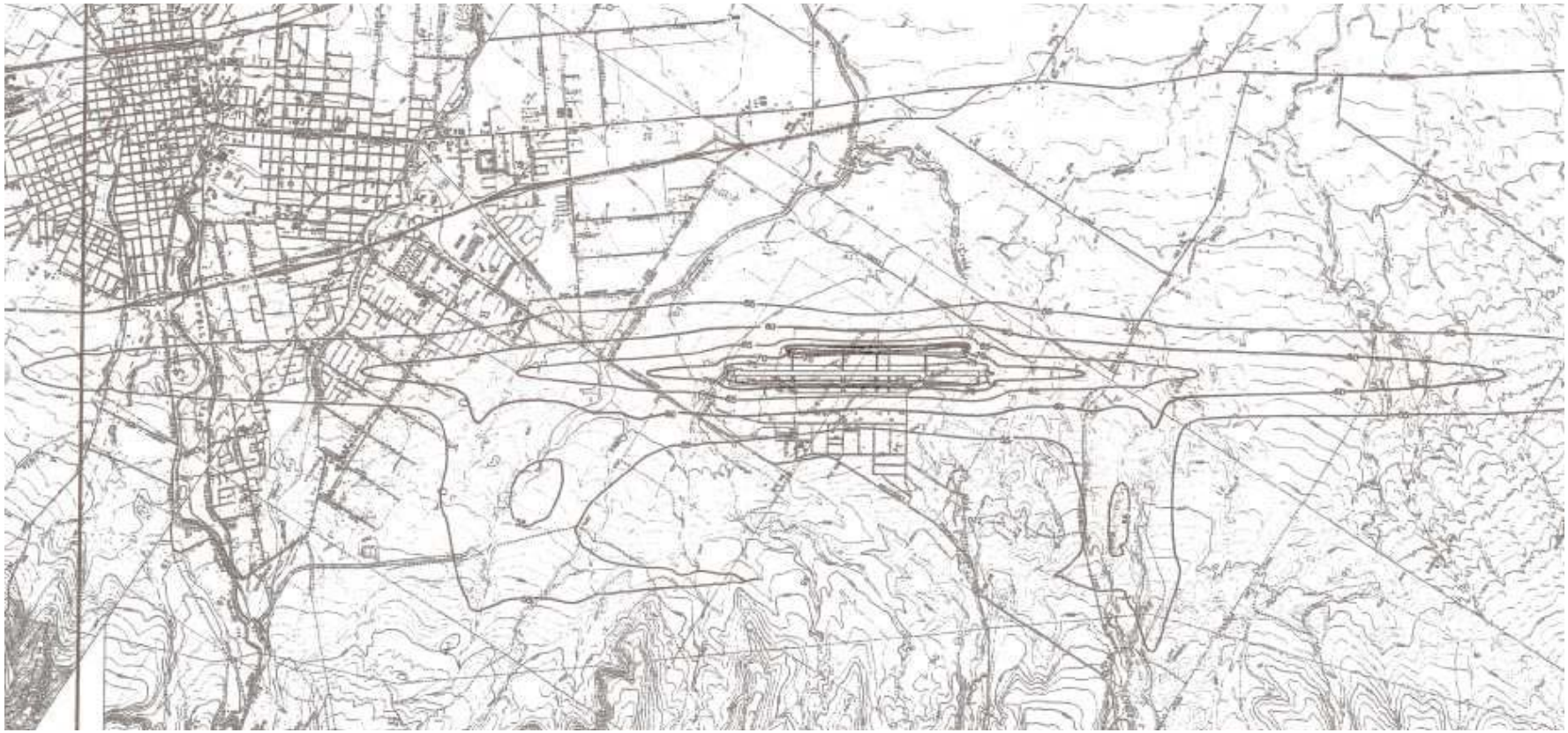

Source: City of Chico, 2002

Figure 4.7-6

Chico Municipal Airport Noise Contours for Cal-Fire Maximum Day Operations

Enloe Medical Center Heliport

Enloe Medical Center has a rooftop helipad for Enloe's Flight Care helicopter which is used primarily for transporting patients. Aircraft typically approach from the north over The Esplanade and turn to the west between Seventh and Sixth avenues. Under normal conditions, helicopters depart to the north, over the Esplanade. However, depending upon wind conditions, the helicopters can arrive and depart from the north or south. To reduce noise impacts to community residents, pilots are asked to maintain an altitude of 700 feet above mean sea level, which is approximately 500 feet above the ground (City of Chico, 2005a).

Predicted noise contours (in CNEL) for a north approach and a south approach to Enloe Medical Center, obtained from the Enloe Medical Center Master Plan DEIR (2005), are depicted in **Figures 4.7-7** and **4.8-8**. Corresponding noise contours depicting predicted single-event noise levels (in SEL) are depicted in **Figure 4.7-9**. The noise contours were calculated assuming an average of 3.5 flights per day. Year 2010 contours are not currently available for the airport. However, based on information obtained from Enloe Medical Center, existing helicopter operations currently average approximately 3 flights per day (Enloe Medical Center, 2010). Year 2005 noise contours presented in **Figures 4.7-7** would, therefore, be generally representative of existing conditions. The predicted noise contours do not take into account shielding or reflection of noise from existing structures. As a result, the noise contours should be considered to represent bands of similar noise exposure, rather than absolute lines of demarcation.

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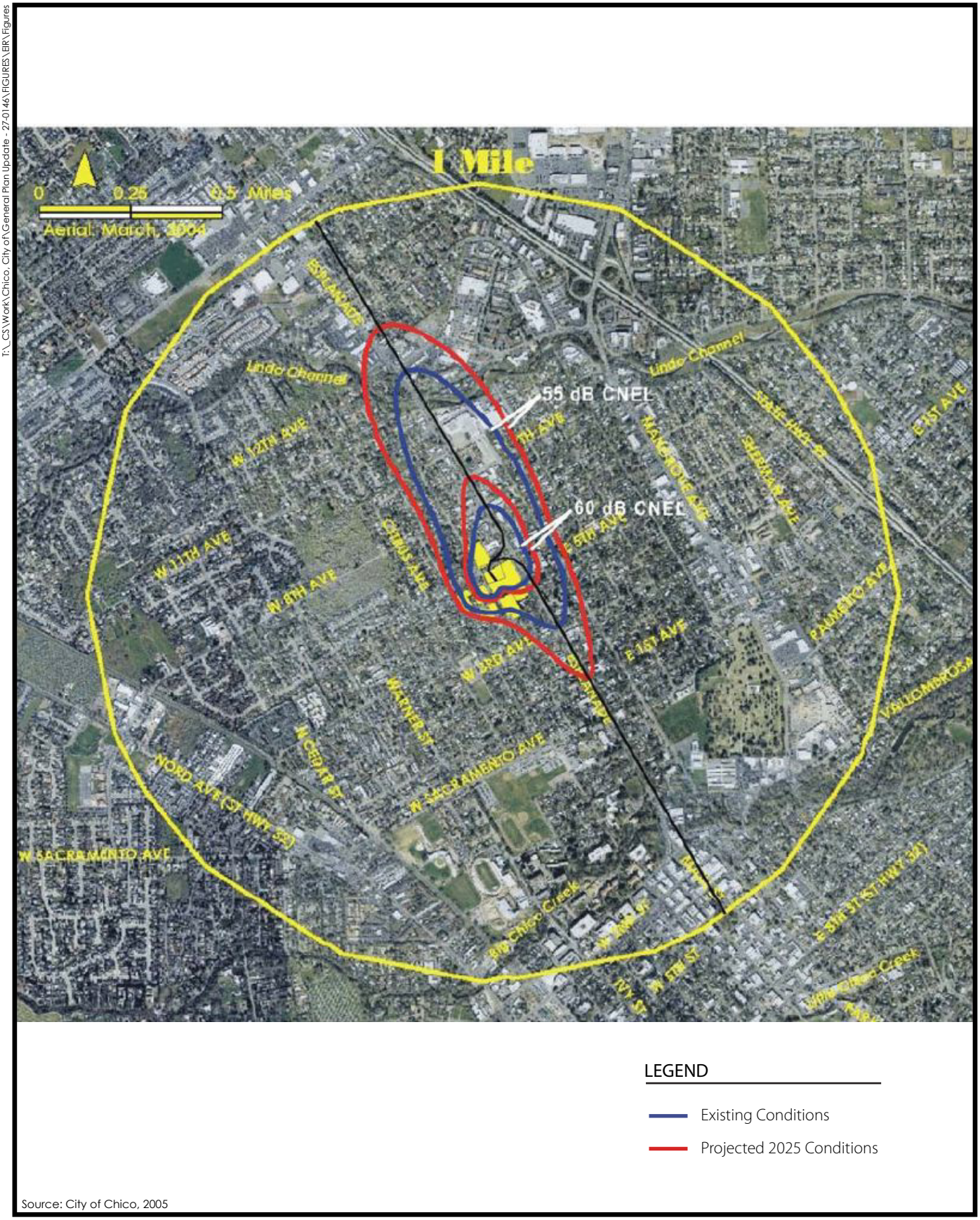

Source: City of Chico, 2005

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Figure 4.7-7
Existing and Future CNEL North Approach

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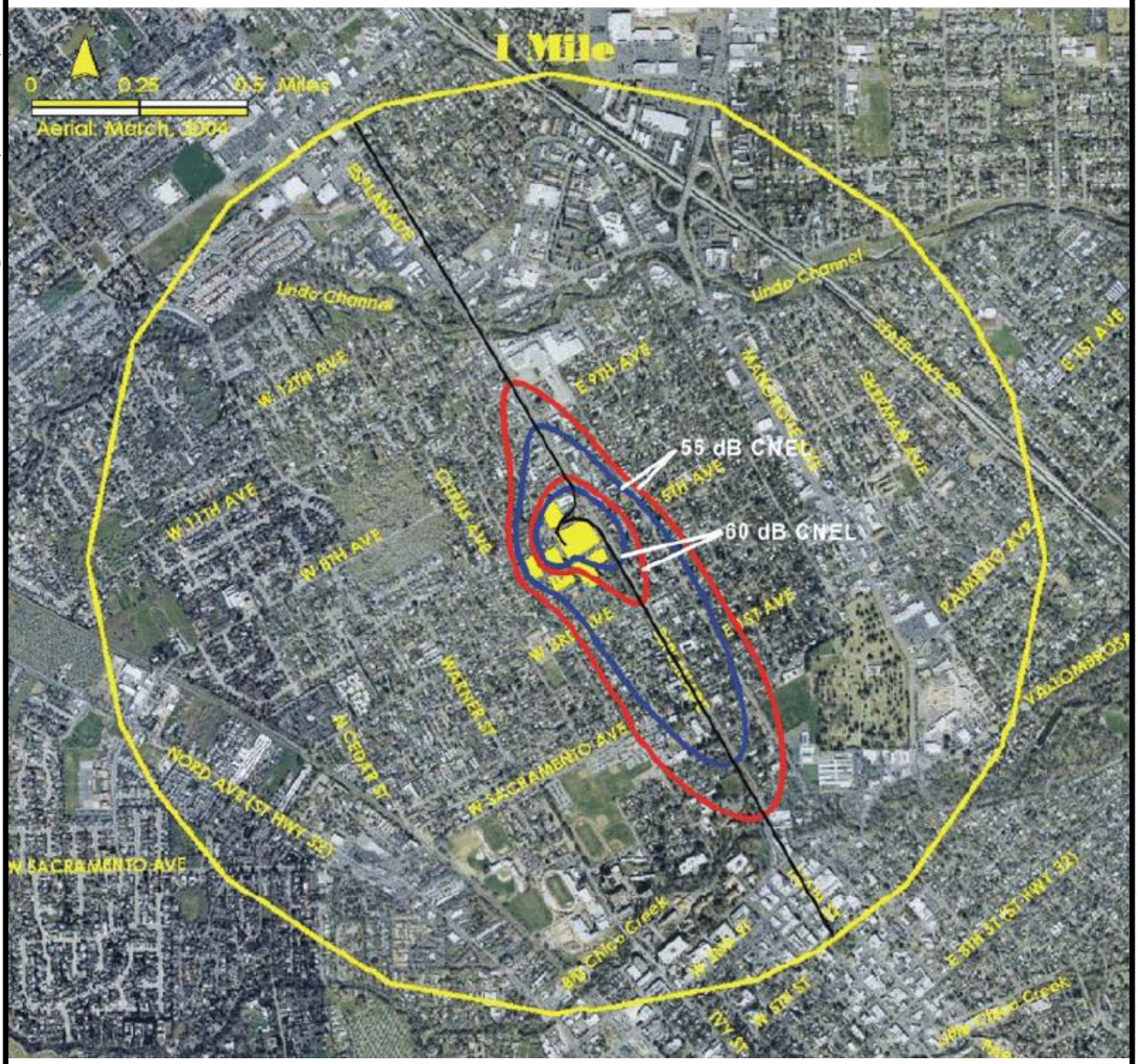

Source: City of Chico, 2005

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Figure 4.7-8
Existing and Future CNEL South Approach

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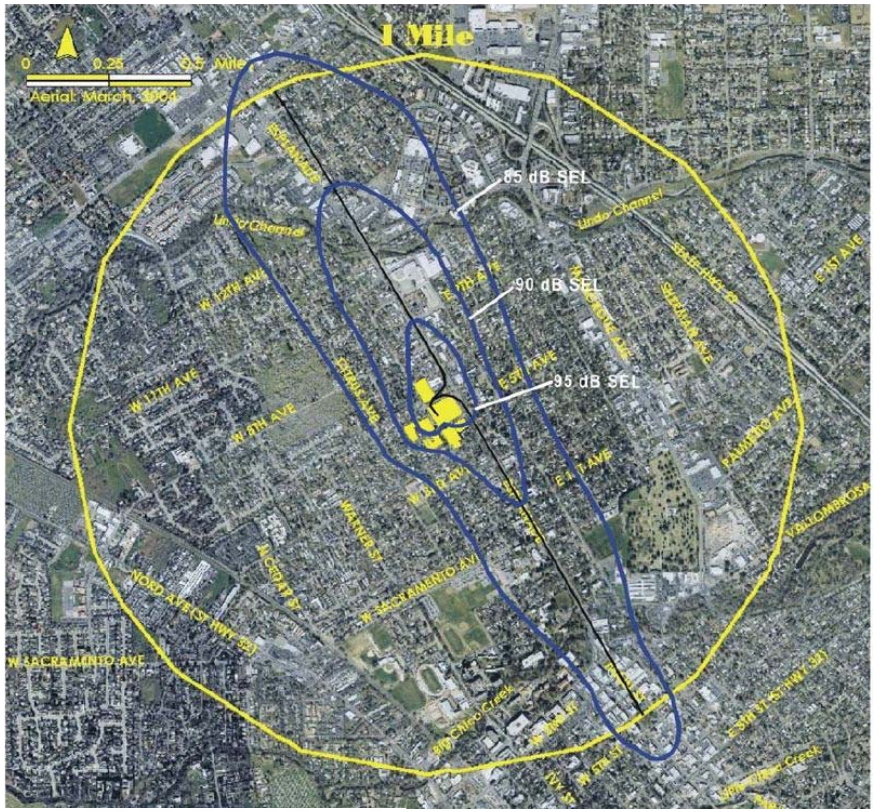
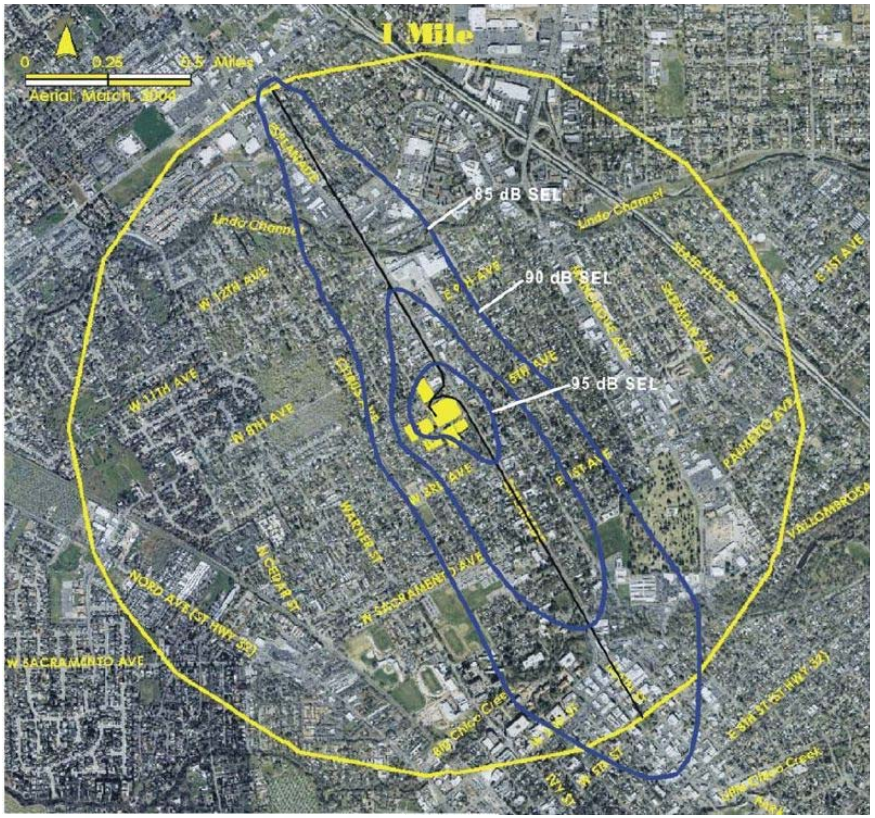
North Approach - South Departure



South Approach - North Departure



Source: City of Chico, 2005

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Figure 4.7-9

Single Event Noise Contours for Enloe Medical Center

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Ranchaero Airport

The Ranchaero Airport is a privately owned airport which is located near the southwestern edge of the City of Chico. This airport serves a combination of recreational, flight training, agricultural, and limited business flights. Existing annual average operations are approximately 14 operations per day. Noise contours are shown in **Figure 4.7-10**.

Union Pacific Railroad

The Union Pacific Railroad (UPRR) tracks are located west of and parallel to State Route 99, bisecting the City of Chico in a general north-south direction. The UPRR is used for both freight transport and Amtrak passenger service. Approximately 18 freight trains and two Amtrak passenger trains travel along this rail line on a daily basis (City of Chico, 1999). The number of freight trains traveling along this segment can vary from day to day, depending on demand, and there are currently no hourly limitations pertaining to freight train travel. Amtrak passenger trains typically run between the nighttime hours of 2:00 a.m. and 4:00 a.m. (Amtrak, 2007).

Noise levels generated by trains can vary depending on numerous factors, including train speed, number of engines used, track conditions (e.g., welded vs. jointed), the condition of train wheels, and shielding provided by intervening terrain. Additional factors, such as the sounding of the train horns as well as the operation of roadside signaling devices, can also contribute to overall noise levels. Depending on such factors, wayside noise levels associated with train passbys can reach levels of up to 110 dBA L_{max} at 50 feet from the track centerline (FTA, 2006).

Noise measurements of train noise levels were conducted on November 6, 2007, near the W. Sacramento Avenue crossing. Based on noise measurements conducted, wayside train noise levels, with roadside warning devices and train horns sounding, ranged from approximately 96 to 104 dBA L_{max} at 50 feet from the track centerline.

The Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Guidelines* (FTA, 2006) was used for the calculation of wayside noise levels generated by trains traveling along the UPRR corridor. Wayside noise levels were calculated based, in part, on average train speeds, train length, and assuming that the number of trains would be distributed equally among daytime and nighttime hours. Predicted noise levels were calculated with and without the sounding of warning devices at grade crossings. With the sounding of train horns, the projected 60 and 65 dBA CNEL noise contour at signalized grade crossings would extend to approximately 810 and 375 feet from the track centerline, respectively. At track locations in excess of approximately 660 feet from grade crossings, the projected 60 and 65 dBA CNEL noise contour would extend to approximately 700 and 325 feet from the track centerline, respectively. It is important to note that these projected noise contours do not include shielding or reflection of noise from intervening terrain or structures, and actual noise levels will vary depending on site-specific conditions. Although these predicted noise contours are not considered site-specific, they are useful for determining potential land use conflicts.

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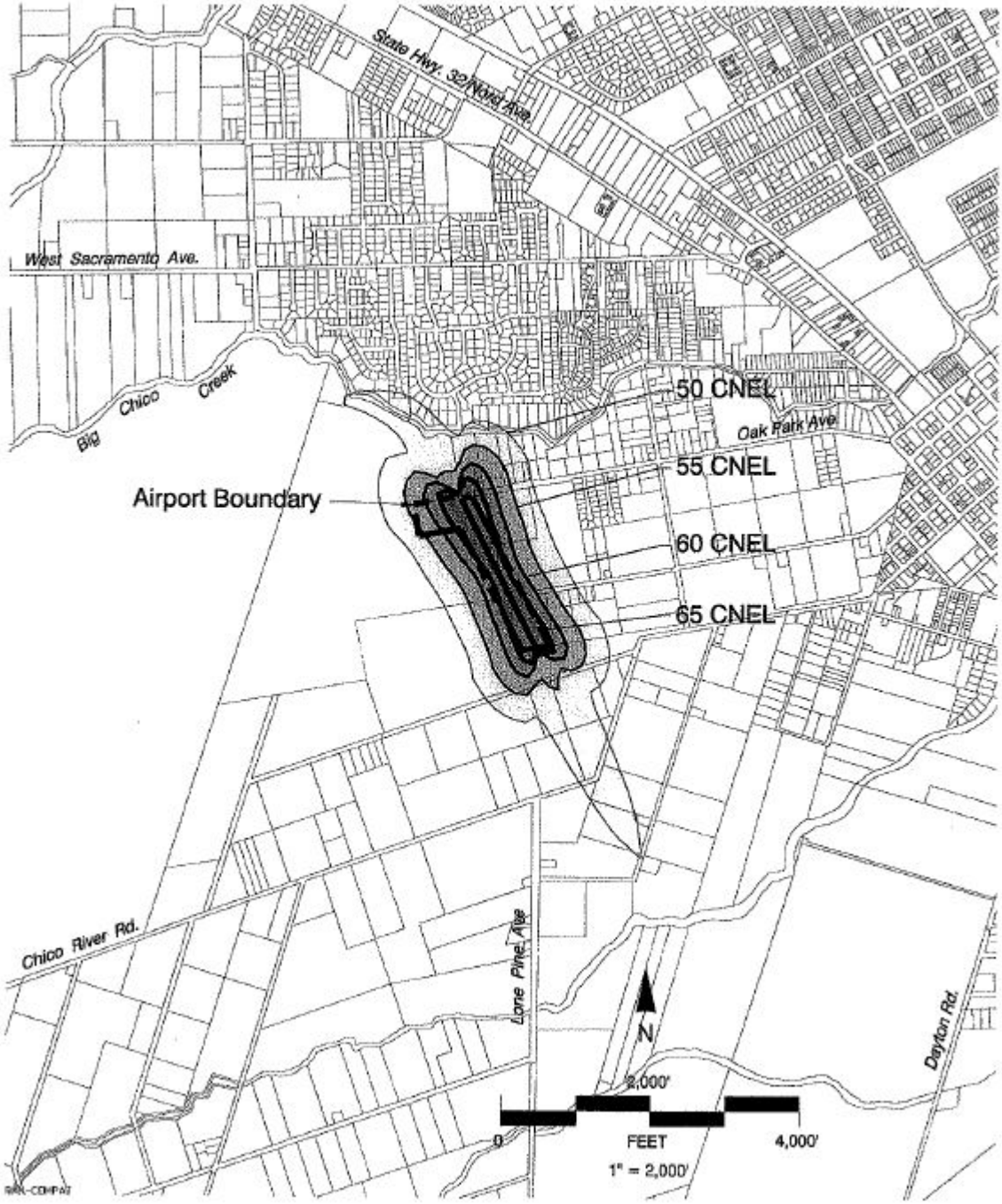

Source: City of Chico, 2005

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Figure 4.7-10
Ranchaero Airport Noise Contours

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Roadway Traffic

Ambient noise levels in many portions of the city are defined primarily by traffic on major roadways. The FHWA Highway Traffic Noise Prediction model (FHWA-RD-77-108) was used to predict traffic noise levels along major area roadways. The FHWA model is based on the Calveno noise emission factors for automobiles and medium- and heavy-duty trucks and is generally considered to be accurate to within 1.5 dBA. Input data used in the model included average-daily traffic levels, day/night percentages of automobiles and medium- and heavy-duty trucks, vehicle speeds, ground attenuation factors, roadway widths, and ground elevation data. Vehicle distribution percentages were based on traffic data obtained during the site reconnaissance conducted for this project, as well as heavy-duty truck distribution percentages obtained from the California Department of Transportation (Caltrans, 2007).

Existing traffic noise levels for roadway segments within the city, including distances to the predicted 60, 65, and 70 dBA L_{dn}/CNEL noise contours, are summarized in **Table 4.7-3**. Predicted noise contours assume no natural or human-made shielding (i.e., intervening terrain, vegetation, berms, walls, buildings) and should be considered to represent bands of similar noise exposure along roadway segments, rather than absolute lines of demarcation. Although these predicted noise contours are not considered site-specific, they are useful for determining potential land use conflicts.

TABLE 4.7-3
EXISTING TRAFFIC NOISE LEVELS IN THE PLANNING AREA

Roadway Segment	ADT	CNEL at 50 Feet from Near Travel-lane Centerline	Distance (feet) from Roadway Centerline to CNEL Contour		
			70	65	60
Bruce Road, Lakeside VLG Commons to Lakewest Drive	12,600	66.38	--	89.8	188.0
Bruce Road, Humbolt Road to Picholine Way	10,500	65.59	--	80.3	166.8
Bruce Road, Remington Drive to E. 20th Street	11,100	65.83	--	83.1	173.0
Bruce Road, E. 20th Street to Raley Boulevard	8,500	66.18	--	67.0	143.8
SR 32, East Avenue to Kennedy Avenue	13,200	68.61	--	106.5	228.2
SR 32 (Nord Avenue), Glenwood Avenue to Glenwood Avenue	16,300	69.52	57.8	122.3	262.5
SR 32 (Nord Avenue), Oak Way to W. 8th Avenue	15,800	66.85	--	81.6	174.3
SR 32 (Nord Avenue), W. Sacramento Avenue to W. Sacramento Avenue	19,300	67.71	--	93.0	199.0
Cohasset Road, Eaton Road to Thorntree Drive	11,000	67.30	--	79.4	170.7
Cohasset Road, Pillsbury Road to East Avenue	25,000	68.09	57.4	114.9	243.3
Cohasset Road, East Avenue to Lorinda Avenue	17,700	65.17	--	75.7	156.6
Deer Creek Highway (SR 32), E. 8th Street/Fir Street Until Road Merges into Undivided Highway	7,000	64.93	--	73.3	151.0
Deer Creek Highway (SR 32), Until Road Merges into Undivided Highway to Forest Avenue	15,900	69.41	56.9	120.3	258.2
Deer Creek Highway (SR 32), Forest Avenue to El Monte Avenue	11,500	68.59	--	96.7	208.1
Deer Creek Highway (SR 32), El Monte Avenue to Bruce Road	10,600	70.32	58.8	126.2	271.5
Deer Creek Highway (SR 32), Bruce Road to Yosemite Drive	6,300	68.07	--	89.3	192.0
E. 20th Street, Bruce Road to Notre Dame Boulevard	8,300	63.30	--	59.0	118.6
E. 20th Street, Forest Avenue to Huntington Drive	11,300	64.64	--	70.4	144.7
E. 20th Street, Business Lane to Forest Avenue	21,600	67.45	--	104.8	221.0
E. 20th Street, Sierra Nevada Court to Dr. Martin Luther King Jr. Parkway	19,200	66.94	--	97.3	204.5
E. 9th Street, Pine Street to Cypress Street	18,400	66.84	--	74.1	159.2
E. Park Avenue/Skyway, Country Drive to Whitman Avenue	24,700	68.04	57.1	114.1	241.4
East Avenue, Connors Avenue to Esplanade	28,500	67.24	--	101.5	213.9
East Avenue, Esplanade to Ilahee Lane	24,500	69.27	67.0	136.9	291.4
East Avenue, Cussick Avenue to Alamo Avenue	19,300	68.24	58.5	117.5	248.8
East Avenue, Guynn Avenue to Streamside Court	16,700	64.92	--	73.1	150.7
East Avenue, Kennedy Avenue to SR 32	16,700	64.92	--	73.1	150.7
East Avenue, Pillsbury Road to Cohasset Road	14,200	63.83	--	68.9	136.8
East Avenue, Cohasset Road to North Avenue	17,200	65.04	--	74.4	153.7

Roadway Segment	ADT	CNEL at 50 Feet from Near Travel-lane Centerline	Distance (feet) from Roadway Centerline to CNEL Contour		
			70	65	60
East Avenue, Floral Avenue to Coleman Court	18,600	65.38	--	78.0	161.7
Eaton Road, Constitution Drive to SR 99 SB Ramp	14,600	65.84	--	63.6	136.5
Eaton Road, Hicks Lane to Silverbell Road	9,600	64.02	--	--	103.3
Eaton Road, Michael Way to Burnap Avenue	6,900	62.58	--	--	83.0
Esplanade, Eaton Road to Tonea Way	8,400	62.36	--	--	95.9
Esplanade, W. Shasta Avenue to Mandalay Court	15,100	64.48	--	68.9	141.2
Esplanade, Panama Avenue to East Avenue	22,800	66.27	--	88.4	184.7
Esplanade, Connors Avenue to White Avenue	21,900	66.09	--	86.2	179.9
Esplanade, E. 2nd Avenue to E. 1st Avenue	21,400	65.99	--	85.0	177.2
Forest Avenue, Humboldt Road to Wildflower Court	15,000	64.45	--	68.7	140.6
Forest Avenue, E. 20th Street to Parkway Village Drive/Barney Lane	16,100	64.76	--	71.6	147.2
Mangrove Avenue, Cohasset Road to E. Lindo Avenue	21,000	66.34	--	82.5	174.4
Mangrove Avenue, E. 3rd Avenue to E. 1st Avenue	19,600	65.61	--	80.5	167.3
Mangrove Avenue, E. 1st Avenue to Palmetto Avenue	22,100	66.13	--	86.7	181.0
Mangrove Avenue, Vallombrosa Avenue to Woodland Avenue/ E. 3rd Street	18,300	65.31	--	77.3	160.0
Park Avenue, Meyers Street to E. Park Avenue	13,100	65.28	--	76.9	159.2
Park Avenue, E. 16th Street to E. 17th Street	17,500	63.94	--	58.5	121.3
Park Avenue, Humboldt Avenue to W. 11th Street	18,500	64.18	--	60.5	125.8
Skyway, Forest Avenue to Dominic Drive	27,200	69.73	71.3	146.5	312.3
Skyway, Notre Dame Boulevard to Forest Avenue	25,100	69.38	68.0	139.1	296.1
W. Sacramento Avenue, Magnolia Avenue to Esplanade	23,500	66.29	--	68.2	146.4
Walnut Street, W. 4th Street to W. 5th Street	19,200	65.52	--	79.5	165.1
Walnut Street, Bidwell Avenue to W. 1st Street	22,700	66.68	--	86.7	183.6
Walnut Street, W. 8th Street to W. 9th Street	14,700	64.79	--	66.0	138.0
SR 99, Garner Lane to Eaton Road	20,580	72.80	135.0	278.5	594.0
SR 99, Eaton Road to East Avenue	32,190	74.74	177.6	373.1	799.3
SR 99, East Avenue to Cohasset Road	45,600	76.26	221.4	469.4	1007.7
SR 99, Cohasset Road to East 1st Avenue	65,210	77.81	278.9	594.9	1278.6
SR 99, East 1st Avenue to SR 32	77,090	78.54	311.0	664.7	1429.3
SR 99, SR 32 to East 20th Street	74,490	78.39	304.1	649.7	1397.0
SR 99, East 20th Street to Skyway	54,480	77.03	248.2	528.1	1134.3
SR 99, South of Skyway	35,100	76.38	225.5	478.5	1027.2

*Noise levels/contours were calculated using the FHWA roadway noise model based on Calveno vehicle reference noise levels and traffic data obtained from the traffic analysis prepared for this project. Refer to **Appendix D** for modeling output files.*

-- Contours are within 50 feet of roadway centerline/within roadway right-of-way

4.7.2 REGULATORY FRAMEWORK

Federal, state, and local governments have established noise standards and guidelines to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise. Those regulations most applicable to the community are summarized below.

FEDERAL

Federal Railroad Administration

The federal government, in response to safety concerns at at-grade crossings, enacted the Swift Rail Development Act of 1994. This act mandated that the Secretary of Transportation issue regulations requiring the use of locomotive horns at public grade crossings, but gave the agency the authority to make reasonable exceptions. On January 13, 2000, the Federal Railroad Administration published a Notice of Proposed Rule Making in the Federal Register addressing the use of locomotive horns at public road-rail grade crossings. Accordingly, locomotive horns must be sounded on approach and while entering public grade crossings unless there is no significant risk of increased grade crossing collisions, the use of a locomotive horn is impractical, or where safety measures can be installed to fully compensate for the absence of the warning provided by the horn. The sounding of warning horns can greatly affect predicted noise contours within the community.

Federal Aviation Administration

As a means of implementing the Aviation Safety and Noise Abatement Act of 1979, the Federal Aviation Administration (FAA) adopted regulations that established a voluntary program which airports can utilize to conduct airport noise compatibility planning. These compatibility planning studies are often referred to as "Part 150" studies. Part 150 includes a system for measuring airport noise impacts and presents guidelines for identifying incompatible land uses. Airports which choose to undertake a Part 150 study are eligible for federal funding both for the study itself and for implementation of approved components of the local program.

The noise exposure maps included in Part 150 studies are depicted in terms of average-daily noise contours (i.e., L_{dn} or CNEL) around the airport. For the purposes of federal regulations, all land uses are considered compatible with noise levels of less than DNL 65 dB. At higher noise exposures, selected land uses are also deemed acceptable, depending upon the nature of the use and the degree of structural noise attenuation provided. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses (Caltrans, 2002a).

U.S. Environmental Protection Agency

In 1974, the U.S. Environmental Protection Agency (USEPA) Office of Noise Abatement and Control published a report entitled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. Although this document does not constitute USEPA regulations or standards, it is useful in identifying noise levels at which increased levels of annoyance would be anticipated. Based on an annual-average day-night noise level (expressed as L_{dn} or DNL), the document states that "undue interference with activity and annoyance" will not occur if outdoor noise levels in residential areas are below 55 dBA L_{dn} and indoor levels are below 45 dBA L_{dn} (USEPA, 1974).

U.S. Department of Housing and Urban Development

The U.S. Department of Housing and Urban Development (HUD) guidelines for the acceptability of residential land uses are set forth in the Code of Federal Regulations, Title 24, Part 51, Environmental Criteria and Standards. These guidelines identify an exterior noise exposure of 65 dBA L_{dn} or less as acceptable. Exterior noise levels of 65 to 75 dBA L_{dn} are considered normally acceptable, provided appropriate sound attenuation is provided to reduce interior noise levels to within acceptable levels. Noise levels above 75 dBA L_{dn} are considered unacceptable. The goal of the interior noise levels is 45 dBA L_{dn} for noise-sensitive land uses. These guidelines apply only to new construction supported by HUD grants and are not binding upon local communities (Caltrans, 2002a).

STATE

Government Code

Government Code Section 65302(f) requires that a noise element be included as part of all city general plans. A summary of the required contents of a noise element is presented below:

1) A noise element shall identify and appraise noise problems in the community. The noise element shall recognize the guidelines established by the Office of Noise Control in the State Department of Health Services and shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

   - Highways and freeways.
   - Primary arterials and major local streets.
   - Passenger and freight railroad operations and ground rapid transit systems.
   - Commercial, general aviation, heliport, helistop, and military airport operations, aircraft over-flights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.
   - Local industrial plants, including, but not limited to, railroad classification yards.
   - Other ground stationary sources identified by local agencies as contributing to the community noise environment.

Noise contours shall be shown for the above noise sources based on noise monitoring and accepted noise modeling techniques. The noise contours are to be used as a guide for designating land uses within the land use element that minimizes the exposure of community residents to excessive noise.

California Building Code

Title 24 of the California Code of Regulations contains standards for allowable interior noise levels associated with exterior noise sources (California Building Code, 1998 edition, Volume 1, Appendix Chapter 12, Section 1208A). The standards apply to new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family residences. The standards state that the interior noise level attributable to exterior sources can not exceed 45 dBA in any

habitable room. Proposed residential structures to be located where the annual L_{dn} or CNEL exceeds 60 dBA require an acoustical analysis showing that the proposed building design would achieve the prescribed allowable interior noise standard. The noise metric (measurement period, such as hourly or daily) is either the day-night average sound level (L_{dn}) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan. Worst-case noise levels, either existing or future, are used as the basis for determining compliance with these standards (Caltrans, 2002a).

California Airport Noise Regulations

The airport noise standards promulgated in accordance with the State Aeronautics Act are set forth in Section 5000 et seq. of the California Code of Regulations (Title 21, Division 2.5, Chapter 6). The current version of the regulations became effective in March 1990. In Section 5006, the regulations state:

> *The level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dBA for purposes of these regulations. Noise-sensitive land uses (i.e., residential dwellings, schools, hospitals and convalescent homes, and places of worship) that are located within the 65 dBA CNEL noise contour would be considered incompatible, unless mitigation has been incorporated. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep, and community reaction.*

State of California General Plan Guidelines

The State of California General Plan Guidelines (OPR, 2003), published by the Governor's Office of Planning and Research (OPR), also provides guidance for the acceptability of projects within specific L_{dn}/CNEL contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. The City of Chico has adopted noise criteria for determination of land use compatibility that are based on OPR-recommended criteria.

LOCAL

Butte County Airport Land Use Commission

The Butte County Airport Land Use Commission's (ALUC) primary responsibility is formulation and adoption of a comprehensive land use plan that provides for the orderly growth and protection of the public health, safety, and welfare within the planning area of each public use airport within the County of Butte. The ALUC assists local agencies in ensuring compatible land uses in the vicinity of all new and existing airports located within Butte County.

City of Chico Municipal Code

The City of Chico Municipal Code (Chapter 9.38, Noise) regulates excessive, unnecessary, and unreasonable noise from various sources within the city. In accordance with the City's Municipal Code, noise levels associated with residential land uses, measured at any point outside the property line, are limited to a maximum of 70 dBA between the hours of 7 a.m. and 9 p.m. and 60 dBA between the hours of 9 p.m. and 7 a.m. Interior noise levels of multi-family residential

property are limited to a maximum of 60 dBA at 3 feet from any wall, floor, or ceiling inside any dwelling unit, measured within adjacent dwelling units with windows and doors closed. Noise levels on commercial or industrial property are limited to a maximum of 70 dBA, measured at any point outside the property line. Noise generated on public property is limited to a maximum of 60 dBA at 25 feet from the source. For construction-related activities that occur between the hours of 10 a.m. and 6 p.m. on Sundays and holidays, and 7 a.m. and 9 p.m. on weekdays, the following limitations shall apply (City of Chico, 2008):

1) No individual device or piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 feet from the source. If the device or equipment is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close as possible to 25 feet from the equipment.

2) The noise level at any point outside the property plane of the project shall not exceed 86 dBA.

4.7.3 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

The impact analysis provided below is based on the following State CEQA Guidelines Appendix G thresholds of significance. A noise impact is considered significant if implementation of the proposed General Plan Update would:

1) Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or of applicable standards of other agencies.

2) Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

3) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

4) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

5) Expose people residing or working in the project area to excessive noise levels for a project located within an airport land use plan area or, where such a plan has not been adopted, or within 2 miles of a public airport or a public use airport.

6) Expose people residing or working in the project area to excessive noise levels for a project within the vicinity of a private airstrip.

METHODOLOGY

A combination of existing literature and general application of accepted noise thresholds was used to determine the impact of ambient noise levels resulting from and on development within the proposed General Plan Update Planning Area. Short- and long-term impacts associated with transportation and non-transportation noise sources were qualitatively assessed based on potential increases in ambient noise levels anticipated to occur at noise-sensitive land uses. Traffic noise levels along major area roadways were estimated using the FHWA Highway Traffic

Noise Prediction model (FHWA-RD-77-108.) The FHWA modeling was based upon the Calveno noise-emission factors for automobiles and medium- and heavy-duty trucks. Input data used in the model included average-daily traffic volumes, day/night percentages of automobiles and medium- and heavy-duty trucks, vehicle speeds, ground attenuation factors, and roadway widths. Existing and future traffic volumes were derived from the traffic analysis prepared for this project. Roadway data and vehicle distribution percentages were based on traffic data obtained during the site reconnaissance conducted for this project, as well as on heavy-duty truck distribution percentages for major highways obtained from Caltrans.

The following proposed General Plan Update policies and actions address noise-related impacts:

Action LU-7.1.1 *(Airport Compatibility) – Amend the City's Municipal Code and Zoning Map to implement airport overflight zoning district overlays, consistent with the boundaries and general policy direction contained within the Butte County Airport Land Use Compatibility Plan, which address the following:*

- *Airport noise-related compatibility issues and noise-resistant construction techniques.*
- *Height limitations for both structures and landscaping.*
- *Lighting, electrical interference, glare, or other issues which may endanger the landing, takeoff, or maneuvering of aircraft.*
- *Prohibition of incompatible land uses and limitations on the density and/or intensity of land uses.*
- *Infill compatibility criteria consistent with the 2005 agreement between the City and the Butte County Airport Land Use Commission.*

Action LU-7.1.2 *(Aviation Easements) – Continue to require avigation easements and deed notices for new development within the Airport Land Use Compatibility Plan area.*

Policy N-1.1 *(New Development and Transportation Noise) – New development of noise-sensitive land uses will not be permitted in areas exposed to existing or planned transportation noise sources that exceed the levels specified in Table N-1, unless the project design includes measures to reduce exterior and interior noise levels to those specified in Table N-1 [Table 4.7-7 of this section].*

Policy N-1.2 *(New Development and Non-Transportation Noise) – New development of noise-sensitive land uses will not be permitted in areas exposed to existing non-transportation noise sources that exceed the levels specified in Table N-2, unless the project design includes measures to reduce exterior noise levels to the unadjusted levels specified in Table N-2 [Table 4.7-8 of this section].*

Policy N-1.3 *(Acoustical Analysis) – Where proposed projects are likely to expose noise-sensitive land uses to noise levels exceeding the City's standards, require an acoustical analysis as part of environmental review so that noise mitigation measures may be identified and included in the project design. The requirements for the content of an acoustical analysis are outlined in Table N-3 [Table 4.7-9 of this section].*

Policy N-1.5 *(Proposed Projects Near Railroads) – Require site-specific noise studies for noise-sensitive projects which may be affected by railroad noise, and incorporate noise attenuation measures into the project design to reduce any impacts to those specified in Table N-1 [Table 4.7-7 of this section].*

TABLE 4.7-4
MAXIMUM ALLOWABLE NOISE LEVELS FROM TRANSPORTATION NOISE SOURCES
[GENERAL PLAN UPDATE TABLE N-1]

Land Use	Outdoor Activity Areas[1] Ldn/CNEL, dB	Interior Spaces	
		Ldn/CNEL, dB	Leq, dB[2]
Residential	65 [3]	45	--
Transient Lodging	--	45	--
Hospitals, Nursing Homes	65 [3]	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	65 [3]	--	40
Office Buildings	--	--	45
Schools, Libraries, Museums	65 [3]	--	45
Playgrounds, Neighborhood Parks	70	--	--

Notes:

1. *Noise standards are to be applied at outdoor activity areas with the greatest exposure to the noise source. When it is not practical to mitigate exterior noise levels at the patios or balconies of multi-family dwellings, a common area or onsite park may be designated as the outdoor activity area. For noise-sensitive land uses that do not include outdoor activity areas, only the interior noise standard shall apply.*
2. *As determined for a typical worst-case hour during periods of use.*
3. *Where it is not possible to reduce noise in outdoor activity areas to 65 dB L_{dn}/CNEL or less using all feasible noise reduction measures, an exterior noise level of up to 70 dB L_{dn}/CNEL may be allowed provided that interior noise levels are in compliance with this table.*

TABLE 4.7-5
MAXIMUM ALLOWABLE EXTERIOR NOISE LEVELS FROM NON-TRANSPORTATION SOURCES
[GENERAL PLAN UPDATE TABLE N-2]

Noise Level Descriptor (dBA)	Exterior Noise Level (dBA)	
	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Average-Hourly Noise Level (L_{eq})	55	50
Intermittent Noise Level (L_2 or L_{max})	75	65

Notes:

Noise levels are for planning purposes and may vary from the standards of the City's Noise Ordinance, which are for enforcement purposes.

Noise levels shall be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Noise level standards do not apply to mixed-use residential units established in conjunction with industrial or commercial uses provided interior noise levels remain below 45 dB Ldn/CNEL.

In areas where the existing ambient noise level exceeds the established daytime or nighttime standard, the existing level shall become the respective noise standard and an increase of 3 dBA or more shall be significant. Noise levels shall be reduced 5 dBA if the existing ambient hourly Leq is at least 10 dBA lower than the standards.

Noise standards are to be applied at outdoor activity areas with the greatest exposure to the noise source. When it is not practical to mitigate exterior noise levels at patio or balconies of multi-family dwellings, a common area or onsite park may be designated as the outdoor activity area.

TABLE 4.7-6
REQUIREMENTS FOR AN ACOUSTICAL ANALYSIS
[GENERAL PLAN UPDATE TABLE N-3]

An acoustical analysis prepared pursuant to the Noise Element shall:
A. Be the financial responsibility of the applicant.
B. Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics.
C. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions and the predominant noise sources.
D. Estimate existing and projected cumulative (20 years) noise levels in terms of L_{dn}, CNEL and the standards of Table N-1 or Table N-2, as applicable, and compare those levels to the adopted policies of the Noise Element. Where the noise source consists of intermittent single events, address the impact on sleep disturbance.
E. Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element, giving preference to site planning and design over mitigation measures which require the construction of noise barriers or structural modifications to buildings which contain noise-sensitive land uses.
F. Estimate noise exposure after the prescribed mitigation measures have been implemented.
G. Describe a post-project assessment program which could be used to evaluate the effectiveness of the proposed mitigation measures.

Policy N-2.1 *(Well-Designed Noise Mitigation) – Utilize effective noise attenuation measures that complement the Community Design Element's Goals.*

Action N-2.1.1 *(Noise Control Measures) – Limit noise at the source through the use of insulation, berms, building design and orientation, staggered operating hours, and other techniques. Utilize physical barriers such as landscaped sound walls only when*

other solutions are unable to achieve the desired level of mitigation.

Policy N-2.2 *(Partners in Noise Reduction) – Consult with public and private organizations to encourage reduction of the noise levels of activities that impact large portions of the community.*

Action N-2.2.1 *(Railroad Warning Systems) – Consult with Union Pacific Railroad (and Amtrak as applicable) to determine if there are alternative warning systems and safety measures that reduce the use of train horns near residential areas while still meeting public safety objectives.*

Action N-2.2.2 *(Silver Dollar Speedway) – Contact the State and the Silver Dollar Fair Board to express the City's interest in reducing the noise levels associated with events at the Silver Dollar Speedway.*

Action N-2.2.3 *(Noise from State Highways) – Request that Caltrans provide freeway sound walls with aesthetic design features along state highways adjacent to residential areas where existing noise levels exceed 67 dB.*

Policy N-3.1 *(City Noise Control Program) – Maintain a noise enforcement program to identify and resolve problems concerning noise in the community.*

Action N-3.1.1 *(Noise Program Duties) – Enforce the City's Noise Ordinance by processing complaints, conducting on-site testing of noise sources, and sharing information on the effects of noise issues in the community.*

Action N-3.1.2 *(Street Noise Environment) – Periodically assess the noise levels associated with city streets by reviewing traffic count data as an indication of increasing traffic noise.*

The impact analysis provided below utilizes these proposed policies and actions to determine whether implementation of the proposed General Plan Update would result in significant impacts. The analyses identify and describe how specific policies and actions as well as other City regulations and standards provide enforceable requirements and/or performance standards that address noise and avoid or minimize significant impacts.

PROJECT IMPACTS AND MITIGATION MEASURES

Noise Impacts Associated with Development and Operation of Land Uses of the Proposed General Plan Update (Standards of Significance 1 and 3)

Impact 4.7.1 The proposed General Plan Update could result in exposure of persons to or generation of noise levels in excess of City standards as well as a substantial permanent increase in ambient noise levels in the City. However, the proposed Chico General Plan Update policy provisions would adequately address noise issues. Therefore, noise impacts associated with the

development and operation of land uses of the proposed General Plan Update would be **less than significant**.

Development under the proposed General Plan Update includes the potential for noise conflicts resulting from adjacent land uses and their operational aspects. While generally addressed through the land use designation and zoning identification process, the potential exists for some development allowed under current land use designations and zoning to have operational aspects that could create noise impacts on other adjacent land uses, including increases in ambient noise levels that may be deemed incompatible with existing land uses. The City's proposed noise policies and their associated actions provide expanded protection geared toward eliminating land use conflicts with respect to noise. Policies and actions include specific numeric noise level standards for new projects affected by or including both transportation and non-transportation noise sources, as well as guidance in evaluating noise impacts and for identification of noise mitigation measures. For example, Policy N-1.1 states that new development of noise-sensitive land uses will not be permitted in areas exposed to existing or planned transportation noise sources that exceed the levels specified in Table N-1, unless the project design includes measures to reduce exterior and interior noise levels to those specified in Table N-1 (**Table 4.7-4** of this section). Similarly, Policy N-1.2 mandates that new development of noise-sensitive land uses will not be permitted in areas exposed to existing non-transportation noise sources that exceed the levels specified in Table N-2, unless the project design includes measures to reduce exterior noise levels to the unadjusted levels specified in Table N-2 (**Table 4.7-5** of this section).

Where proposed projects are likely to expose noise-sensitive land uses to noise levels exceeding the City's standards, Policy N-1.3 requires an acoustical analysis as part of environmental review so that noise mitigation measures may be identified and included in the project design. The requirements for the content of an acoustical analysis are outlined in Table N-3 (**Table 4.7-6** of this section). Policy N-1.5 requires site-specific noise studies for noise-sensitive projects which may be affected by railroad noise, and incorporate noise attenuation measures into the project design to reduce any impacts to those specified in Table N-1 (**Table 4.7-4** of this section).

The proposed General Plan includes policies by which the compatibility of sensitive land uses that would be exposed to noise sources would be reviewed and appropriate mitigation measures incorporated to achieve acceptable noise levels. Implementation of the applicable policies and standards contained in the City's proposed General Plan Update would ensure that future development meets applicable noise criteria for land use compatibility and/or includes noise attenuation features to meet applicable noise standards. No mitigation measures are necessary. With incorporation of the proposed General Plan policies, this impact would be considered **less than significant**.

Exposure to Surface Transportation Noise (Standards of Significance 1 and 3)

Impact 4.7.2 Traffic conditions under the proposed General Plan Update could result in a substantial permanent increase in ambient noise levels that could adversely affect noise-sensitive land uses. In addition, future development of noise-sensitive land uses could be exposed to roadway and/or railroad noise levels in excess of the City's noise standards. This impact would be considered **significant**.

Surface transportation noise sources within the Planning Area include vehicle traffic on area roadways as well as trains traveling along the UPRR. Noise-related impacts associated with roadway vehicle traffic and the UPRR are discussed in more detail below.

Roadway Vehicle Traffic

Distances to noise contours with projected future noise levels for major roadways in the Planning Area at build-out of the proposed General Plan Update are summarized in **Table 4.7-7**. Noise levels/contours were calculated using the FHWA roadway noise model based on Calveno vehicle reference noise levels and traffic data obtained from the traffic analysis prepared for this project. Refer to **Appendix D** for modeling output files. It is important to note that the predicted noise levels and distance to noise contours do not take into account shielding of noise by intervening structures or terrain. As a result, these noise contours should not be considered as absolute lines of demarcation. Because distances to noise contours will vary depending on site-specific conditions, these contours should be used as a guide for establishing a pattern of land uses that minimizes the exposure of community residents to excessive noise. As depicted in **Table 4.7-7**, the highest traffic noise levels in the city are generated by vehicle traffic on SR 99.

Predicted increases in traffic noise levels associated with build-out of the proposed General Plan Update are compared to existing traffic noise levels in **Table 4.7-8**. As noted in **Table 4.7-8**, build-out of the proposed General Plan Update, in comparison to existing conditions, would result in increases in traffic noise levels of up to approximately 5 dBA CNEL along certain area roadways. Of the major roadways analyzed, implementation of the proposed General Plan Update would likely result in noticeable increases in traffic noise levels (i.e., 3 dBA or greater) along 12 of the 61 major roadway segments evaluated. These roadway segments would include portions of Bruce Road, SR 32, and Eaton Road, as well as E. 20th Street, between Bruce Road and Notre Dame Boulevard, and Esplanade, between Eaton Road and Tonea Way. Some of the roadway segments identified in **Table 4.7-8** would exceed the maximum noise exposure of 70 dB L_{dn}/CNEL for noise-sensitive land uses under proposed General Plan Update Policy N-1.5. It is important to note that the increases in traffic noise levels associated with build-out of the proposed General Plan Update would occur gradually over a period of approximately 20 years, or more.

Significant increases in traffic noise levels along some smaller local roadways could also potentially occur, particularly in areas located near proposed future development projects. Development of noise-sensitive land uses could also occur within the projected 60 dBA CNEL noise contours. For these reasons, implementation of the proposed General Plan Update would be considered to result in a substantial permanent increase in ambient noise levels in the Planning Area above levels existing without the project and result in exposure of persons to or generation of noise levels in excess of standards established in the proposed General Plan as a result of increased traffic noise levels. As a result, exposure to vehicular traffic noise on area roadways would be considered a **significant** impact.

TABLE 4.7-7
YEAR 2030 TRAFFIC NOISE LEVELS UNDER PROPOSED GENERAL PLAN UPDATE BUILD-OUT

Roadway Segment	ADT	CNEL at 50 Feet from Near Travel-lane Centerline	Distance (feet) from Roadway Centerline to CNEL Contour		
			70	65	60
Bruce Road, Lakeside VLG Commons to Lakewest Drive	19,760	68.34	59.3	119.2	252.7
Bruce Road, Humbolt Road to Picholine Way	34,400	70.75	82.1	170.7	364.9
Bruce Road, Remington Drive to E. 20th Street	27,910	69.84	72.4	149.0	317.6
Bruce Road, E. 20th Street to Raley Boulevard	22,810	70.47	60.1	128.9	277.4
SR 32, East Avenue to Kennedy Avenue	14,920	69.14	54.6	115.4	247.5

Roadway Segment	ADT	CNEL at 50 Feet from Near Travel-lane Centerline	Distance (feet) from Roadway Centerline to CNEL Contour		
			70	65	60
SR 32 (Nord Avenue), Glenwood Avenue to Glenwood Avenue	18,540	70.08	62.7	133.2	286.0
SR 32 (Nord Avenue), Oak Way to W. 8th Avenue	17,790	67.36	--	88.2	188.6
SR 32 (Nord Avenue), W. Sacramento Avenue to W. Sacramento Avenue	21,470	68.18	--	99.8	213.7
Cohasset Road, Eaton Road to Thorntree Drive	20,130	69.92	55.3	118.6	255.3
Cohasset Road, Pillsbury Road to East Avenue	28,400	68.64	61.7	124.7	264.7
Cohasset Road, East Avenue to Lorinda Avenue	21,930	66.10	--	86.3	180.1
Deer Creek Highway (SR 32), E. 8th Street/Fir Street until road merges into Undivided Highway	16,470	68.65	61.7	124.8	264.8
Deer Creek Highway (SR 32), until road merges into undivided highway to Forest Avenue	37,170	73.10	98.6	211.2	454.4
Deer Creek Highway (SR 32), Forest Avenue to El Monte Avenue	31,540	72.97	88.0	189.3	407.5
Deer Creek Highway (SR 32), El Monte Avenue to Bruce Road	29,440	74.76	115.8	249.1	536.4
Deer Creek Highway (SR 32), Bruce Road to Yosemite Drive	13,490	71.37	69.0	148.1	318.9
E. 20th Street, Bruce Road to Notre Dame Boulevard	25,180	68.12	57.7	115.5	244.5
E. 20th Street, Forest Avenue to Huntington Drive	22,260	67.58	--	106.8	225.4
E. 20th Street, Business Lane to Forest Avenue	32,380	69.21	66.5	135.7	288.7
E. 20th Street, Sierra Nevada Court to Dr. Martin Luther King Jr. Parkway	22,480	67.63	--	107.5	226.9
E. 9th Street, Pine Street to Cypress Street	21,310	67.48	--	81.7	175.5
E. Park Avenue/Skyway, Country Drive to Whitman Avenue	36,860	69.78	71.7	147.6	314.6
East Avenue, Connors Avenue to Esplanade	33,930	68.00	56.8	113.4	239.9
East Avenue, Esplanade to Ilahee Lane	27,640	69.80	71.9	148.0	315.6
East Avenue, Cussick Avenue to Alamo Avenue	20,220	68.44	60.1	121.0	256.6
East Avenue, Guynn Avenue to Streamside Court	18,040	65.25	--	76.6	158.5
East Avenue, Kennedy Avenue to SR 32	19,540	65.60	--	80.4	167.0
East Avenue, Pillsbury Road to Cohasset Road	14,210	63.84	--	68.9	136.9
East Avenue, Cohasset Road to North Avenue	17,650	65.16	--	75.6	156.3
East Avenue, Floral Avenue to Coleman Court	18,610	65.39	--	78.0	161.8
Eaton Road, Constitution Drive to SR 99 SB Ramp	27,380	68.57	--	96.4	207.4
Eaton Road, Hicks Lane to Silverbell Road	30,290	69.01	--	103.1	221.8
Eaton Road, Michael Way to Burnap Avenue	14,820	65.90	--	64.2	137.8

Roadway Segment	ADT	CNEL at 50 Feet from Near Travel-lane Centerline	Distance (feet) from Roadway Centerline to CNEL Contour		
			70	65	60
Esplanade, Eaton Road to Tonea Way	18,920	65.89	--	77.3	162.8
Esplanade, W. Shasta Avenue to Mandalay Court	21,580	66.03	--	85.4	178.2
Esplanade, Panama Avenue to East Avenue	27,140	67.03	--	98.5	207.1
Esplanade, Connors Avenue to White Avenue	23,500	66.40	--	90.0	188.4
Esplanade, E. 2nd Avenue to E. 1st Avenue	22,470	66.21	--	87.6	183.0
Forest Avenue, Humboldt Road to Wildflower Court	21,910	66.10	--	86.2	180.0
Forest Avenue, E. 20th Street to Parkway Village Drive/Barney Lane	20,910	65.89	--	83.8	174.5
Mangrove Avenue, Cohasset Road to E. Lindo Avenue	23,980	66.92	--	89.8	190.4
Mangrove Avenue, E. 3rd Avenue to E. 1st Avenue	22,230	66.16	--	87.0	181.7
Mangrove Avenue, E. 1st Avenue to Palmetto Avenue	22,430	66.20	--	87.5	182.8
Mangrove Avenue, Vallombrosa Avenue to Woodland Avenue/E. 3rd Street	20,580	65.82	--	83.0	172.7
Park Avenue, Meyers Street to E. Park Avenue	21,520	67.44	--	104.5	220.5
Park Avenue, E. 16th Street to E. 17th Street	21,830	64.90	--	67.0	140.2
Park Avenue, Humboldt Avenue to W. 11th Street	21,110	64.75	--	65.6	137.2
Skyway, Forest Avenue to Dominic Drive	32,690	70.52	79.6	165.1	352.7
Skyway, Notre Dame Boulevard to Forest Avenue	30,010	70.15	75.6	156.2	333.3
W. Sacramento Avenue, Magnolia Avenue to Esplanade	23,510	66.30	--	68.2	146.4
Walnut Street, W. 4th Street to W. 5th Street	22,050	66.12	--	86.5	180.7
Walnut Street, Bidwell Avenue to W. 1st Street	25,960	67.26	--	94.5	200.6
Walnut Street, W. 8th Street to W. 9th Street	17,630	65.58	--	73.9	155.4
SR 99, Garner Lane to Eaton Road	38,090	75.47	197.4	416.9	894.0
SR 99, Eaton Road to East Avenue	58,170	77.31	259.0	551.5	1184.9
SR 99, East Avenue to Cohasset Road	75,730	78.46	307.4	656.9	1412.5
SR 99, Cohasset Road to East 1st Avenue	96,300	79.50	359.8	770.5	1657.6
SR 99, East 1st Avenue to SR 32	116,030	80.31	406.8	872.2	1876.8
SR 99, SR 32 to East 20th Street	102,430	79.77	374.7	802.8	1727.2
SR 99, East 20th Street to Skyway	74,150	78.37	303.2	647.8	1392.8
SR 99, South of Skyway	45,440	77.50	266.4	567.6	1219.8

Noise levels/contours were calculated using the FHWA roadway noise model based on Calveno vehicle reference noise levels and traffic data obtained from the traffic analysis prepared for this project. Refer to ***Appendix D*** *for modeling output files.*

-- Contours are within 50 feet of roadway centerline/within roadway right-of-way.

TABLE 4.7-8
PREDICTED CHANGES IN TRAFFIC NOISE LEVELS
AT BUILD-OUT OF THE GENERAL PLAN UPDATE AS COMPARED TO EXISTING CONDITIONS

Roadway Segment	CNEL at 50 Feet from Near Travel-lane Centerline		Predicted Change in Noise Level (CNEL)
	Existing	Future with Build-Out of the General Plan Update	
Bruce Road, Lakeside VLG Commons to Lakewest Drive	66.38	68.34	1.96
Bruce Road, Humbolt Road to Picholine Way	65.59	70.75	5.16
Bruce Road, Remington Drive to E. 20th Street	65.83	69.84	4.01
Bruce Road, E. 20th Street to Raley Boulevard	66.18	70.47	4.29
SR 32, East Avenue to Kennedy Avenue	68.61	69.14	0.53
SR 32 (Nord Avenue), Glenwood Avenue to Glenwood Avenue	69.52	70.08	0.56
SR 32 (Nord Avenue), Oak Way to W. 8th Avenue	66.85	67.36	0.51
SR 32 (Nord Avenue), W. Sacramento Avenue to W. Sacramento Avenue	67.71	68.18	0.47
Cohasset Road, Eaton Road to Thorntree Drive	67.30	69.92	2.62
Cohasset Road, Pillsbury Road to East Avenue	68.09	68.64	0.55
Cohasset Road, East Avenue to Lorinda Avenue	65.17	66.10	0.93
Deer Creek Highway (SR 32), E. 8th Street/Fir Street until road merges into undivided highway	64.93	68.65	3.72
Deer Creek Highway (SR 32), until road merges into undivided highway to Forest Avenue	69.41	73.10	3.69
Deer Creek Highway (SR 32), Forest Avenue to El Monte Avenue	68.59	72.97	4.38
Deer Creek Highway (SR 32), El Monte Avenue to Bruce Road	70.32	74.76	4.44
Deer Creek Highway (SR 32), Bruce Road to Yosemite Drive	68.07	71.37	3.30
E. 20th Street, Bruce Road to Notre Dame Boulevard	63.30	68.12	4.82
E. 20th Street, Forest Avenue to Huntington Drive	64.64	67.58	2.94
E. 20th Street, Business Lane to Forest Avenue	67.45	69.21	1.76
E. 20th Street, Sierra Nevada Court to Dr. Martin Luther King Jr. Parkway	66.94	67.63	0.69
E. 9th Street, Pine Street to Cypress Street	66.84	67.48	0.64
E. Park Avenue/Skyway, Country Drive to Whitman Avenue	68.04	69.78	1.74
East Avenue, Connors Avenue to Esplanade	67.24	68.00	0.76
East Avenue, Esplanade to Ilahee Lane	69.27	69.80	0.53
East Avenue, Cussick Avenue to Alamo Avenue	68.24	68.44	0.20
East Avenue, Guynn Avenue to Streamside Court	64.92	65.25	0.33

Roadway Segment	CNEL at 50 Feet from Near Travel-lane Centerline		Predicted Change in Noise Level (CNEL)
	Existing	Future with Build-Out of the General Plan Update	
East Avenue, Kennedy Avenue to SR 32	64.92	65.60	0.68
East Avenue, Pillsbury Road to Cohasset Road	63.83	63.84	0.01
East Avenue, Cohasset Road to North Avenue	65.04	65.16	0.12
East Avenue, Floral Avenue to Coleman Court	65.38	65.39	0.01
Eaton Road, Constitution Drive to SR 99 SB Ramp	65.84	68.57	2.73
Eaton Road, Hicks Lane to Silverbell Road	64.02	69.01	4.99
Eaton Road, Michael Way to Burnap Avenue	62.58	65.90	3.32
Esplanade, Eaton Road to Tonea Way	62.36	65.89	3.53
Esplanade, W. Shasta Avenue to Mandalay Court	64.48	66.03	1.55
Esplanade, Panama Avenue to East Avenue	66.27	67.03	0.76
Esplanade, Connors Avenue to White Avenue	66.09	66.40	0.31
Esplanade, E. 2nd Avenue to E. 1st Avenue	65.99	66.21	0.22
Forest Avenue, Humboldt Road to Wildflower Court	64.45	66.10	1.65
Forest Avenue, E. 20th Street to Parkway Village Drive/Barney Lane	64.76	65.89	1.13
Mangrove Avenue, Cohasset Road to E. Lindo Avenue	66.34	66.92	0.58
Mangrove Avenue, E. 3rd Avenue to E. 1st Avenue	65.61	66.16	0.55
Mangrove Avenue, E. 1st Avenue to Palmetto Avenue	66.13	66.20	0.07
Mangrove Avenue, Vallombrosa Avenue to Woodland Avenue/E. 3rd Street	65.31	65.82	0.51
Park Avenue, Meyers Street to E. Park Avenue	65.28	67.44	2.16
Park Avenue, E. 16th Street to E. 17th Street	63.94	64.90	0.96
Park Avenue, Humboldt Avenue to W. 11th Street	64.18	64.75	0.57
Skyway, Forest Avenue to Dominic Drive	69.73	70.52	0.79
Skyway, Notre Dame Boulevard to Forest Avenue	69.38	70.15	0.77
W. Sacramento Avenue, Magnolia Avenue to Esplanade	66.29	66.30	0.01
Walnut Street, W. 4th Street to W. 5th Street	65.52	66.12	0.60
Walnut Street, Bidwell Avenue to W. 1st Street	66.68	67.26	0.58
Walnut Street, W. 8th Street to W. 9th Street	64.79	65.58	0.79
SR 99, Garner Lane to Eaton Road	72.80	75.47	2.67
SR 99, Eaton Road to East Avenue	74.74	77.31	2.57
SR 99, East Avenue to Cohasset Road	76.26	78.46	2.20

Roadway Segment	CNEL at 50 Feet from Near Travel-lane Centerline		Predicted Change in Noise Level (CNEL)
	Existing	Future with Build-Out of the General Plan Update	
SR 99, Cohasset Road to East 1st Avenue	77.81	79.50	1.69
SR 99, East 1st Avenue to SR 32	78.54	80.31	1.77
SR 99, SR 32 to East 20th Street	78.39	79.77	1.38
SR 99, East 20th Street to Skyway	77.03	78.37	1.34
SR 99, South of Skyway	76.38	77.50	1.12

Notes: Traffic noise levels were estimated using the FHWA Highway Traffic Noise Prediction model (FHWA-RD-77-108). Traffic volumes were derived from the traffic analysis prepared for this project and assume that peak-hour volumes constitute approximately 10 percent of average-daily volumes. Roadway data and vehicle distribution percentages were based on traffic data obtained during the site reconnaissance conducted for this project, as well as heavy-duty truck distribution percentages obtained from Caltrans.

UPRR

As previously discussed above, the UPRR tracks are located west of and parallel to SR 99, bisecting the City of Chico in a general north-south direction. The UPRR is used for both freight transport and Amtrak passenger service. Approximately 18 freight trains and two Amtrak passenger trains travel along this rail line on a daily basis (City of Chico, 1999). The number of freight trains traveling along this segment can vary from day to day, depending on demand, and there are currently no hourly limitations pertaining to freight train travel. Amtrak passenger trains typically run between the nighttime hours of 2:00 a.m. and 4:00 a.m. (Amtrak, 2007).

Projected volumes for future years are not currently available. Based on conversations with UPRR staff, future train volumes would not be anticipated to increase substantially in comparison to existing conditions. However, as congestion on area roadways increases, it is conceivable that reliance on freight and Amtrak train service could increase.

Within the City of Chico, railroad noise levels are highly influenced by the sounding of locomotive warning horns. The use of locomotive horns is typically required by law on approach to public at-grade crossings. The Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Guidelines* (FTA, 2006) were used for the calculation of wayside noise levels generated by the trains traveling along the UPRR corridor. Wayside noise levels were calculated based, in part, on average train speeds, train length, and the number of trains traveling during the daytime and nighttime hours. Predicted noise levels were calculated with and without the sounding of warning devices at grade crossings. With the sounding of train horns, the projected 60 and 65 dBA CNEL noise contour at signalized grade crossings would extend to approximately 810 and 375 feet from the track centerline, respectively. At track locations in excess of approximately 660 feet from grade crossings, the projected 60 and 65 dBA CNEL noise contour would extend to approximately 700 and 325 feet from the track centerline, respectively. It is important to note that these projected noise contours do not include shielding or reflection of noise from intervening terrain or structures, and actual noise levels will vary depending on site-specific conditions. Although these predicted noise contours are not considered site-specific, they are useful for determining potential land use conflicts.

Policy N-1.5 requires site-specific noise studies for noise-sensitive projects which may be affected by railroad noise, and incorporate noise attenuation measures into the project design to reduce any impacts to those specified in Table N-1 (**Table 4.7-4** of this section). Similarly, where proposed projects are likely to expose noise-sensitive land uses to noise levels exceeding the City's standards, Policy N-1.3 requires an acoustical analysis as part of environmental review so that noise mitigation measures may be identified and included in the project design. The requirements for the content of an acoustical analysis are outlined in Table N-3 (**Table 4.7-6** of this section).

Implementation of the proposed General Plan Update noise policies identified above would reduce potential transportation noise impacts. Future development projects would be required to analyze project-related noise impacts and incorporate necessary noise reduction measures sufficient to achieve the applicable noise standards of the proposed Noise Element. Implementation of these policies and actions will help to reduce impacts associated with proposed development. Noise reduction measures typically implemented to reduce traffic noise include increased insulation, setbacks, and construction of sound barriers. Some measures, such as construction of sound barriers, may have secondary impacts related to aesthetics and safety. The feasibility of these measures would be determined on a project-by-project basis. However, it may not be possible to fully mitigate traffic and/or railroad noise in all areas, particularly in existing developed areas constrained due to age, placement, or other factors which limit the feasibility of mitigation such as residences fronting the right of way that limit the placement of noise barriers. As a result, increases in transportation noise associated with the proposed General Plan Update could result in a permanent increase in ambient noise levels in the project vicinity above levels existing without the project and would result in exposure of persons to or generation of noise levels in excess of standards established in the proposed General Plan, which is considered to be a **significant and unavoidable** impact.

Exposure to Stationary Noise (Standards of Significance 1 and 3)

Impact 4.7.3 Subsequent development associated with the proposed General Plan Update could result in new noise-sensitive land uses encroaching upon existing or proposed stationary noise sources or new stationary noise sources encroaching upon existing or proposed noise-sensitive land uses. As a result, this impact is considered **significant**.

Implementation of the proposed General Plan Update could result in the future development of land uses that generate substantial noise levels in close proximity to noise-sensitive uses. These may include commercial, industrial, institutional (public schools), and recreational land uses. In addition, new noise-sensitive land uses could be located in areas of existing stationary noise sources. Exposure of noise-sensitive land uses to non-transportation noise levels could result in a permanent increase in ambient noise levels. Policy N-1.2 mandates that new development of noise-sensitive land uses will not be permitted in areas exposed to existing non-transportation noise sources that exceed the levels specified in Table N-2, unless the project design includes measures to reduce exterior noise levels to the unadjusted levels specified in Table N-2 [**Table 4.7-5** of this section]. Where proposed projects are likely to expose noise-sensitive land uses to noise levels exceeding the City's standards, Policy N-1.3 requires an acoustical analysis as part of environmental review so that noise mitigation measures may be identified and included in the project design. The requirements for the content of an acoustical analysis are outlined in Table N-3 [**Table 4.7-6** of this section]. Action N-2.1.1 would limit noise at the source through the use of insulation, berms, building design and orientation, staggered operating hours, and other techniques.

In accordance with the City's Municipal Code (Title 9, Chapter 9.38, Noise), noise levels associated with activities in residentially-designated areas, measured at any point outside the property line, are limited to a maximum of 70 dBA between the hours of 7 a.m. and 9 p.m. and 60 dBA between the hours of 9 p.m. and 7 a.m. Noise levels associated with activities that exceed these standards are addressed through the City's code enforcement efforts. Interior noise levels of multi-family residential property are limited to a maximum of 60 dBA at 3 feet from any wall, floor, or ceiling inside any dwelling unit, measured within adjacent dwelling units with windows and doors closed. Noise levels on commercial or industrial property are limited to a maximum of 70 dBA, measured at any point outside the property line. Noise generated on public property is limited to a maximum of 60 dBA at 25 feet from the source (City of Chico, 2008). General Plan Update Policy N-3.1 would maintain a noise enforcement program to identify and resolve problems concerning noise in the community.

Implementation of the above policies and standards would reduce noise associated with new stationary noise sources and the placement of new noise-sensitive land uses over which the City has jurisdiction (e.g., commercial and industrial sites, residential uses). However, some stationary noise impacts cannot be mitigated to a less than significant level due to limitations on the City to control the exact placement of substantial noise-generating uses, such as projects implemented by other public agencies located in proximity to noise-sensitive land uses (e.g., residential). Accordingly, stationary source noise levels from activities on uses over which the City has limited, or no, control could result in noise levels that exceed the City's maximum allowable noise standards. Thus, this impact is considered **significant and unavoidable**. No additional feasible mitigation has been identified that would further reduce this impact.

Exposure to Groundborne Vibration (Standard of Significance 2)

Impact 4.7.4 Subsequent development under the proposed General Plan Update could result in exposure of persons to or generation of excessive groundborne vibration levels. However, substantial sources of groundborne vibration that would result in significant vibration impacts are not expected in the Planning Area. As a result, this impact is considered **less than significant**.

The effects of ground vibration can vary from no perceptible effects at the lowest levels, low rumbling sounds and detectable vibrations at moderate levels, and slight damage to nearby structures at the highest levels. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in structural damage. The effects of ground vibration are influenced by the duration of the vibration and the distance from the vibration source.

There are no federal, state, or local regulatory standards for vibration. However, various criteria have been established to assist in the evaluation of vibration impacts. For instance, Caltrans has developed vibration criteria based on human perception and structural damage risks. For most structures, Caltrans considers a peak-particle velocity (ppv) threshold of 0.2 inches per second (in/sec) to be the level at which architectural damage (i.e., minor cracking of plaster walls and ceilings) to normal structures may occur. Below 0.10 in/sec there is "virtually no risk of 'architectural' damage to normal buildings." Damage to historic or ancient buildings, however, could occur at levels of 0.08 in/sec ppv. In terms of human annoyance, continuous vibrations in excess of 0.1 in/sec ppv are identified by Caltrans as the minimum level perceptible level for ground vibration. Short periods of ground vibration in excess of 0.2 in/sec ppv can be expected to result in increased levels of annoyance to people within buildings (Caltrans, 2002b).

Groundborne vibration sources located within the city that could potentially affect future development would be primarily associated with railroad operations. Construction activities could also result in short-term groundborne vibration levels that could affect nearby sensitive land uses. Groundborne vibration levels and associated impacts as a result of trains traveling along the UPRR and short-term construction activities are discussed in more detail below.

UPRR

Groundborne vibration levels associated with railroad operations are dependent on various factors, including track type and condition, train speeds, site conditions, and train characteristics, such as the number of engines, number of cars, weight, and wheel type and condition. Site and geologic conditions can also influence how vibration propagates at increasing distance from the track. Based on Caltrans vibration measurement data, the highest train vibration level measured was 0.36 in/sec at 10 feet. Based on this level, Caltrans prepared a "drop-off curve" used to estimate maximum train vibration levels at distance from the track centerline. The curve represents maximum expected vibration levels from trains and thus is considered by Caltrans to be "very conservative" (Caltrans, 2002b).

Based on the Caltrans drop-off curve for train vibration levels, predicted maximum groundborne vibrations levels along the UPRR corridors would not exceed 0.20 in/sec ppv beyond approximately 7.5 feet from the track centerline, the level above which architectural damage for typical building construction or increased levels of annoyance for individuals in buildings may occur (Caltrans, 2002b). The proposed General Plan Update would not result in the development of new land uses within 7.5 feet of railroad track centerlines, therefore, would not result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Construction Activities

With the exception of pavement breaking, blasting, and pile driving, construction activities and related equipment typically generate groundborne vibration levels of less than 0.20 in/sec, which is the architectural damage risk threshold recommended by Caltrans. Based on Caltrans measurement data, use of off-road tractors, dozers, earthmovers, and haul trucks generates groundborne vibration levels of less than 0.10 in/sec, or one half of the architectural damage risk level, at 10 feet. The highest vibration level associated with a pavement breaker was 2.88 in/sec at 10 feet. During pile driving, vibration levels near the source depend mainly on the soil's penetration resistance as well as the type of pile driver used. Impact pile drivers tend to generate higher vibration levels than vibratory or drilled piles. Groundborne vibration levels of pile drivers can range from approximately 0.17 to 1.5 in/sec ppv. Caltrans indicates that the distance to the 0.2 in/sec ppv criterion for pile driving activities would be approximately 50 feet. However, as with construction-generated noise levels, pile driving can result in a high potential for human annoyance from vibrations, and pile-driving activities are typically considered as potentially significant if these activities are performed within 200 feet of occupied structures (Caltrans, 2002b). Vibration levels associated with blasting are highly variable, site-specific, and dependent on various factors, such as the amount of explosive used, soil conditions between the blast site and the receptor, and the depth where blasting would take place. Blasting that occurs below the surface would typically produce lower vibration levels due to additional attenuation provided by distance to the receptor and transmission through soil and rock.

The City's Municipal Code (Chapter 9.38, Noise) establishes hourly restrictions and noise standards that pertain to construction-related activities that would address vibration impacts as

well. For construction-related activities that occur between the hours of 10 a.m. and 6 p.m. on Sundays and holidays, and 7 a.m. and 9 p.m. on weekdays, the following limitations shall apply:

- No individual device or piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 feet from the source. If the device or equipment is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close as possible to 25 feet from the equipment.

- The noise level at any point outside the property plane of the project shall not exceed 86 dBA.

Similar to short-term noise from construction activities, vibrations from construction activities are inevitable and cannot be mitigated beyond a certain level. Thus, local agencies frequently tolerate short-term vibrations at levels that they would not accept for permanent vibration sources. A more severe approach would be impractical and might preclude the kind of construction activities that are inevitable from time to time in urban environments. Most residents of urban areas recognize this reality and expect to experience vibration from construction activities on occasion. Vibration from construction activities is considered to be temporary in the sense that once the construction activities cease, so too would the vibrations from the construction activities. Vibrations from construction activities are also considered to be intermittent due to the type, location, and duration of construction equipment being used.

Due to the short-term nature of construction vibrations, the intermittent frequency of construction vibrations, and the required compliance with the City's Municipal Code hourly restrictions for construction-related activities, construction vibration level increases would typically not result in exposure of persons to or generation of excessive groundborne vibration. By restricting the hours of construction to avoid vibrations during times when it could potentially be more of a nuisance, the impact of new construction vibration is reduced to a **less than significant** level. In addition, individual development projects will be subject to site-specific environmental review, which will necessitate identification of site-specific mitigation in the event that significant impacts are identified.

Mitigation Measures

None required.

Exposure to Construction Noise (Standard of Significance 4)

Impact 4.7.5 Construction activities associated with subsequent activities under the proposed General Plan Update could result in a substantial temporary or periodic increase in ambient noise levels. However, the proposed Chico General Plan Update policy provisions and continued implementation of the City Municipal Code would adequately address construction noise issues. Therefore, construction noise impacts would be **less than significant**.

Construction noise typically occurs intermittently and varies depending upon the nature or phase (e.g., demolition/land clearing, grading and excavation, erection) of construction. Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Temporary increases in ambient noise levels, particularly during the nighttime hours, could result in increased levels of annoyance and potential sleep disruption. Although noise ranges were found to be similar for all construction phases, the grading phase tends to involve the most equipment and resulted in slightly higher average-hourly noise levels. Typical noise levels for individual pieces of construction equipment and

distances to predicted noise contours are summarized in **Table 4.7-9**. As depicted, individual equipment noise levels typically range from approximately 74 to 88 dBA L_{eq} at 50 feet. Typical operating cycles may involve 2 minutes of full power, followed by 3 or 4 minutes at lower settings. Intermittent noise levels can range from approximately 77 to 95 dBA L_{max}, the loudest of which include blasting and the use of pile drivers and impact devices (e.g., hoe rams, impact hammers).

TABLE 4.7-9
TYPICAL CONSTRUCTION EQUIPMENT NOISE

Equipment	Typical Noise Level (dBA) 50 feet from Source		Distance (feet) to Noise Contours (dBA L_{eq})		
	L_{max}	L_{eq}	70	65	60
Air Compressor	80	76	105	187	334
Auger/Rock Drill	85	78	133	236	420
Backhoe/Front-End Loader	80	76	105	187	334
Blasting	94	74	83	149	265
Boring Hydraulic Jack/Power Unit	80	77	118	210	374
Compactor (Ground)	80	73	74	133	236
Concrete Batch Plant	83	75	94	167	297
Concrete Mixer Truck	85	81	187	334	594
Concrete Mixer (Vibratory)	80	73	74	133	236
Concrete Pump Truck	82	75	94	167	297
Concrete Saw	90	83	236	420	748
Crane	85	77	118	210	374
Dozer/Grader/Excavator/Scraper	85	81	187	334	594
Drill Rig Truck	84	77	118	210	374
Generator	82	79	149	265	472
Gradall	85	81	187	334	594
Hydraulic Break Ram	90	80	167	297	529
Jack Hammer	85	78	133	236	420
Impact Hammer/Hoe Ram (Mounted)	90	83	236	420	748
Pavement Scarifier/Roller	85	78	133	236	420
Paver	85	82	210	374	667
Pile Driver (Impact/Vibratory)	95	88	420	748	1,330
Pneumatic Tools	85	82	210	374	667
Pumps	77	74	83	149	265
Truck (Dump/Flat Bed)	84	80	167	297	529

Note: Predicted noise contours associated with construction activities may vary depending on the type and number of pieces of equipment used, usage rates Predicted noise contours do not include shielding provided by intervening terrain and structures.

Source: Ambient, 2010

Depending on distances from nearby noise-sensitive land uses, construction activities associated with build-out of the Planning Area may result in temporary and periodic increases in ambient noise levels at nearby receptors. Increases in ambient noise levels, particularly during the nighttime hours, could result in increased levels of annoyance and potential sleep disruption to occupants of nearby dwellings.

The City's Municipal Code (Chapter 9.38, Noise) establishes hourly restrictions and noise standards that pertain to construction-related activities. For construction-related activities that occur between the hours of 10 a.m. and 6 p.m. on Sundays and holidays, and 7 a.m. and 9 p.m. on weekdays, the following limitations shall apply:

- No individual device or piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 feet from the source. If the device or equipment is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close as possible to 25 feet from the equipment.

- The noise level at any point outside the property plane of the project shall not exceed 86 dBA.

Due to the short-term nature of construction noise, the intermittent frequency of construction noise, and the required compliance with the construction noise standards established as part of the City's existing Municipal Code noted above, construction noise level increases will not result in a substantial temporary or periodic increase in ambient noise levels in the Planning Area above existing levels that would result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or of applicable standards of other agencies. The impact of new construction noise will be **less than significant** through compliance with the City's Municipal Code requirements and no mitigation measures are required.

Exposure to Aircraft Noise (Standards of Significance 5 and 6)

Impact 4.7.6 Sensitive land uses constructed near Chico Municipal Airport, Ranchaero Airport, and the Enloe Medical Center could be exposed to aircraft noise in excess of applicable noise standards for land use compatibility. This is considered a **less than significant** impact.

The Butte County Airport Land Use Commission's (ALUC) Airport Land Use Compatibility Plan was established to ensure that there are no direct conflicts with land uses, noise, or other issues that would impact the functionality and safety of airports located within the county, including the Chico Municipal and Ranchaero Airports. ALUCs are required to review city and county general plans and zoning ordinances and to make findings of whether they are consistent with the applicable Airport Environs Land Use Plans, which contain noise contours and define appropriate restrictions for types of construction and building heights in navigable air space, as well as appropriate land use restrictions regarding sensitive uses within close proximity to airports.

Projected future (year 2018) noise contours for the Chico Municipal Airport are depicted in **Figure 4.7-4.** Noise contours for average and maximum Cal-Fire days are depicted in **Figure 4.7-5** and **Figure 4.7-6**, respectively. Projected future (year 2030) noise contours were not available for this airport at the time that this Draft EIR was prepared. However, projected noise contours could expand in future years as demand for airport services increases. Future development in the vicinity of airport may result in exposure of community residents to the noise

from aircraft operations. Future aircraft noise levels and contours would depend on various factors, including:

- Magnitude and duration of the noise from aircraft operations;
- Number of aircraft operations; and
- Time of occurrence (i.e., day, evening, and nighttime hours)

The Chico Municipal Airport is the largest airport in Butte County. According to the Airport Land Use Compatibility Plan, the airport has 70,000 annual takeoffs and landings. There are approximately 130 aircraft based at the airport. The airport runway is equipped with a precision instrument landing system and accommodates a full range of business aircraft. The airport has limited scheduled commuter airline service. The airport also receives major use during the fire season due to the fact that it is a designated "fire attack base." Average annual daily aircraft operations without fire attack aircraft is 182 operations yet during a peak fire season day, an additional 200 aircraft operations may occur.

The Chico Municipal Airport provides a full compliment of cargo service to the north state area. Four carriers operating from the existing airport structures located on the easterly side of the aircraft-parking apron currently handle air cargo at this airport. The cargo aircraft currently used at the Chico Municipal Airport include a Cessna 208, Cessna 402, Piper PA32 and a Beech 99. These cargo aircraft operate from the existing aircraft parking apron (BCAG, 2008). Air cargo service is currently limited to small single and twin-engine aircraft that generally carry the freight to major hubs (BCAG, 2008). The expansion of air cargo operation out of the Chico Municipal Airport is difficult to forecast. The major air cargo operators such as UPS, Federal Express, Airborne, and Emery, will not establish hub operations in an area that does not have major air cargo demands such as San Francisco or Los Angeles (BCAG, 2008).

The number of aircraft based at the Chico Municipal Airport has not changed significantly since 1980 and the trend has not shown significant increase. As the population grows, the potential exists for an increase in based aircraft, but that increase within the next 20 years is not forecast to exceed 50 percent of the current based aircraft population (BCAG, 2008), or 105,000 takeoffs and landings by 2030 (70,000 + 50 percent increase = 105,000).

The Chico Municipal Airport is also the busiest airport in Butte County. The primary runway, Runway 13L-31R is currently 6,722 feet long (BCAG, 2008). The Chico Airport Master Plan states that the runway should be extended to 8,600 feet to be able to adequately service turbo jet aircraft in the future, such as the Boeing 717, and the McDonnell Douglas DC-9 and MD-80 (BCAG, 2008). This extension would accommodate all aircraft operations forecast to use the airport and will further decrease noise impacts (BCAG, 2008). According to the 2008-2035 Regional Transportation Plan adopted by the Butte County Association of Governments with the intent to maintain, manage, and improve the region's transportation system over a 20 year period, it would be prudent to consider the protection and reservation of the needed land to the north to allow for the runway extension in the future. The proposed General Plan Update would designate these lands Public Facilities and Services in order to accommodate existing and future airport operations. Other capacity considerations identified in the Chico Airport Master Plan propose widening and extending Runway 13R-31L to be used by Cal-Fire operations and commercial service when the main runway is closed for maintenance, reconstruction, or due to an accident.

It is not anticipated that future expansion of the Chico Municipal Airport will result in noise-related impacts of future potential development under the proposed General Plan Update. As previously mentioned, the extension of the primary runway from 6,722 feet to 8,600 feet will allow for the use of turbo jet aircraft in the future which would further decrease noise impacts (BCAG, 2008). In addition, Policy N-1.1 of the proposed General Plan Update states that new development of noise-sensitive land uses will not be permitted in areas exposed to existing or planned transportation noise sources that exceed the levels specified in Table N-1 of the General Plan Update, unless the project design includes measures to reduce exterior and interior noise levels to those specified in Table N-1 [Table 4.7-7 of this section].

It is also important to note that the proposed General Plan Update noise standards for transportation noise source are consistent with those identified by federal and state airport regulations. As discussed earlier in this section and in accordance with both federal and state regulations, all land uses are considered compatible within a noise environment of less than 65 dBA L_{dn}/CNEL. This noise criterion level is based upon an average-daily noise level (expressed in L_{dn} or CNEL), which represents the average noise level over a 24-hour period, with adjustment factors applied to account for the lower tolerance of individuals to noise during the more noise-sensitive evening and nighttime hours. This noise criterion level was selected based upon a review of existing evidence obtained from studies of community noise reaction, noise interference with speech and sleep, and noise induced hearing loss. It is considered protective of individuals residing in urban residential areas where houses are of typical construction with windows partially open. Within higher noise environments, the acceptability of some land uses depends on various factors, including the type of land use and degree of structural noise attenuation provided to ensure acceptable interior noise levels. For various reasons, airport proprietors and local governing agencies may impose noise criterion and other limitations that are more restrictive. As such, the proposed General Plan Update noise standards would be considered protective of community residents with regard to potential noise-related impacts, such as community noise reaction, noise interference with speech and sleep, and noise induced hearing loss. Although the proposed General Plan Update would result in inconsistencies with land uses identified in the ALUC's Comprehensive Land Use Plan (CLUP), potential noise-related impacts associated with future development would be considered less than significant. Please refer to Section 4.1 for a discussion of land use impacts with regard to consistency with the ALUC's CLUP.

Future growth associated with the proposed General Plan Update is not expected to be exposed to excessive noise levels from the Ranchaero Airport, given its limited operations and distance from designated noise-sensitive land uses under the proposed General Plan Update (see **Figure 4.7-10**). Ranchaero airport has an average of 14 daily aircraft operations, yet this number is expected to increase to an average of 27 daily aircraft operations during the next 15 years (City of Chico, 2005b). 90 percent of those flights are single engine general aviation flights and ten percent are helicopter operations (City of Chico, 2005b). Less than one percent are multi-engine aircraft, which are significantly louder compared to single engine aircraft. 85 percent of all aircraft landing and departing from Ranchaero Airport make close-in turns to avoid overflight of residential areas north of the airport (City of Chico, 2005b).

The proposed General Plan Update provides that residential development is acceptable at a CNEL level of 65 decibels for the exterior environment and 45 decibels for the interior environment. As shown in **Figure 4.7-10**, the 65 decibel noise contour extends just beyond the edge of the Ranchaero Airport runway. Therefore, potential future development proposed at the nearest available location to the Ranchaero Airport would fall within the 60 decibel noise contour at the loudest.

The Ranchaero Airport is located adjacent to existing residential development to the north. General Plan Update Action N-2.1.1 would limit noise at the source through, among other mechanisms, the use of insulation. Insulation is a proven measure to reduce interior noise to acceptable levels based on the CNEL noise exposure expected. Furthermore, Policy N-1.1 states that new development of noise-sensitive land uses will not be permitted in areas exposed to existing or planned transportation noise sources that exceed the levels specified in Table N-1 of the General Plan Update, unless the project design includes measures to reduce exterior and interior noise levels to those specified in Table N-1 [Table 4.7-7 of this section].

As noted previously, Enloe Medical Center is a source of helicopter flights in the City. The Esplanade is used as the primary approach and departure route for Enloe Medical Center. Predicted and existing CNEL noise contours for Enloe Medical Center are depicted in **Figure 4.7-7** and **Figure 4.7-8**. Implementation of the noise standards below would ensure consistency with city noise standards. It should be noted that significant and unavoidable single-event noise impacts would occur with the implementation of the Enloe Medical Center Master Plan as identified in the Enloe Medical Center Master Plan EIR (State Clearinghouse No. 2004012118). Implementation of the proposed General Plan Update would not include any actions that would worsen this previously identified noise impact.

The proposed General Plan Update contains policies and actions that include specific performance standards addressing transportation/aircraft noise. As previously mentioned, new development of noise-sensitive land uses will not be permitted in areas exposed to existing or planned transportation noise sources that exceed the levels specified in Table N-1, unless the project design includes measures to reduce exterior and interior noise levels to those specified in Table N-1 (**Table 4.7-4** of this section) (Policy N-1.1). The proposed General Plan Update includes policies (i.e., policies N-1.1 and N-1.3) by which the compatibility of noise-sensitive land uses that would be exposed to transportation noise sources would be reviewed and appropriate mitigation measures incorporated to achieve acceptable noise levels. General Plan Update Policy N-2.2 would promote coordination with public and private organizations to ensure consistency with the City's community noise standards and Action LU-7.1.2 requires aviation easements and deed notices for new development within the Airport Land Use Compatibility Plan area. General Plan Action LU-7.1.1 requires that the city amend its Municipal Code to establish airport compatibility overlay zoning districts that conform to the boundaries and policy direction of the ALUCP's overflight zones. The overlay districts would enforce development standards consistent with the standards in the ALUCP, including noise-resistant construction, structure and tree height limitations, density/intensity limitations on the use of land, and establishing infill criteria consistent with the 2005 agreement between the city and the ALUC.

Implementation of the applicable policies and standards contained in the City's proposed General Plan Update would ensure that future development near Chico Municipal Airport, as well as near other facilities involving the use of aircraft, such as Enloe Medical Center, would meet applicable noise criteria for land use compatibility and/or include noise attenuation features to meet applicable noise standards. In addition, proposed future development projects located within air traffic patterns, corridors, and airport influence zones would be reviewed to ensure continued consistency with applicable plans, including the Butte County Airport Land Use Compatibility Plan. With incorporation of the proposed General Plan policies, this impact would be considered **less than significant**.

4.7.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

The cumulative noise setting includes 2030 development anticipated within Butte County in addition to build-out of the proposed General Plan Update (see Section 4.0, Introduction to the Environmental Analysis and Assumptions Used). The future (cumulative) ambient noise environment will be affected by build-out of the proposed General Plan Update. Cumulative development would alter the intensity of land uses in the region and increase housing, employment, shopping, and recreational opportunities. Such development would result in new noise generators and noise-sensitive land uses and potentially increase land use conflicts and hazards associated with noise. The primary factor for cumulative noise impact analysis is the consideration of future traffic volumes. Under future cumulative conditions, projected increases in population growth are anticipated to result in increased traffic volumes and associated noise levels on area roadways. This cumulative impact analysis herein focuses on the project's contribution to cumulative traffic noise impacts and whether that contribution is considered significant.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Transportation Noise Impacts (Standard of Significance 1)

Impact 4.7.7 Implementation of the proposed General Plan Update, in combination with other development in nearby unincorporated areas of the county, would increase transportation noise along area roadways. This would be a **cumulatively considerable** impact.

As identified in **Table 4.7-8**, implementation of the proposed General Plan Update, in combination with anticipated growth by the year 2030, would result in noticeable increases in traffic noise. In comparison to existing conditions, increases in traffic noise levels of up to approximately 5 dBA CNEL would occur along certain portions of area roadways. Of the major roadways analyzed, noticeable increases in traffic noise levels (i.e., 3 dBA or greater) would be predicted to occur along 12 of the 61 major roadway segments evaluated, but not all would exceed 70 CNEL. These roadway segments would include portions of Bruce Road, SR 32, and Eaton Road. Increased traffic noise levels would also be experienced in the Planning Area outside of the urban development areas in the unincorporated area of Butte County.

The proposed General Plan Update policies include requirements that contain specific performance standards addressing transportation noise. These policies are listed under Impact 4.7.3. Implementation of the proposed General Plan Update noise policies identified under Impact 4.7.3 would reduce potential transportation noise impacts in the city. Additionally, future development projects would be required to analyze project-related noise impacts and incorporate necessary noise reduction measures sufficient to achieve applicable noise standards. Noise reduction measures typically implemented to reduce transportation noise include increased insulation and building requirements, setbacks, and construction of sound barriers. Some measures, such as construction of sound barriers, may have secondary impacts related to aesthetics and safety. The applicability of these measures would be determined on a project-by-project basis.

However, it is may not be possible to fully mitigate transportation noise in all areas of the city, particularly for existing development that may be constrained due to age, placement, or other factors which limit the feasibility of mitigation, such as residences fronting on the roadway that

limit the placement of noise barrier. In addition, the City does not have jurisdiction to implement noise mitigation outside of its boundaries (or may not be allowed to in Caltrans right-of-ways) to address potential noise impacts to the surrounding, nearby unincorporated areas of Butte County or along Caltrans facilities. It is important to note that the increases in traffic noise levels associated with build-out of the proposed General Plan Update would occur gradually over a period of approximately 20 years, or more. Nonetheless, the proposed General Plan Update's contribution to cumulative traffic noise would be **cumulatively considerable** and a **significant and unavoidable** impact

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