

Safety Element

SAFETY ELEMENT

"People generally ran from the stores and dwellings into the streets while a few fell to praying with great zeal."

Colusa Sun Herald, on the
1892 Earthquake
April 23, 1892

ORGANIZATION OF THE SAFETY ELEMENT

The Safety Element addresses aspects of Colusa County's natural and man-made environment which pose threats to human life or property. These conditions define basic constraints to land use to which the community development pattern must respond. The issues contained in the Safety Element are listed below:

- o Flood protection and dam inundation
- o Geologic and seismic hazards
- o Wildfire
- o Hazardous substances
- o Injection Wells
- o Noise

Many of the issues discussed in this Element are related to isolated incidents requiring quick, coordinated response. Thus, the Safety Element addresses, in a generalized manner, emergency response plans and needs. Water quality is both a safety issue, in terms of potential threats to public health, and a natural resource issue, in terms of maintaining an adequate supply of drinking and irrigation water. Although water quality is discussed in this Element, a more in-depth discussion of water issues can be found in the Conservation and Community Services Element.

OVERVIEW OF HAZARDS

FLOODING

Flood hazards in Colusa County can be attributed to several sources: seasonal overflow of creeks and the Sacramento River, poor drainage in natural basins, and the potential failure of dams on reservoirs impounding the Sacramento River or its tributaries. The county participates in the National Flood Insurance Program of the Federal Insurance Administration, operated under the Federal Emergency Management Agency (FEMA). Figure SAFE-1 shows areas located within the 100-year and 500-year flood zones as identified by FEMA. A 100-year flood zone is defined as an area in which a flood has a probability of occurring once in 100 years, or a 1% chance every year. A 500-year flood zone poses less of a risk, as it is an area with a probability of flooding once in 500 years, or a 0.2% chance every year. These two zones cover nearly one-half of the valley floor, with the most severe hazard areas located along the Colusa Drain and west of Butte Creek. Land outside the levees on

the west side of the river actually is less likely to flood than land along the Colusa Drain, several miles further east. The river is about 5 feet higher in elevation than the Drain; consequently, Colusa, Grimes, and Princeton fall within the 500-year flood plain, while the wildlife refuges fall within the 100-year flood plain.

Federal flood insurance is available to homeowners in the flood plain. No insurance can be obtained for homes which are built either within the designated floodway (see Figure LU-2) or below the elevation of the 100-year flood. However, insurance is available in the 100-year flood plain for homes built with the first floor of living area above the 100-year flood elevation.

Overbank Flooding

Natural channels subject to flooding include the Sacramento River and several creeks throughout the county. These creeks include Turks Creek near Delevan; Freshwater and Salt Creeks near Williams; Whiskey, Elk, and Petroleum Creeks near Arbuckle; as well as Sand Creek, Cortina Creek, Salt Creek, Lurline Creek, Stone Corral Creek and Funks Creek.

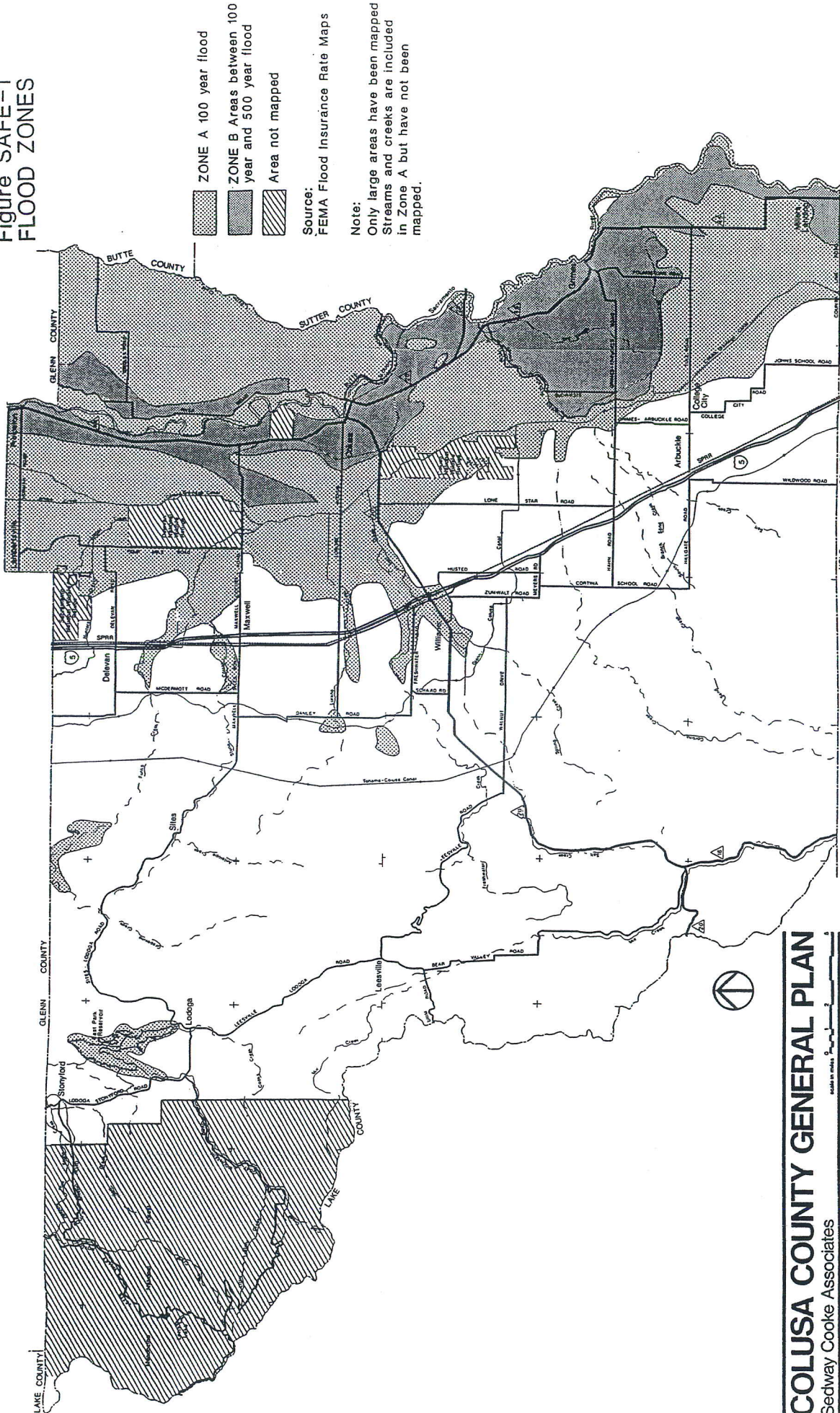
Butte Sink, a low-lying trough in nearby Butte County, is used as a flood basin to carry overflow from the Sacramento River. Water is diverted to the Sink from the river through a weir located just north of the City of Colusa. A system of levees prevents the river's floodwaters from inundating Colusa, Princeton, Grimes, and adjacent farmlands. More information on the levees can be found in the Community Services Element of this plan.




The Sacramento River is bounded by silty loam soils which are subject to seepage problems during high river periods. When the river is high, seepage affects homes near the levees in Colusa, Grimes, and Princeton.

The Sacramento River System is monitored by the State Department of Water Resources (DWR), which provides advance flood warnings. Reports on river levels are routinely received at the Colusa County Sheriff's Communication Center during times of high water. The Colusa County Office of Emergency Services has developed guidelines for responding to Sacramento River flooding, based on river level progression, as measured at the Colusa Bridge. A flood situation generally evolves through a series of five stages:

- o Stage I--Watch Stage. Pre-emergency river level is 60 feet or below at the Colusa Bridge.
- o Stage II--Warning Stage. River level is 63 feet at the Colusa Bridge.
- o Stage III--Alert Stage. River level is 70 feet and forecast to rise, at the Colusa Bridge. Flooding is possible.
- o Stage IV--Danger Stage. River level is 71 feet and forecast to rise at the Colusa Bridge. Flooding is expected.
- o Stage V--General Evacuation. River level is 73 feet and forecast to rise at the Colusa Bridge. Flooding is imminent.

**Figure SAFE-1
FLOOD ZONES**



-  ZONE A 100 year flood
-  ZONE B Areas between 100 year and 500 year flood
-  Area not mapped

Source:
FEMA Flood Insurance Rate Maps

Note:
Only large areas have been mapped
Streams and creeks are included
in Zone A but have not been
mapped.

COLUSA COUNTY GENERAL PLAN
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Areas of Poor Drainage

The buildup of alluvial fans in the western foothills and sediment carried in floodwaters from the Sacramento River have caused the natural formation of troughs parallel to the river. On the west side of the river, the Colusa Basin stretches 75 miles between the towns of Orland and Knights Landing. Much of the Colusa Basin is a designated flood plain. During the rainy season, as the basin approaches holding capacity, thousands of acres may be flooded. Flooding may inundate roads in the basin, cutting the riverfront communities off from the towns along I-5.

Localized flooding occurs in several communities in the county because of poor natural drainage and inadequate storm drain systems. For example, the City of Williams experienced major flooding problems on the north side during the winter of 1982-83. Arbuckle and Colusa also experience minor flooding in very wet years. (Interstate 5 Corridor Draft Area Plan EIR 1985). The Colusa area experienced a major flood in 1983 and a minor flood in 1986.

The County and the City of Colusa currently are negotiating with Southern Pacific Railroad to purchase or obtain easements on a section of abandoned railroad right-of-way along Highway 20 to Highway 45. It is believed the raised embankment acts as a dike that keeps flood water out of the city of Colusa.

Dam Failure

Five reservoirs which retain water from tributaries of the Sacramento River could cause damage in Colusa County if their dams were to fail: Lake Oroville, Lake Shasta, Whiskeytown Lake, Black Butte Lake, and East Park Reservoir. Dam inundation could affect much of the eastern portion of the county. A major earthquake centered close to a dam would be the most likely cause of failure. The DWR has estimated the inundation that would result from a hypothetical severe dam failure for all of the dams which could significantly affect Colusa County (see Figure SAFE-2).

Lake Oroville, located in Butte County, would represent the most immediate threat, since flood waters could reach the county within eight hours. Lake Shasta, in Shasta County, could cause the most extensive inundation, reaching as far west as Maxwell and College City in a period of 42 hours. Inundation from Whiskeytown Lake, located in Trinity County, would take over three days to reach Colusa County. Failure of the dam on Black Butte Lake, which is on the border of Glenn and Tehama Counties, could result in some inundation within a period of about 35 hours. The inundation from this lake would be less extensive than the other dams.

Failure of the dam at East Park Reservoir could cause minor inundation at the reservoir's outlet. The flood waters would flow into Glenn County; thus, its failure would have no significant effect on Colusa County. In Glenn County, the flooding would extend up to one-quarter mile on either side of Stony Creek at its widest point. The water would cause an overflow of Stony Gorge Reservoir, which is located on Stony Creek. Black Butte Reservoir would retain the excess inundation. Although the area of potential flooding does not pass through urbanized areas, small communities in the upper foothills could be affected. Thus, some emergency response coordination is needed between Colusa County, Glenn County, and the Bureau of Reclamation, which owns and maintains the East Park Reservoir Dam.

The inundation scenarios shown in Figure SAFE-2 were based on hypothetical worst-case dam failures and are best used for emergency planning and response purposes. Depending on the severity of an actual dam failure, inundation could be much less severe than that predicted by these scenarios.

Flood Control Measures

A California law (SB428) enacted in 1983 allowed Colusa County to form a flood control and drainage district and "zones of benefit" within the district to solve local drainage and flooding problems. After a zone is formed, residents can vote to levy assessments to improve their local drainage problems. As described in the Community Services Element, the first such zone was formed in Colusa in 1987. Concurrently, a bill which passed the State Legislature in 1987 (SB 1338) established the Colusa Basin Drainage District—a regional area that includes portions of Colusa, Glenn, and Yolo Counties. Since flooding is not only a local problem, but a regional one, the district's aim is to coordinate flood control efforts among basin agencies.

Implications for Development

Nearly all of Colusa County's communities experience some degree of flood hazard. Princeton, Colusa, and Grimes are entirely within the 500-year flood plain, while flood plains associated with seasonal creeks affect Maxwell, Arbuckle, and Williams. The Sacramento River communities will always be confronted with the danger of flooding from breached levees, and with seepage problems during periods of high water. As this hazard affects the entire community rather than a specific geographic area, it does not constrain growth in a discrete section of town. However, it does reinforce the importance of regularly maintaining the levees and being sufficiently prepared for a catastrophic flood. The presence of more frequently flooded areas close to these towns suggests that major transportation routes may be flooded during heavy rains.

Although the possibility of catastrophic flooding in Colusa, Princeton, and Grimes is remote, this inherent hazard makes these towns less suitable for growth than the communities at slightly higher elevations along I-5. Growth which occurs in these communities should conform to requirements of the federal flood insurance program.

The Arbuckle, Williams, and Maxwell areas are each traversed by creeks which are subject to seasonal flooding. Northwest of Arbuckle, Elk Creek and Salt Creek are susceptible to minor overbank flooding. No development has occurred within the flood plains of those creeks to date, and none is recommended in the land use plan. Within the developed portion of Arbuckle, localized flooding problems are associated with poor storm drainage. While these problems do not constrain the town's growth or threaten human safety, they create a nuisance during heavy rains and should be corrected through structural improvements.

The problem is much more extensive in Williams, where the 100-year flood plain of Salt Creek affects a swath of land nearly 4,000 feet wide north of the city and 2,000 feet wide east of the city. The Salt Creek flood plain covers land in both the city and the county and affects developed as well as undeveloped properties. Natural drainage patterns are complicated by the numerous man-made barriers in the area, including the railroad, I-5, and the Highway 20 bypass. Past flooding has caused extensive property damage north and east of town.

Figure E-2
DAM FLOODATION

Note: Based on hypothetical severe dam failure
Area of inundation under worst case scenario

Shasta Lake
Time: 42 hours *

Black Butte Lake
Time: 35 hours *

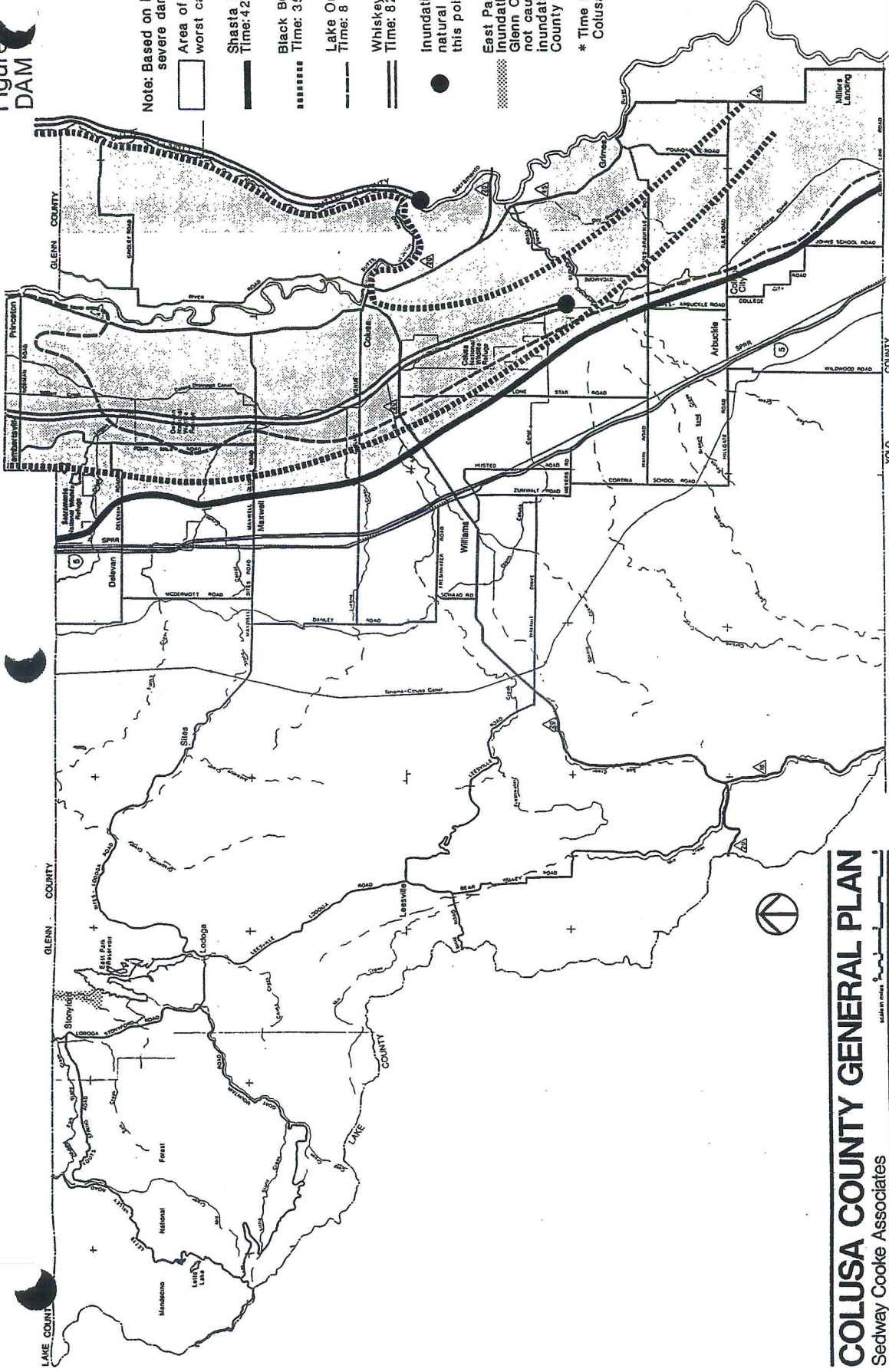
Lake Oroville
Time: 8 hours *

Whiskeytown Lake
Time: 82 hours *

Inundation confined to natural channels beyond this point

East Park Reservoir inundation flows into Glenn County and would not cause further inundation in Colusa County

* Time to reach City of Colusa vicinity



COLUSA COUNTY GENERAL PLAN

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The land use plan for Williams directs the town's residential growth south and industrial growth east of I-5, avoiding the flood-prone area. However, several parcels in the flood plain are shown for future urban uses. The designation assumes that FEMA will redefine the flood plain following improvements to Salt Creek and the storm-water drainage system in Williams. Until FEMA does confirm new flood plain boundaries for this area, development should not be permitted.

North of Maxwell, Stone Corral Creek presents potential flood hazards. Some development has already occurred within the flood plain. The community plan directs future growth away from this area, thereby reducing potential future hazards.

GEOLOGIC AND SEISMIC HAZARDS

Landslides

Landslides present a risk to human life and property located in or directly below hillside areas. Figure SAFE-3 shows areas of high landslide potential within the county. Soils subject to movement are shallow, gravelly, and have low water holding potential. These areas are located in the Coast Range and foothills of the western county and are not heavily populated. Besides risks to life and property, there are also risks of landslides blocking roads and of roads collapsing. Because of this and other constraints, the Land Use Element discourages development in the foothills and mountains. Earthquake shaking frequently triggers rapid slides on sloping unstable land. Heavy rains and soil saturation, plus activities such as excavation, deforestation, and slope undercutting can trigger landslides.

Subsidence

Subsidence can be thought of as localized sinking of the ground surface with little or no horizontal movement. Subsidence can be caused by excessive groundwater withdrawal, by extraction of natural gas or oil, or by tectonic movement. It can damage all types of construction, including buildings, sewer and water pipes, gas lines, canals, and roads. On a broad scale, subsidence can lower the elevation of large areas of land. This results in increased flood hazard due to higher flood depths and longer flood durations. The threat of subsidence depends upon its extent over an area and the slope gradient which results from its occurrence.

Areas of known and potential subsidence in the County are identified in Figure SAFE-4. The area of greatest concern is located near Arbuckle, where localized subsidence has been recorded since the late 1960s (Blodgett, USGS, pers. comm.). (Subsidence may have been occurring for a much longer period of time; however, it has only been recorded since the late 1960s.) The direct cause of subsidence in this particular area has not been identified, although the area is currently being studied by the California Department of Water Resources and the U.S. Geological Survey. The Department of Water Resources indicates that there is a strong possibility that the subsidence may be related to tectonic movement, although earlier studies by the California Division of Mines and Geology attribute the subsidence in this area to groundwater withdrawal. It is probably not due to gas withdrawal, since gas deposits are very deep.

Subsidence does not generally constrain development if enough is known about the rate and characteristics of the movement. For Colusa County, it is important that subsidence be investigated so that corrective measures can be taken.

Expansive Soils

Expansive clayey soils increase in volume when wet and shrink in the process of drying. Structures built directly on soils having this characteristic can suffer structural damage from differential movement of foundations and cracking of pavements and foundations. As Figure SAFE-4 shows, a majority of the county contains highly expansive soils. These soils impose major limitations for building foundations, utilities, and roadways; however, standard engineering techniques can effectively reduce potential structural damage.

Volcanism

Volcanic eruptions have the potential to destroy structures, pollute water systems, ruin farmlands, and devastate the natural landscape. Sutter Buttes is an inactive volcanic plug located east of Colusa County. According to the U.S. Geological Survey, there has been no recorded volcanic activity associated with this geologic feature during the last 1.4 million years and future activity is not expected.

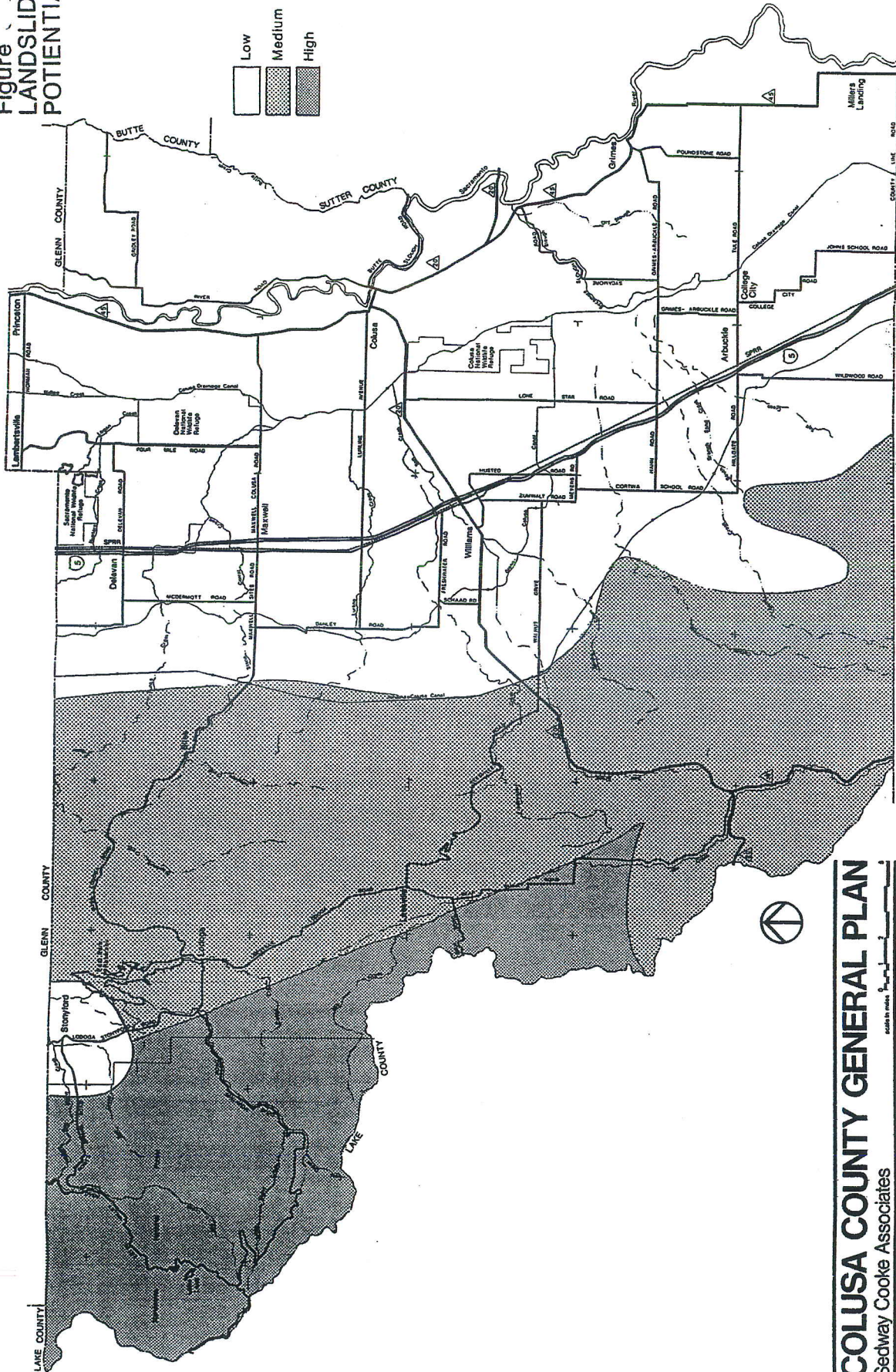
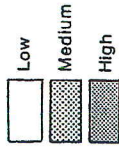
The closest area of volcanic activity to Colusa County is Mount Konocti, 45 miles west of Williams. Mount Konocti is the most recent large volcano in Lake County, and volcanic deposits as young as 9,000 years old are known to exist. Future eruptions would be expected around the eastern arm of Clear Lake, to the north and east of Mount Konocti, and near High Valley and Chalk Mountain in Lake County (Lake County General Plan 1981). Colusa County would not be expected to experience volcanic hazards associated with an eruption of Mount Konocti.

Lassen National Forest, located in the southeast corner of Shasta County, is at the southern end of the Cascade Range, an active volcanic chain that extends northward into British Columbia. As the recent history of Mount St. Helens indicates, the Cascades are still young and active. The most recent volcanic activity from Lassen Peak occurred in 1914-1917 when eruptions produced lava flows on the flank of the crater, numerous ash falls, and a large mudflow. Since Colusa County is located downwind from this relatively active volcano, it is possible that a major eruption could deposit ash over portions of Colusa County. Significant damage is not expected.

Erosion

Erosion is a naturally occurring process involving the removal of soil from one area through wind and water and the deposit of this material in another area. Erosion can be accelerated by human activities such as grading, burning, grazing, irrigation, and cultivation. Soils in Colusa County are susceptible to varying degrees of erosion based on their organic matter content, depth, soil texture, and slope. The U.S. Soil Conservation Service (SCS) rates soils according to the degree of soil loss that can occur per acre per year while still maintaining agricultural viability. This rating is called a "T Factor" and is based on the depth of a soil. T Factors range from 1 to 5, with 1 being very poor and 5 being very good. The valley soils of eastern Colusa

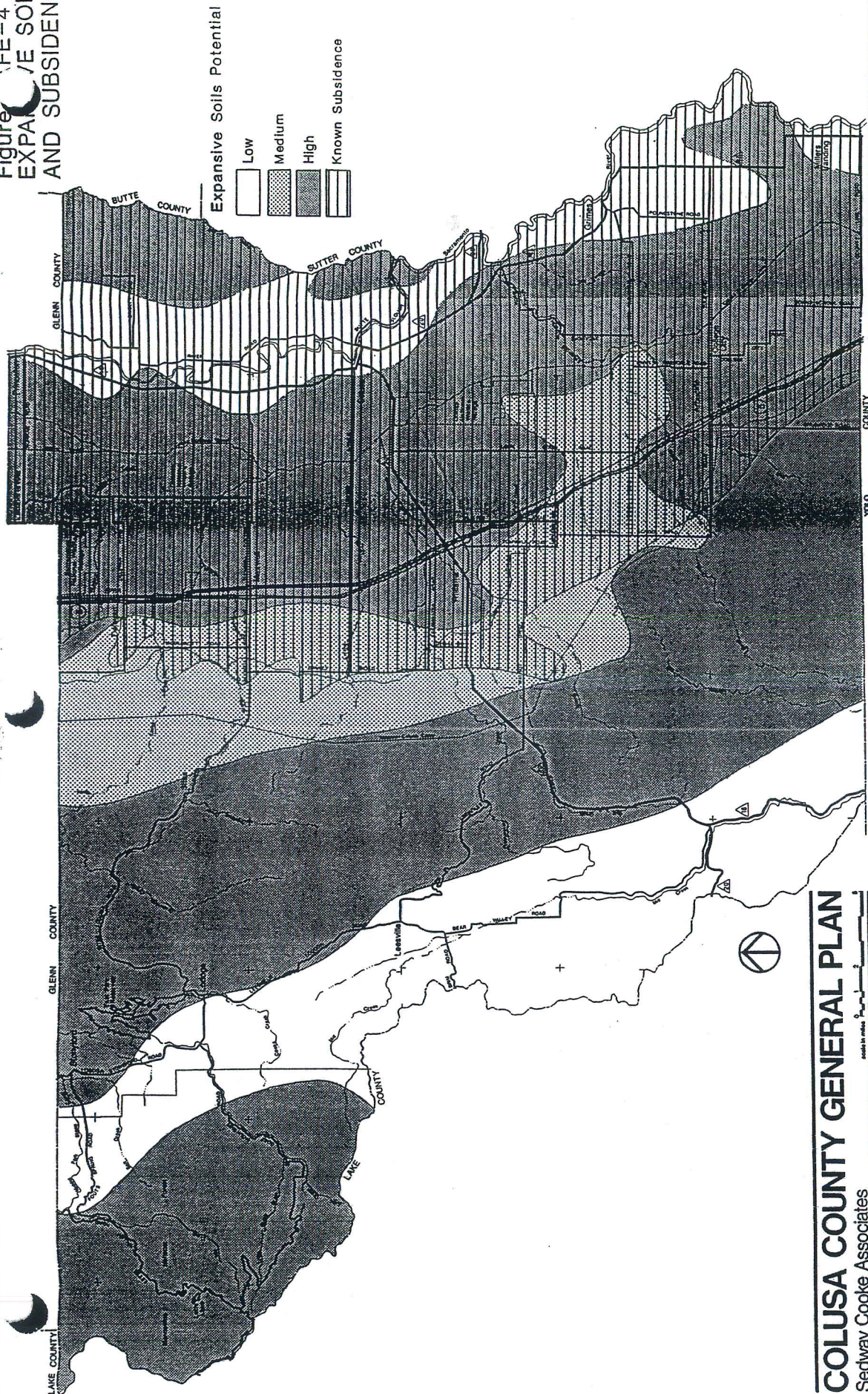
Figure E-3
LANDSLIDE
POTENTIAL



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Figure CAFE-4
EXPANSIVE SOILS
AND SUBSIDENCE



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County are rated 5, while the foothills have a rating of 2-3. In the mountainous areas, approximately at the 5,000-foot elevation where timber grows, the soils have a T Factor rating of 5.

With the exception of riverbank areas along the Sacramento River, a majority of soils in the river flood plain and basin areas of the county are not susceptible to severe erosion (see Figure CO-6 in the Conservation Element). The flow and overflow of streams causes most of the erosion in this area. Overflow results in deposits of silt and sediment. Dikes, ditches, levees, and drains tend to concentrate and accelerate overflow, sometimes resulting in bank and gully erosion (Clenenden & Associates, 1982).

North of the City of Colusa, the Sacramento River makes several wide swings. Considerable bank erosion takes place along this portion of the river. Deposits of silt and sediment occur on the land between the river and its levees.

West of the river basin area, channels which drain the foothills are subject to erosion and deposition, with the older soils subject to more erosion than more recent soils. Orchards within the Arbuckle almond district planted on Arbuckle and Hill soils experience erosion during heavy or protracted rains. West of Arbuckle in the foothills, areas occupied by Rumsey soils are subject to considerable gully and streambank erosion, and are the source of most of the gravel and cobbles which fill the drainageways.

Soils in the foothills and Coast Range in the western portion of the county are shallow, gravelly, and sloping. Varying degrees of erosion occurs in these areas depending on the slope and soil type. Sheet, gully, and streambank erosion occur in the mountainous and intermountain regions. For instance, Bear Creek was a meandering, shallow stream in the late 1800s. Today, it has 10- to 15-foot banks. Streams which drain into Bear Creek have also cut downward.

Seismicity

Seismic safety hazards exist through the entire state of California. It is recognized that the northern Sacramento Valley floor--which includes part of Colusa County--can regularly expect low-intensity shocks. There are no known active faults in Colusa County. Most faults are quaternary (active 200,000 years ago) or pre-quaternary (active 2 million years ago). Most earthquake preparedness efforts in the county have considered the effect of quakes centered outside the county. In such instances, the area could be subject to moderate groundshaking. An earthquake of magnitude 5.7 on the Richter scale centered at the nearest known fault (at the Sutter Buttes), which is the maximum credible earthquake for this fault, could cause groundshaking in Colusa County up to an intensity of VI to VIII as measured on the Modified Mercalli (MM) scale. The groundshaking would be less intense in the northwestern half of the county (MM VI or VII) than in the southeastern half (which could experience MM VII or VIII). Table SAFE-1 outlines the Modified Mercalli scale of earthquake intensities.

The results of earthquake activity in the vicinity of Colusa County could be similar to that which resulted from the Vacaville-Winters earthquake of 1892. Groundshaking was estimated at IX MM at its epicenter; VI MM in the southeastern two-thirds of Colusa County; and V MM in the northwestern third of the county. (As a comparison, the 1983 Coalinga earthquake was measured at VIII MM.)

Table SAFE-I: Modified Mercalli Scale of Earthquake Intensities

<u>Intensity</u>	<u>Observed Effects</u>
I-II	Shaking usually not felt, although swaying trees, structures or bodies of water may be observed.
III-V	Usually felt by people indoors, but shaking may not be recognized as caused by an earthquake; it is similar to the shaking caused by the passing of trucks. Hanging objects swing; doors and windows rattle. Doors may swing and dishes may rattle.
VI-VIII	Felt by everyone, with no doubt as to the cause. Objects fall from shelves. Damage to structures minor to moderate; especially in unreinforced masonry, chimneys, and architectural ornaments.
VIII-IX	General fright, waves on bodies of water, small landslides triggered. Damage moderate to major: general damage to foundations, partial to complete collapse of unreinforced masonry structures, partial damage to reinforced masonry. Underground pipes broken.
X-XII	General panic. Large landslides, cracks in the ground. Destruction of most buildings, underground pipelines broken.

Note: This intensity scale is older and more subjective than the more familiar Richter scale, which measures the magnitude of an earthquake in terms of the energy released at the epicenter.

Source: John T. Alfors, et al., Urban Geology Master Plan for California, CDMG Bulletin 198, 1973.

According to the Division of Mines and Geology, the possibility of a major earthquake in the area cannot be entirely ruled out. Four minor quakes on an unknown fault in the foothills occurred in April and May of 1985, the largest registering 3.7 on the Richter Scale. Moreover, the 1983 Coalinga quake that measured 6.7 on the Richter Scale occurred on an unknown fault in an area geologically similar to western Colusa County. A 1987 geological study found that additional earthquakes of magnitude 6.5 were likely between Vacaville and Williams (Eaton, 1987).

The threat is due to unknown faults created by the folding of the coastal mountains as they push eastward against the Sacramento Valley. While motion between the Pacific Plate and the North American Plate is generally to the northwest, the Pacific Plate also creates eastward pressure. The pressure results in "thrust faults", so named for their vertical motion. A buried thrust fault is believed to have caused the October, 1987 Whittier earthquake in the Los Angeles area.

In the event of an earthquake, the hardest hit area would probably be downtown Colusa, with its numerous unreinforced brick buildings. If a serious quake occurs, the county would utilize the same disaster plan used for flooding and other emergencies. Despite the low risk, the Office of Emergency Services recommends that county residents keep enough food and water on hand for up to a week. While it does not appear necessary at this time for Colusa County to plan for a major seismic event, the county should respond if geologic evidence indicates that the faults are active.

WILDFIRE

Wildfires are a potential hazard to development located in the foothill and mountain areas of the county. An average of 4 fires burn approximately 2 acres per year in the portion of the Mendocino National Forest located in Colusa County (Stonyford Fire District, personal communication). Over a 10-year period, an estimated 12 wildfires burned approximately 386 acres of State-managed lands in Colusa County (California Department of Forestry, personal communications).

The U.S. Forest Service, U.S. Soil Conservation Service (SCS), State Department of Forestry, Bureau of Land Management, and private land owners collectively attempt to reduce fire hazards throughout the County through the Coordinated Resource Planning Program developed by the SCS. One of the primary objectives of this program is to reduce wildfire and range fire hazard through the use of prescribed burning. The Stonyford Fire District estimates that approximately 4,000 to 5,000 acres of land are burned per year through prescribed burning (Stonyford Fire District, personal communications). The fires in the summer of 1987 burned over 6,000 acres of land in the Mendocino National Forest, including several hundred acres of private land.

The severity of wildfire problems depends on a combination of vegetation, climate, slope, and people. The California Department of Forestry bases the severity of fire hazards on three of these factors: vegetation, climate, and slope. Figure SAFE-5 shows portions of the county which are highly susceptible to fire hazard. The grassland, chaparral, woodland, and forest vegetation found in these areas, coupled with hot, dry summers, present extreme fire hazard during critical fire periods for approximately 50 percent of the County. In addition to natural factors such as light-

ning, human activity is a primary factor contributing to the incidence of wildfires in these areas. Campfires, smoking, debris burning, arson, and equipment use are cited as common causes of wildfires. Recreational areas in the County are considered extremely hazardous because human activity is generally greatest during critical fire periods (California Department of Forestry). A more detailed review of fire protection measures and policies is contained in the Community Services Element of the General Plan.

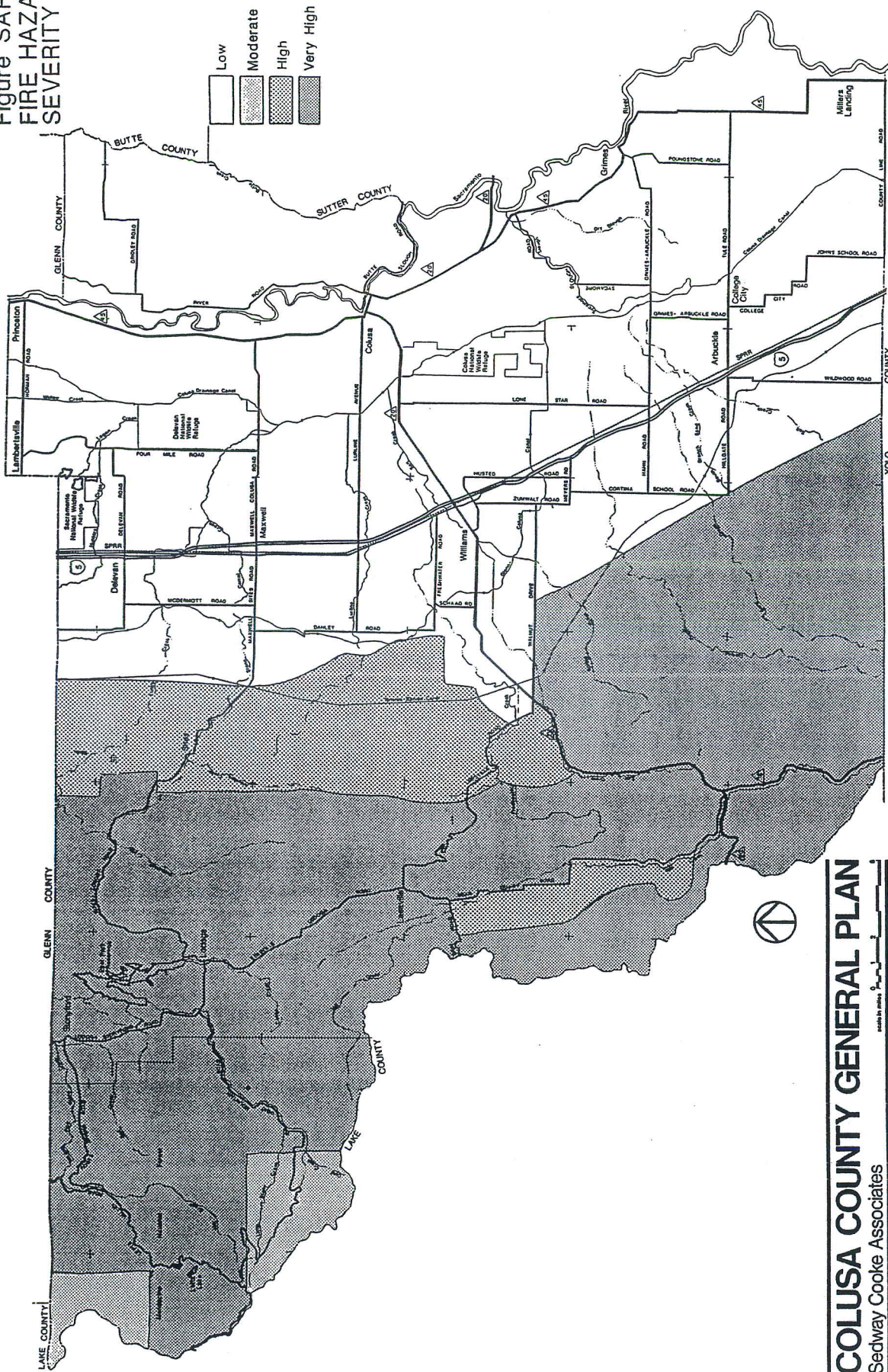
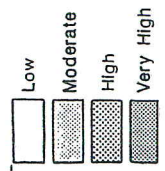
HAZARDOUS SUBSTANCES

A majority of the hazardous substances used in the county are associated with agricultural operations and production. Pesticides, including insecticides and herbicides, are widely used and are applied through aerial and ground application. Interstate Highway 5, Highway 20, and the Southern Pacific Railroad are major routes for hazardous materials brought into or transported through the County. The storage, handling, and disposal of hazardous materials is regulated by the County Department of Agriculture and the County Office of Emergency Services. Recently enacted state legislation, AB 2185 and AB 2187, requires that businesses report the types and amounts of hazardous materials they use to the County Office of Emergency Services. Additionally, businesses must provide emergency response plans for a release or a threatened release of hazardous materials. Farmers are exempt from reporting to the Office of Emergency Services because they are required to provide a yearly inventory of hazardous materials in use to the County Agricultural Commissioner. This inventory is then forwarded to the Office of Emergency Services.

The county's solid waste disposal system is profiled in the Community Services Element. Air and water quality at the Evans Road and Stonyford Landfills is regulated by the State and County under AB 3374, known as the Calderone Act. This Act requires a one-time solid-waste assessment test of air and water quality on all non-hazardous landfills. The solid-waste assessment test (SWAT) report is then submitted to the Regional Water Quality Control Board, which regulates disposal sites, for its review. The Act required that all air quality testing be completed by the end of 1987. For water quality testing, sites were ranked statewide to establish a schedule for testing. The Evans Road Landfill was ranked 2, requiring completion of testing in 2 years, and Stonyford Landfill and Maxwell Transfer Station were ranked 4, requiring completion of tests within the next 4 years (J. Krug, personal communication).

The County Department of Agriculture monitors the Evans Landfill on a regular basis to ensure safe dumping of all hazardous wastes and to avoid possible future contamination. However, after May 1991, hazardous wastes will not be allowed to be placed into landfills, pursuant to state law. As noted in the Community Services Element, the Tanner Act (AB 2948) provided an incentive to California counties by providing funding to study their hazardous waste problems and to devise siting requirements for disposal. Based on the recommendations given by the counties that participate in the study program, a statewide plan for disposal of hazardous wastes will be developed. In conjunction with this study, a Colusa County Hazardous Waste Management Plan Advisory Committee has been formed. The Advisory Committee and County Director of Environmental Health are working on a public awareness program to explore how the quantity of hazardous materials currently being generated (six pounds per person per day, including household waste) can be reduced.

**Figure SAFE-5
FIRE HAZARD
SEVERITY ZONES**



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INJECTION WELLS

An injection well is an abandoned gas well used to dispose of the saline water which is drawn up during petroleum and gas extraction. The wastewater is disposed by injecting it into the ground. This disposal method has generated controversy for two reasons. First, there is the potential for the saline water to leak into groundwater supplies. Second, there is some concern that toxic substances may be illegally injected into the wells. There is a consensus in the county that the environmental impact of injection wells needs to be studied more closely and that use of the wells should be regulated more stringently.

The California Division of Oil and Gas (CDOG) presently regulates the drilling of wells and issues permits for injection. Colusa County also issues well permits, but has not developed drilling regulations. Under CDOG regulations, precautions taken to prevent saline leakage include placing a steel pipe into the well hole and cementing it before injection begins. Mechanical integrity tests are performed on wells once a year, and CDOG officials inspect well sites periodically.

After considerable public controversy, the Colusa County Planning Commission has approved two additional injection wells, both of which are subject to mitigating measures prescribed by the County's Technical Advisory Committee. The measures are designed to keep saline water from leaking into groundwater supplies and to prevent users from pumping toxics into the wells. Recently, the Colusa County Planning Commission has asked the Board of Supervisors to consider enacting an ordinance to regulate injection wells operating in the county.

NOISE

Overview

Noise is simply defined as unwanted sound. It is a byproduct of urbanization not unlike smog, sewage, solid waste or any of the other residuals that result from human activity. As an environmental pollutant, noise usually receives less attention than air or water pollution. Sound waves dissipate rapidly and do not leave behind the visual or chemical degradation caused by other kinds of pollution. However, noise should be regarded as a very real limitation to the development of certain uses in certain areas. Noise can cause pain, stress, loss of hearing, and irritability. It can interrupt sleep, lower property values, and disrupt community life. To minimize these problems, each community's land use plan should promote a development pattern which recognizes both sources of noise and "noise-sensitive" uses.

California Government Code Section 65302(g) states that the general plan must include a Noise Element. It is acceptable to incorporate this element into the safety element, for like flooding, landslides, earthquakes, and other hazards, noise is an environmental factor that affects the suitability of land for human use. The purpose of the Noise Element can be summarized as follows:

- o to identify noise sources and appraise noise problems in the community;
- o to identify noise sensitive areas, such as rest homes and hospitals;
- o to project noise for major sources such as Interstate 5 and the railroad;

- o to minimize the number of people exposed to uncomfortable levels of noise in the future; and
- o to provide the basis for local programs or ordinances which control and abate environmental noise.

In addition to its safety implications, noise is also a fundamental concern in the Land Use, Circulation, and Housing Elements. One objective of the Land Use Element is to encourage a development pattern that is compatible with current and future noise conditions. Likewise, the Circulation Element promotes traffic patterns and road designs which minimize the intrusion of noise into existing and planned residential areas. The Housing Element, meanwhile, promotes decent, healthy, and quiet living environments for county residents.

In a rural county like Colusa, noise is perceived as a relatively minor problem. There are no large urban centers or major airports, few noise-producing industrial uses, and few congested highways. Agricultural noises, such as the hum of cropdusters or washing and scraping at plum packing sheds, are viewed by most residents as part of life in a farm community. In some parts of the county, residents have lived beside rice dryers or concrete batch plants for years and have become accustomed to their sound qualities.

Noise in Colusa County can become a more serious problem under two circumstances: first, when a new noise source is introduced in an area where residents are accustomed to quiet; and second, when new housing is introduced in an area where the existing noise levels exceed the new residents' expectations. The first situation might arise very gradually, for instance as traffic increases on a major thoroughfare. It may also arise suddenly, as a new industry begins operation or a new road is opened to traffic. The second situation could arise if new homes were built within close range of a landing strip, freeway, or industry. Good planning and sound insulation guidelines can effectively prevent this situation from occurring.

Measurement of Noise

The human perception of noise is usually defined in **decibels (dB)**. Decibels are measured on a logarithmic scale, so that each increase of 10 dB is equivalent to a doubling in loudness. The measurements are usually taken on an "A-Weighted" scale which filters out very low and very high frequencies in a manner similar to the human ear. The letter "A" is added to the decibel abbreviation to indicate the use of the A-weighted scale (dBA).

Decibel readings for common noise sources are shown in Table SAFE-2. Everyday sounds range from 30 dBA, which is very quiet, to almost 100 dBA, which is very noisy. At 70 dBA, noise can become irritating and disruptive. When noise levels reach 75 dBA for prolonged periods, some hearing loss may occur and noise is likely to be identified as the major source of annoyance by the community.

Noise measurements are usually expressed with some indication of the duration of the measurement period. For longer periods, the measurement reflects the average noise level over the period. Adjustments are usually made to reflect the greater sensitivity of people to noise at night. For instance, the term **Community Noise Equivalent Level (CNEL)** is used to describe the average noise level during a 24-hour day, with a penalty of 5 dBA added to sound levels between 7 and 10 PM and a

Table SAFE₂-4: Typical Sound Levels for Common Noise Sources

<u>QUALITY OF SOUND</u>	<u>SOUND LEVEL, dBA</u>	<u>TYPICAL SOUNDS</u>
UNCOMFORTABLY LOUD (THRESHOLD OF PAIN)	130	
	120	Jet takeoff at 200 feet Thunder
	110	Rock band
VERY LOUD	100	Power lawn mower
	90	Diesel bus at 15 feet Motorcycle at 25 feet
	80	Inside sports car, 55 mph Garbage disposal at 3 feet
	70	Freeway traffic at 50 feet
LOUD	60	Vacuum cleaner at 10 feet Inside department store
	50	Normal conversation Quiet street
	40	Average residence Quiet room
VERY QUIET	30	Whisper at 5 feet
	20	Leaves rustling
BARELY AUDIBLE	10	Mosquito at 3 feet
THRESHOLD OF HEARING	0	

Source: 1985; U.S. Environmental Protection Agency, Fundamentals of Noise: Measurement, Rating Schemes, and Standards, December 1971, p. 29; SCA.

penalty of 10 dBA added to sound levels between 10 PM and 7 AM. The term **Day-Night Average Level (L_{dn})** is similar, but does not include the 5 dBA penalty for evening noise. Shorter measurement durations (typically one hour) are described as **Energy Equivalent Levels (L_{eq})**, indicating the total energy contained by sound over a given sample period.

Use of the longer measurement period accounts for the variations in the frequency of sound levels that occur during the day. For instance, a train may produce a sustained noise level (L_{eq}) of 80 dBA during the one minute it passes through Arbuckle. However, if only one train passed through the town each day, the L_{dn} or CNEL reading would be considerably lower than 80 dBA.

The US Environmental Protection Agency has suggested a noise reduction goal of 55 dBA (L_{dn}) in residential areas for the protection of health and welfare. The US Department of Housing and Urban Development's minimum standard for noise in residential areas is 65 dBA (L_{dn}). CNEL or L_{dn} levels can be mapped using contour lines around major noise generators. The contours typically correspond to 5 dBA intervals and the maps include all contours greater than 60 dBA (L_{dn}). The 60 dBA cut-off corresponds to the state requirement that all new housing with exterior noise levels exceeding this level be insulated. As a guideline, interior noise levels should be no louder than 45 dBA (L_{dn}). Since noise reduction provided by a typical house is 12 to 18 dBA, additional insulation is usually required where exterior noise exceeds 60 dBA.

Colusa County has yet to undertake a community-wide noise survey and a mapping of noise contours exceeding 60 dBA. However, sufficient data has been collected for the community's primary noise sources to determine the severity of existing noise problems and to develop noise compatibility criteria for future development. Data from adjoining counties with similar conditions is also helpful in documenting the local noise environment.

Existing Noise Environment

One of the most valued qualities of Colusa County is that it is quiet. Typical noise levels on a tomato farm over a 24-hour period are about 44 dBA. The 24-hour noise level in a typical upland valley area is about 40 dBA. Even along county roads in undeveloped areas the average noise level in a day is 50 dBA. These noise levels are typical of a rural, uncongested environment.

The primary sources of noise in Colusa County are highways, namely Interstate 5 and Highway 20; the Southern Pacific railroad; low-flying airplanes; agricultural industries; and farm machinery. Noise is also generated within each community through every-day activities such as lawn-mowing, leaf-blowing, or chain-saw operation.

Streets and Highways. Based on the noise typically generated by different volumes of highway traffic, the only highways with L_{dn} readings regularly exceeding 60 dBA are Interstate 5 and Highway 20. Sutter County's Noise Element identifies "noisy" streets as those carrying over 5,000 vehicles per day. With I-5 carrying about 15-18,000 vehicles per day and Highway 20 carrying up to 10,000 vehicles per day (in Colusa), these two highways are the only roads in Colusa County exceeding that volume. The third busiest road, Highway 99 W, seldom exceeds 3,000 vehicles per day.

Isolated segments of road, particularly inclines in the western part of the county, may have higher L_{dn} readings, but generally through unpopulated areas. Other road segments exceeding the 60 L_{dn} level might be present around intersections in towns where truck traffic must stop and start. For instance, the L_{dn} level at the corner of Highway 99 W and County Road 6 in Dunnigan had an L_{dn} reading of 62 dBA (1983, Dunnigan Area Plan). By contrast, the noise level along Highway 45 within Grimes was measured at 54 dBA during a brief sampling period in early 1987.

Of all communities in the county, Arbuckle is the most seriously impacted by traffic noise. While the interstate bypasses Maxwell and Williams, it literally bisects Arbuckle. Noise measurements taken along the freeway south of Arbuckle show an L_{eq} of 75 dBA at the pavement edge, and an L_{eq} of 55 dBA 2,000 feet back from the freeway. Noise measurements were taken at three locations within Arbuckle in 1982 and 1986. The results are summarized below:

<u>Sampling Location</u>	<u>Distance from Freeway Right-of-way</u>	<u>L_{eq} Reading (in dBA)</u>	
		<u>1982</u>	<u>1986</u>
Sixth Street at Eddy	60', freeway at grade	70.5	70.5
Putnam Way at King	30', freeway depressed	68.9	69.5
Sixth Street at Gail	60', freeway at grade	71.0	69.5

The three readings show no substantial change between 1982 and 1986. Sixth Street and Putnam Way provide a buffer on the east and west sides of the freeway right-of-way so that no home directly abuts the freeway. The combination of a depressed road surface and mature street trees along both sides of the freeway help reduce exposure to sound. Nonetheless, there are about 30 homes along Sixth Street and Putnam Way that are subject to noise levels in the range of 70 dBA.

Using standard CalTrans testing procedures, a single family house 400' back from the freeway would receive a sound level of 65 dBA. Drawing such a contour on either side of the I-5 pavement through Arbuckle would encompass about 45 residences on each side of the freeway (including 18 apartments), as well as the town library, Pierce High School, and two churches.

In Williams, there are fewer than five residences within 400' of the freeway. However, the 100-unit County Migrant Labor Camp lies within this zone as does a motel at the I-5/Highway 20 interchange. In Maxwell, there are no homes within 1,000 feet of the freeway pavement and no noise-sensitive uses adjacent to the freeway.

Although noise levels in the city of Colusa have not been mapped, noise contours along Highway 20 are generally between 60 and 70 dBA. Twenty miles to the east in Yuba City, the 65 dBA contour along Highway 20 is about one-half block deep on either side of the roadway. Traffic volumes on Highway 20 in Yuba City are about triple the volumes through downtown Colusa.

Measurements taken prior to the construction of improvements at Colusa Industrial Properties (EIR, 1981) showed a CNEL reading of 68 dBA 100 feet from the Highway 20 centerline and a CNEL reading of 62 dBA 300 feet from the centerline. The latter figure is equivalent to the length of one city block. Other measurements taken at Colusa Industrial Properties indicated the following:

<u>Distance from Hwy 20 Centerline</u>	<u>Noise level exceeded 10 % of the time</u>	<u>Noise level exceeded 50 % of the time</u>	<u>Noise level exceeded 90 % of the time</u>
125 feet	70 dBA	59 dBA	51 dBA
300 feet	65 dBA	50 dBA	49 dBA

In conclusion, traffic noise exceeding 65 dBA affects roughly 15 percent of all Arbuckle residences, and an insignificant number of Maxwell and Williams residences. Traffic noise in the city of Colusa is generally limited to areas within one city block of Highway 20. Several noise-sensitive uses, including the migrant labor camp, public libraries, and schools are affected by traffic noise in the county. The overall impact of traffic noise is softened by the depressed freeway in Arbuckle and the abundance of mature street trees in Arbuckle and Colusa.

Railroad Noise. The Southern Pacific railroad stretches over 30 miles through Colusa County from the Yolo to Glenn County line. The rail line bisects the towns of Arbuckle, Maxwell, and Williams and is abutted by agricultural industries, warehouses, and residences in each of these towns. Between 6 and 9 freight trains use the line in a typical 24-hour period. Railroad noise contours in Dunnigan were mapped in 1981 by Yolo County; since the measurements were for the same rail line under similar topographical conditions, the results may be interpolated to Colusa County:

<u>Sound Level</u>	<u>Distance from tracks</u>
70 dBA	120 feet
65 dBA	260 feet
60 dBA	475 feet
55 dBA	900 feet

Using these parameters, there are 2 homes in Arbuckle within the 70 dBA contour, about 10 homes within the 65 dBA contour, and about 80 homes or apartments within the 60 dBA contour. About 40 of these homes are also affected by high traffic noise from Interstate 5. In Williams, there are 4 homes within the 65 dBA contour and about 27 homes within the 60 dBA contour. In Maxwell, there are 17 homes within the 65 dBA contour and 39 homes (including an 11-unit mobile home park) within the 60 dBA contour.

Airport Noise. The only general aviation facility in the county is the Colusa County Airport. Although there are landing strips throughout the county, they are located in rural, unpopulated areas and are used for cropdusting. There are no residential structures in the landing or take-off paths of the Colusa County Airport. The nearest residential area is about 4,000 feet from the end of the runway, adjoining the Colusa Golf and Country Club.

The 70 dBA CNEL contour surrounding the airport extends approximately 500 feet on either side of the runway. At a distance of 750 feet from the runway edge, the 70 dB contour is about 500 feet wide, and at a distance of 1,500 feet from the runway edge, the contour is about 250 feet wide (1974 Colusa County Noise Element). Since these figures are based on a "typical" general aviation airport and not on actual monitoring at Colusa County Airport, noise sampling in the vicinity of the airport is recommended.

Agricultural/Industrial Noise. The most extensive noise monitoring for agricultural-industrial uses in the county was done in January, 1985 in the 14th Street area of Colusa. This is one of the few areas in the county where a large concentration of noise-producing uses is intermixed with residential uses. Five 12-minute samples were taken in the vicinity of a wood fabrication plant, a PG &E maintenance yard, a rice drying and storage operation, two packing sheds, and a cement batch plant. Noise levels ranged from 45.6 to 55.0 dBA (L_{eq}). Heavy trucks and rice dryers were the primary noise sources.

60 dBA L_{dn} noise contours were mapped around the sources described above, assuming peak harvest activity. A number of homes fall within these contours, generally within 400 feet of the rice dryers or between 100-300 feet of the batch plant and wood fabrication plant.

Noise testing at the Cargill Rice Dryers in Grimes was performed in February, 1987. Using a 214 Sound Level Meter, noise levels were measured with the blowers on and off for short time periods. Results are summarized as follows:

<u>Distance from the Dryers</u>	<u>Noise Level (L_{eq})</u>
Blowers On:	
50 feet	77.5 dBA
100 feet	71.5 dBA
150 feet	69.0 dBA
200 feet	66.0 dBA
500 feet (75' South of Hwy 45)	61.5 dBA
Blowers Off:	
400 feet (Highway 45)	54.0 dBA

The blowers operate continuously for about four months a year. Given the low ambient noise level in Grimes, the data suggests that residential uses are not appropriate within about 500 feet of the dryers unless mitigating measures such as extra insulation or sound walls are provided.

Future Noise Environment

Traffic Noise. The land use and circulation plans have consciously been shaped to minimize traffic noise conflicts in the future. One of the major issues in developing each community plan was relating new development to the projected noise environment. Noise-sensitive uses have generally been sited away from Interstate 5 and Highway 20, which will continue to be the county's most heavily traveled roadways.

A projected 70 percent increase in traffic volumes between 1985 and 2010 will result in wider noise contours along both sides of the interstate. This will exacerbate noise problems in Arbuckle, where a greater number of homes will be subject to freeway noise. Although traffic noise will increase along the interstate through Williams and Maxwell, the adjoining lands are planned for commercial and industrial uses.

Construction of a Highway 20 bypass will improve noise conditions in the city of Colusa. Since the bypass is planned south of the abandoned railroad embankment and

the nearest "Urban Residential" area is about 1000' from the proposed alignment, no major noise problems should result when the bypass is built. Urban Residential development is planned along a half-mile segment of Highway 20 in Williams. Some combination of berms, landscaping, sound walls, setback requirements, and insulation should be used to ensure an acceptable noise environment for new homes in this area.

Increases in traffic noise will occur within planned industrial areas, particularly in Williams and Maxwell. The Environmental Impact Report (EIR) for the Plank Industrial Park (Williams Industrial Properties) projected that by the year 2010, noise levels would increase from 73 dBA to 80 dBA along I-5, from 63 dBA to 70 dBA along State Route 20, and from 55 dBA to 70 dBA along Husted Road. However, the EIR estimated that noise volumes within the developed part of Williams, about a mile away, would only increase by about one dBA as a result of the project.

Railroad Noise. No major increases in railroad use are forecast between now and the year 2010. If rail spurs are constructed within planned industrial areas, noise impacts on nearby areas should be studied. If it is found that the rail spurs could increase noise levels in nearby residential areas to unacceptable levels, measures should be taken to mitigate the impacts.

Airport Noise. As population and employment increase in the county, air traffic at the Colusa County Airport will also increase. Although commercial flight service is not likely, the use of executive jets at the airport may become common during the next 20 to 25 years. Given the amount of land planned for industrial growth in Colusa, Williams, and Maxwell, demand for better air freight facilities could also increase substantially. The combination of increased traffic, executive jet service, and air freight service will necessitate expansion of the airport before the year 2010. In response, a 900-foot extension to the existing 2,800-foot runway has been tentatively planned.

Use of executive jets at the airport could increase the 70 dBA contour from 2,000 feet beyond the end of the runway to about 6,000 feet. The width of the 70 dBA contour could increase from 500' to 1750' at a distance of 800 feet beyond the runway and from 250' to 1,250' at a distance of 1,600 feet beyond the runway (1974 Colusa County Noise Element). Thus, it is important that the runway extension be to the south of the existing airport and not to the north as originally proposed. A southward extension would permit acceptable noise conditions to be maintained in both existing and planned development areas between now and the year 2010. Additional studies of noise impacts are recommended before undertaking any airport improvements.

It is assumed that the number of landing strips in the county will remain about the same between now and the year 2010. Noise from planes taking off and landing at these strips should not increase significantly over the next two decades. No urban development has been planned near existing landing strips, although the strip to the west of Williams is not far from a planned rural residential area. Depending on the pace of development west of Williams, relocation of the strip may become necessary by the year 2010.

Industrial Noise. The land use plan encourages the separation of residential and industrial uses to avoid noise incompatibility. Where such uses abut one another, "light" industry producing relatively low noise levels is recommended. In some areas, such as 14th Street in Colusa, buffer zones of light industry or office uses are planned between existing heavy industrial areas and residential areas. Depending on

future zoning in existing heavy industrial areas, issuance of a use permit to modify the building could be conditioned upon certain noise reduction measures. In areas that are not yet developed, performance standards and design guidelines should be followed to ensure that sound levels in nearby areas do not exceed the standards set in this element.

Mineral Extraction Noise. Some concern has been expressed about the noise generated by mining or quarry operations. Although mining activity in the county is relatively light, it could increase substantially in the future. The blasting, milling, and truck use associated with mineral extraction can be particularly disruptive because the areas where extraction occurs are usually isolated and noise-free. Noise in these areas may scare wildlife, disturb recreational activities, and annoy rural area residents.

The Environmental Impact Statement (EIS) for the McLaughlin Mine near the Lake/Yolo/Napa County border indicated that a proposed gold mining operation would result in L_{dp} noise levels of 74 dBA 1,000' from the mine, 66 dBA 2,000 feet from the mine and 55 dBA 5,500 feet from the mine. Moreover, 55 dBA noise contours along rural roads to the site would move from 55' back from the pavement edge to as far as 100' back.

Although no specific mining proposals have been made in Colusa County, these figures are provided to illustrate the widespread noise impacts that result from such activities. In the case sited above, just 7 miles from the Colusa County line, noise from a single mining operation would affect a three square mile area.

Noise Abatement Program




Noise Standards. Compatibility between new land uses and activities should be ensured in the future by adhering to the standards shown in Table SAFE-3. These standards have been developed in accordance with guidelines published by the California Department of Health Services, Office of Noise Control. They identify the levels of noise which are compatible with activities common in different land use categories. Recommended interior noise levels reflect the levels of sound required to carry out normal activity in each of the specified types of space. These standards should be periodically re-evaluated and revised, if necessary.

Table SAFE-3 identifies three separate levels of standards for noise exposure: normally acceptable, conditionally acceptable, and normally unacceptable.

- o **Normally acceptable** noise levels are those which pose no threat to the specified use. Standard construction techniques would reduce external noise so that the interior noise level would not disrupt activities.
- o **Conditionally acceptable** noise levels are those in which standard building construction would not be adequate to protect the land use. However, standard mitigation measures such as noise barriers, site design to protect sensitive uses, architectural design to protect noise-sensitive activities, or acoustical insulation could easily be employed to achieve acceptable sound levels.

Table SAFE-3: Noise/Land Use Compatibility

LAND USE CATEGORY	RECOMMENDED NOISE LEVELS, L _{dn} (dBA)							INTERIOR, MAX.
	EXTERIOR RANGE							
	50	55	60	65	70	75	80	
Residential:								
Low Density								45
Medium to High Density								45
Commercial:								
Hotel								50
Office								55
Restaurant, Retail								60
Other								65
Industrial:								
Light Industrial								55
Manufacturing								50
Other								70
Public/Quasi-Public:								
School, Library, Church, Hospital, Theater								45
Other								55
Open Space:								
All Categories								--

- KEY:
-  **NORMALLY ACCEPTABLE**
Specified land use is acceptable, assuming standard building construction.
 -  **CONDITIONALLY ACCEPTABLE**
Standard building construction is not adequate for specified land use; however, mitigation measures may be easily employed to reduce noise to acceptable levels. An analysis of the measures by a qualified acoustical professional is required, to be approved by the County.
 -  **NORMALLY UNACCEPTABLE**
The specified land use should be discouraged unless the County finds the project to be in the public interest and a detailed analysis by a qualified acoustical professional shows that specific measures which are to be included in the project would reduce indoor and outdoor noise to acceptable levels. The analysis and attenuation measures must be approved by the County.

- o **Normally unacceptable** noise levels are those for which simple mitigation measures would not be adequate. The specified land uses would not be appropriate in these areas unless major noise attenuation measures have been designed into the project by a professional who is competent in sound reduction and unless a detailed noise study has been conducted to assure the performance of the design. Construction of the specified use should be strongly discouraged in areas with these levels. For residential uses, construction would be "normally unacceptable" where sound levels exceeded 65 dBA for more than 8 hours a day.

Mitigating Noise Impacts. As illustrated in Table SAFE-4, standard building construction provides some noise reduction from outside to inside. The Federal Highway Administration has developed a manual to further reduce highway noise through a combination of techniques. While these techniques are most useful for new construction, they also may be used to retrofit existing buildings in unacceptably high noise environments.

- o **Site Planning.** The arrangement of buildings on a site can be used to minimize noise impacts. Four primary techniques are used: (1) increasing the distance between the noise source and the receiver; (2) placing non-residential land uses such as parking lots, maintenance facilities, and utility areas between the source and receiver; (3) locating non-residential buildings parallel to the noise source so that they act as a sound barrier (a 2-story building can reduce noise levels on the side of the building away from the noise source by about 13 dBA); and (4) orienting the noise-sensitive areas away from the noise (doubling the distance from a noise source can reduce its intensity by as much as 6 dBA).
- o **Architectural Design.** Noise impacts can be reduced by separating more noise-sensitive rooms from less noise-sensitive rooms, and locating the more noise-sensitive rooms furthest away from the noise source. In residences, bedrooms, living rooms, and dining rooms are most noise-sensitive; kitchens and bathrooms are less so. Solid walls or reduced window areas in the area of the noise source can cut down the amount of noise reaching the receiver.
- o **Acoustical Construction.** Noise can be intercepted as it passes through the walls, floors, ceilings, and doors of a building. Walls provide building occupants with the most protection from exterior noise. The amount of noise protection can be increased through greater wall mass and stiffness, use of cavity partitions, increased airspace, increased stud spacing, use of staggered studs, use of resilient materials to hold the studs and panels together, addition of acoustical blankets, and sealing of cracks and edges.

Windows are one of the acoustically weakest points of a wall. Reduced window size, increased glass thickness, and use of double-glazed windows will decrease the amount of sound entering through windows. Doors are acoustically even weaker than windows. By using solid core doors rather than hollow core doors, vinyl seal around the edges, and gasketed stops, sound penetration can be reduced. Beamed ceilings can be acoustically reinforced by adding a layer of fiberglass or other noise-resistant material.

Overall interior noise levels can be reduced by extensive use of thick, heavy carpeting, drapes, wall hangings, and acoustical ceiling tiles. They

Table SAFE-4: Approximate Noise Reduction Provided by Buildings

<u>Building Type</u>	<u>Noise Reduction due to Building Structure (dBA)</u>
All	10
Light frame, closed windows	20
Masonry, single-glazed windows	25
Masonry, double-glazed windows	35

<u>Portion of Exterior Wall with Open Windows</u>	<u>Noise Reduction of Wall (dBA)</u>
1%	17
2%	14
4%	11
8%	8
16%	5
32%	2
50%	0

Source: Federal Highway Administration (Bolt Beranek and Newman, Inc.), Fundamentals and Abatement of Highway Traffic Noise, June 1973, p. 1-35.

cannot reduce the sound entering the building, but they can reduce overall noise levels by reducing sound reverberations. Psychological noise attenuation can be accomplished by masking noise. Techniques include air conditioning, music, the sound of running water, or anything which reduces perceived fluctuations in noise.

- o **Barriers.** A noise barrier is an obstacle placed between a noise source and receiver to interrupt the path of the noise. They can be constructed as earth berms, walls, fences, or dense plantings of shrubs and trees. A berm provides noise attenuation of up to 15 dBA if it is several feet higher than the "line of sight" between the noise source and the receiver. Walls serve the same function with the same results. Landscaping is not as effective acoustically, but is generally the most aesthetically pleasing. Often a combination of these methods proves to be the best solution.

SAFETY POLICIES

HAZARD REDUCTION POLICIES

Flood Protection

- SAFE-1 Flood plains should generally be maintained as open space. In these areas, their use for agriculture, recreation, preservation of vegetation and wildlife habitat, and scenery should be encouraged.
- SAFE-2 Urban development should be discouraged in the 100-year flood plain. Any habitable structure which is permitted shall be built so that the first floor of living area is above the 100-year flood elevation.
- SAFE-3 No critical or high-occupancy structures such as schools, hospitals, police facilities, or fire stations should be built within the 100-year flood plain.
- SAFE-4 The county should support coordinated efforts to maintain levees along the Sacramento River and the 2047 canal.
- SAFE-5 Flood control policies in the Community Services Element should be supported to reduce the hazards associated with flooding.

Geologic Hazard Protection

- SAFE-6 No development shall take place on or immediately adjacent to an existing landslide unless a geotechnical investigation has been performed. This investigation shall define slide activity and slide limits, and contain specific recommendations regarding avoidance, removal, or repair. The County Planning Department should maintain a map showing the general location of existing landslides for reference by development sponsors. The determination of the location of a landslide relative to a proposed development and the preparation of any geotechnical report shall be the responsibility of the development sponsor.

- SAFE-7 A geotechnical investigation should be performed for any development proposal in an area of known subsidence in order to determine whether engineering modifications should be made to the design to eliminate or mitigate the adverse impacts. The county may also require a geotechnical investigation for any development proposed on highly expansive soils.
- SAFE-8 Timber management, grazing and excavation practices in the western portion of the county which will minimize erosion and landslide potential should be supported by the county.

Wildfire Protection

- SAFE-9 Efforts to reduce or eliminate fire hazards should be supported, provided that they do not adversely affect the county's other natural resources.
- SAFE-10 An adequate water source for fire protection purposes shall be ensured prior to development in high or moderate fire hazard zones.
- SAFE-11 Fire protection policies in the Community Services Element should be supported to reduce the hazards associated with wildfire.
- SAFE-12 Reservoirs for firefighting purposes should be maintained by major industrial developments if located in high or moderate fire hazard zones (e.g., mineral extraction operations in the western county).

Injection Wells

- SAFE-13 Further study of the environmental impact of injection wells should be encouraged.

Noise

- SAFE-14 New projects should be conditioned, improved, or denied according to the standards of Table SAFE-3. When necessary, environmental impact reports should be used to gauge the existing and projected noise environments for proposed projects. All projects in areas above the "conditionally acceptable" noise level should provide the county with proof from a professional acoustical consultant that occupants of the project will be protected from excessive noise.
- SAFE-15 New land uses that produce high levels of noise should not be allowed to encroach upon noise-sensitive uses. Concurrently, new noise-sensitive land uses should be discouraged near uses that produce high levels of noise, including transportation routes.
- SAFE-16 When development occurs adjacent to noise generators (such as highways or railroads), noise abatement practices should be used to improve the ambient noise environment. Such abatement practices include noise barriers, site planning, architectural design, and acoustical construction.

- SAFE-17 The planning and design of local, collector, and arterial streets should consider the noise impacts on adjacent uses and include measures to mitigate significant impacts.
- SAFE-18 Housing, hospitals, schools and other noise-sensitive uses should be designed with careful consideration given to projected noise from surrounding roadways, railroads, and development.
- SAFE-19 Colusa County should support state and federal legislation that reduces the detrimental impacts of noise, as well as state and federal funding programs for the construction of noise barriers or insulation of buildings. A likely result will be noise reductions from sources over which the county has no control or responsibility; for example, legislation may call for noise-attenuating road surfaces on federally supported highways.
- SAFE-20 Colusa County should enforce state and federal laws which prohibit the operation of vehicles equipped with illegal or faulty exhaust systems.
- SAFE-21 New development should be encouraged to follow site planning practices which create quieter environments.
- SAFE-22 Activities which would unnecessarily disturb the peace and quiet of neighborhoods or cause unusual discomfort or annoyance should be prohibited. Regulation of non-vehicular noise (construction, air compressors, manufacturing, loud music) should be encouraged to avoid disturbing adjacent uses.

SAFETY IMPLEMENTATION POLICIES

- SAFE-23 The County Planning Department and the Office of Emergency Services should maintain hazard maps to aid in the review of development proposals and in the development of emergency response plans. Such maps shall illustrate potential flooding, dam inundation, landslides, subsidence, and wildfire threats.
- SAFE-24 The county should work with flood control districts, the Department of Water Resources, the State Office of Emergency Services, and the Federal Emergency Management Agency to develop coordinated responses to flood emergencies. The county should coordinate with local fire protection districts, the California Division of Forestry, and the U.S. Forest Service for protection from wildfires.
- SAFE-25 Known hazard information should be reported as part of every General Plan amendment, zoning change, or use permit approval.
- SAFE-26 Development proposals in potential hazard areas should be referred to appropriate agencies for review and recommendations.
- SAFE-27 The county should encourage the State Department of Mines and Geology and the State Department of Water Resources to further investigate the cause of subsidence in eastern Colusa County in order to develop a plan to prevent further subsidence and correct existing problems, if possible.

- SAFE-28 The county should support State investigations of earthquake faults and other seismic hazards in the Sacramento Valley and Coast Range. Earthquake preparedness should remain an active part of the county's Emergency Response Program.
- SAFE-29 Emergency shelters and first-aid centers should be designated in the communities of Maxwell, Williams, and Arbuckle in public facilities outside of the 100-year flood plain. Primary emergency shelters and first-aid centers should be established at the high schools in these communities. Williams High School should be opened first, and should serve as a coordinating center. If necessary, secondary emergency shelters could be opened at elementary schools or other public facilities in those communities.
- SAFE-30 The county should develop regulations for injection wells to ensure that saline water does not leak into groundwater and toxic substances are not injected into the wells. Such measures could be attached to permits to operate the wells, and may include the following:
- o Allow the county to randomly check substances prior to injection, and permit up to five tests per year to determine the composition of the substances.
 - o Require operators to maintain a log of injections to be made available to county inspectors.
 - o Require operators to secure well facilities and storage tanks against unauthorized access.
 - o Require operators to pay for tests of existing wells within one-quarter mile of an injection site, if requested by a county inspector, to determine the extent of possible contamination.
- SAFE-31 Colusa County should conduct noise sampling and prepare noise contour maps for unincorporated areas along Highways 20 and Interstate 5, for the Colusa County Airport, and for major point sources of noise such as rice dryers and concrete batch plants. These maps should be kept on file in the County Planning, Public Works, and Environmental Health Departments and should be referenced in the evaluation of all future development. The cities of Colusa and Williams should be encouraged to take similar action.
- SAFE-32 As a practical matter, projections of future noise levels should only be required in commercial, industrial, and mineral extraction developments, in large residential developments that will generate substantial traffic volumes, and in developments close to a known source of noise exceeding noise control standards.
- SAFE-37 Colusa County shall adopt a county noise ordinance which regulates noise from residential and non-residential sources and defines limits of acceptable noise, time of day and duration characteristics, and the location of the noise source relative to sensitive uses and activities.

SAFE-38 The Airport Advisory Committee should function as the county Airport Land Use Commission (ALUC). This Committee should, among other things, determine noise compatibility guidelines for land uses in the approach and take-off zones around Colusa County Airport. The Committee should prepare an airport master plan which includes existing and projected noise contours greater than 60 dBA in 5 dBA intervals.

