

CHAPTER V

SAFETY

A. INTRODUCTION AND PURPOSE

The State of California requires the County to prepare and adopt a Safety Element as part of the General Plan (Government Code, Title 7, Sections 65302 (f) and 65302.1). This Safety Chapter of the General Plan combines and updates information and policies contained in the earlier safety and seismic safety elements which were adopted by the County in 1974. As with the other chapters of this year 2000 General Plan, this chapter primarily satisfies the Government Code requirements and discusses local issues unique to Merced County.

The purpose of the Safety Chapter is to identify the various hazards impacting the County, and to provide policies for the protection of County residents and properties from unreasonable risks associated with these hazards. The most significant hazards identified in this chapter include seismic activity and related impacts; slope instability; geologic hazards such as subsidence; flooding; and fires. Emergency evacuation routes are identified in relation to various hazards. Several of these topics are also covered in other chapters of the General Plan including the Land Use, Open Space/Conservation and Agricultural chapters. However, the focus of the topics is somewhat different from that discussed in the Safety Chapter.

Environmental Setting

It is important to understand the County's environmental setting in order to recognize the hazards described in this chapter.

Merced County is located near the geographic center of California in the San Joaquin Valley and is bordered by two mountain ranges, the Sierra Nevada to the east and the Diablo Range to the west. Small intermittent streams enter the Valley from the semi-arid mountains of the Diablo Range, some are lost on alluvial fans, while others have been dammed to form reservoirs for irrigation. Perennial rivers flow from the more humid and larger drainage areas of the Sierra Nevada and these have also been dammed for irrigation. In the past, water spread over these drainage areas depositing sand, silt and clay and built up large alluvial fans along each side of the Valley. The larger and more gently sloping fans on the east side are built up principally by deposits from granitic rock sources which have created extensive foothills, rising to approximately 500 feet above sea level. The coastal range on the western County border reaches elevations of 3000 feet and dips steeply under the alluvial fans of the Valley. Alluvial fans on the westside generally have steeper slopes and have been built up by materials originating in the sedimentary rocks of the coastal range. As a result, there is an abrupt boundary between mountains and

valley with hardly any transitional foothill belt.

The Valley floor is made up of alluvial materials from both ranges which are reflected in the soils. The Valley is barely above sea level and because of this, much of the runoff from the two ranges and elsewhere in the Valley, has created rivers, a high water table and extensive wetlands.

B. SAFETY CHAPTER ISSUES

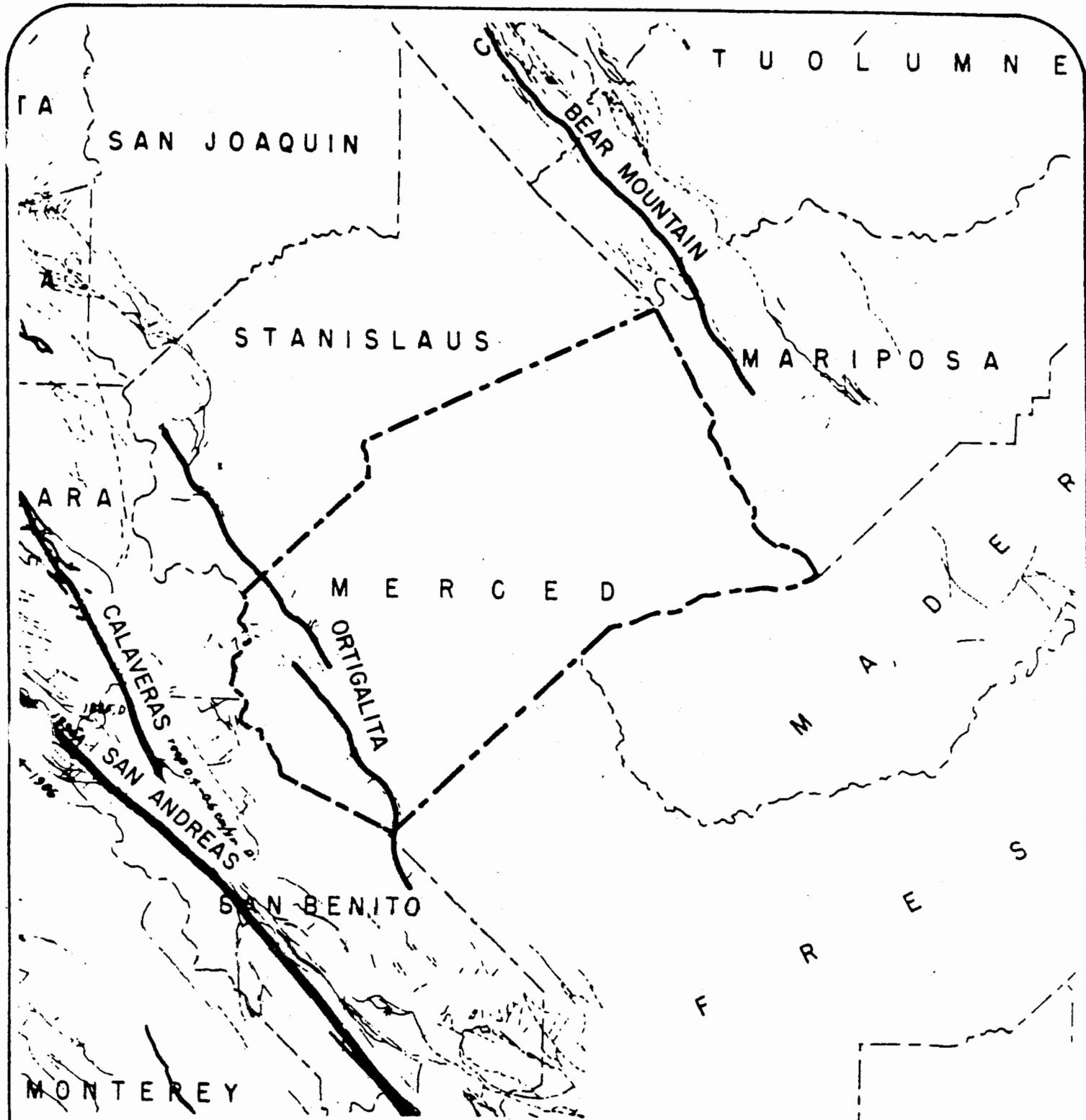
1. Seismic Safety

a. Ground Shaking

The nearest faults of major historical significance are the San Andreas to the west of Merced County, a distance of approximately 15 miles from the County line; the Hayward and Calaveras faults to the northwest; the White Wolf, Garlock, and Sierra Nevada faults to the south, and the Bear Mountain Fault Zone about 5 miles east of and parallel to the eastern border of Merced County (Map 10). These faults have been in the past, and will continue in the future to be the principal source of seismic activity affecting the County of Merced.

The only fault known inside our County is the "Ortigalita", also known as the "Telsa-Ortigalita Fault", located in the western quarter of the County, dissecting the Coast Range in a northwesterly direction. This fault has not been active in historic times, however, there is no guarantee that it will never become active again.

While there is no record of any seismic activity originating in the County (other than tremors on the west side, close to the Ortigalita Fault), the County has been shaken by earthquakes originating elsewhere. There is documented evidence of six earthquakes that shook the area, those of 1872, 1906, 1952, 1966, 1984, and 1989. It is quite likely that other quakes were felt here, but local reports are not available. The County of Merced has been very fortunate in the past and has not suffered any loss of life. However, major damage occurred in Los Banos in 1906, with minor structural damage recorded throughout the County on other occasions. Urbanized areas are now much larger and many more people would be subject to impacts. The possibility of future earthquakes of equal or greater magnitude than those mentioned could cause a great many casualties and extensive property damage in the County. This could be aggravated by aftershocks and by secondary effects of fire, landslides and dam failure. Ground settlement may also occur in unconsolidated valley sediments, many of which are saturated with water. These sediments represent the poorest kind of soil condition for resisting seismic shock waves. The changes that occur, such as liquefaction and loss of strength in fine-grained materials, can result in ground cracking, unequal settlement, subsidence and other surface changes.



Geologic Faults in and Adjacent to Merced County

SOURCE: California Division of Mines & Geology - 1971

MAP 10

MERCED COUNTY
YEAR 2000 GENERAL PLAN



There are various land use controls or methods for addressing seismic hazards. Avoiding a hazard such as a fault zone may be the best solution when planning new land uses. The Alquist-Priolo Earthquake Fault Zoning Act (1973) was created to prohibit the location of most structures for human occupancy across the traces of active faults, thus lessening the hazard of fault rupture. Cities and counties affected by the zones must regulate certain development "projects" within the zones and withhold development permits until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting. Merced County has one such earthquake fault zone which is in the vicinity of the San Luis Dam. There are no known habitable structures that have been constructed or proposed in this zone and the County will process development permits in compliance with California law.

b. Ground Failure

A great deal of soil compaction and settlement can also result from seismic groundshaking. If the sediments which compact during an earthquake are saturated, water from voids is forced to the ground surface, where it emerges in the form of mud spouts or sand boils. If the soil liquefies in this manner (liquefaction), it loses its supporting capacity with the result that structures may settle into the ground. The extent of damage ranges from minor displacement to total collapse.

Engineering treatment of either the ground or structures or both can sometimes stabilize hazards, such as liquefaction. However, these solutions are often temporary and high cost may not justify their use. Other alternatives include land use restrictions or controls through special ordinances. Regulating the type or density of use in a given area can be effective in handling potential hazards. Agriculture, recreation or other open space uses are more acceptable than residential or commercial uses for seismic hazard areas. Similarly, certain low occupancy uses may be acceptable in some risk areas, whereas high occupancy uses or critical facilities (schools, hospitals) may not be.

Although no specific liquefaction hazard areas have been identified in the County, this potential is recognized throughout the San Joaquin Valley where unconsolidated sediments and a high water table coincide. It is reasonable to assume that liquefaction hazards exist in many of Merced County's wetland areas which are identified in the Open Space/Conservation Chapter. The County's wetlands are generally adjacent to the San Joaquin River and extend west to the Southern Pacific Railroad and east toward State Highways 99 and 59 south.

c. Building Collapse

Among buildings that have a history of poor performance in past earthquakes

are unreinforced masonry (URM) buildings and buildings located in geologically hazardous areas which are then subject to earthquake fault displacement, landslide or soil liquefaction. URM buildings are considered the foremost threat to life. Although not every URM building will collapse in a significant earthquake, a large number of them will have some degree of life-threatening failure. For URM buildings identified as critical facilities, such as fire stations and hospitals, this potential threat is more significant as these structures are needed during the response to emergencies.

Recognizing the danger posed by a significant number of potentially hazardous buildings in California, the state legislature enacted the Unreinforced Masonry Building Law in 1986, (Senate Bill 547 [Alquist]; Government Code Section 8875). The law requires cities and counties in Seismic Zone 4 to identify and inventory certain older and potentially hazardous buildings by 1990. Merced County is located in Zone 3 and is therefore not subject to the 1990 deadline. However, it would improve the safety of County residents if this law was used to guide local efforts in identifying hazardous buildings. This inventory could conceivably be accomplished by the year 2000. The State Seismic Safety Commission has stated that jurisdictions which choose to address hazards beyond those of URM buildings will further reduce death, injury and economic loss and will help protect California's architectural and historic resources from earthquake hazards. With respect to new construction, the Uniform Building Code requirements for Seismic Zone 3 are applied to all development in the County.

The State Division of Mines and Geology has published a map of maximum expectable earthquake intensities for California. There are two severity zones statewide, both of which can be found in Merced County (See Map 11). In contrast to the seismic zones used for building code compliance, these "intensity zones" identify the severity of damage expected should an earthquake occur. Emergency response actions during an earthquake are explained in Section B.7 of this Chapter.

2. Dam Failure/Seiche

Protection from flood hazards created by dam failures is critical to the safety and well-being of Merced County residents. It is important to be familiar with dam construction and related geologic characteristics in order to recognize potential hazards. Dam failures can result from a number of natural or man-made causes such as earthquakes, erosion, improper siting, rapidly rising flood waters and structural/design flaws.

There are three general types of dams: earth and rockfill, concrete arch or hydraulic fill, and concrete gravity. Each of these types of dams has different failure characteristics. The earth-rockfill dam will fail gradually due to erosion of a breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. A concrete arch or hydraulic fill dam will fail almost instantaneously; creating a very rapid flood buildup to a peak and

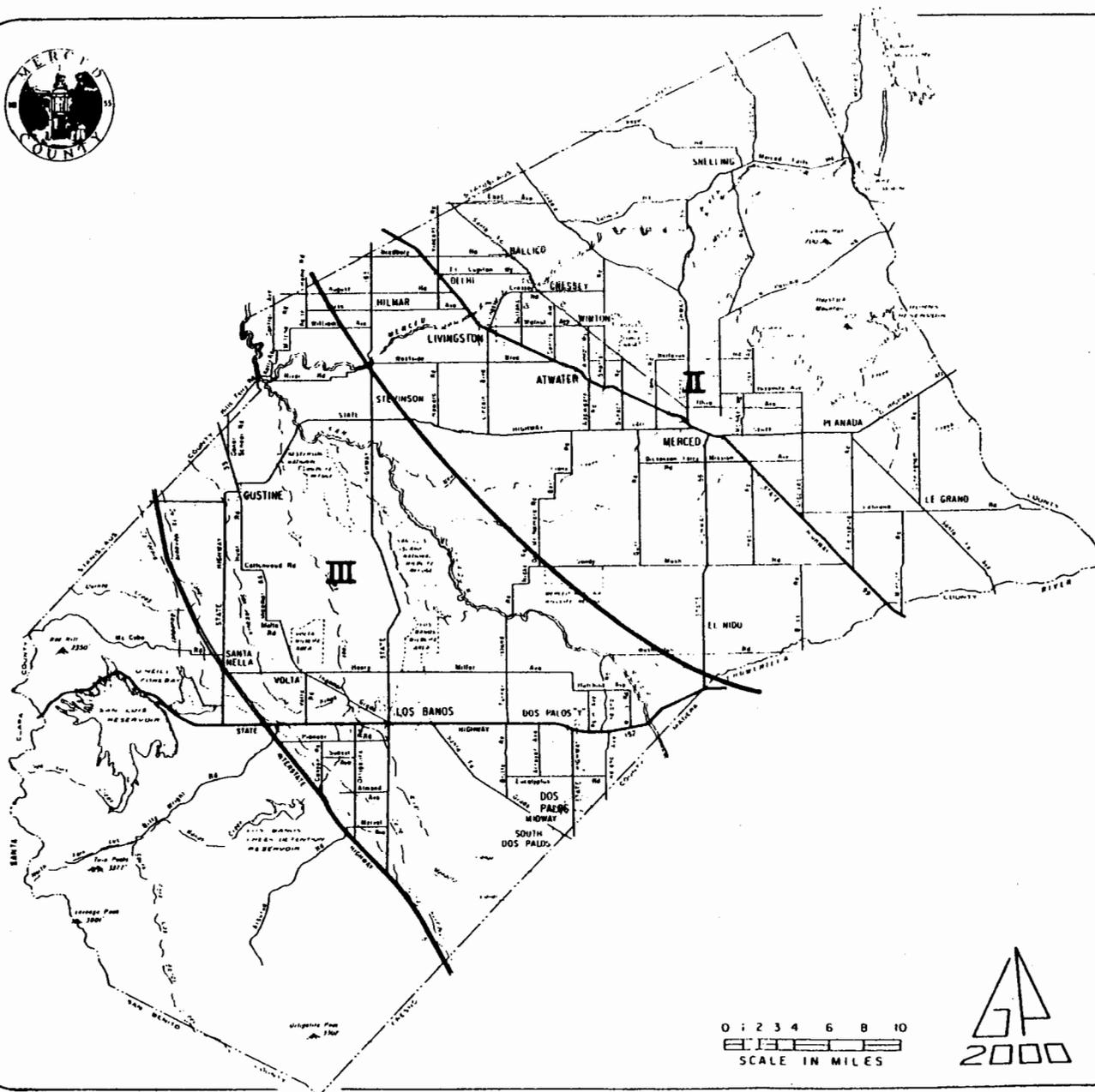
then a gradual decline. A concrete gravity dam will fail somewhere in between instantaneous and gradual, with corresponding buildup of a flood wave.

In addition to the above mentioned characteristics, warning ability is generally determined by the frequency of inspections for structural integrity, the flood wave arrival time (the time it takes for the flood wave to reach its maximum distance of inundation), and the ability to notify persons downstream and their ability to evacuate. The existence and frequency of updating and exercising an evacuation plan that is site-specific assists in warning and evacuation functions.

A dam failure can cause loss of life, damage to property, and other ensuing hazards, as well as the displacement of persons residing in the inundation path. Damage to the electric generating facilities and transmission lines associated with hydro-electric dams, could also impact life support systems in communities outside the immediate hazard areas.

A catastrophic dam failure, depending on the size of the dam and population downstream, could exceed the response capability of local communities. Damage control and disaster relief support would be required from other local governments and private organizations, and from the State and Federal governments. This "mutual aid" could consist of mass evacuation of the inundation areas, search and rescue operations, emergency medical care, food distribution and temporary shelter for injured or displaced persons. State and Federal assistance could be required and may continue for an extended period of time. These efforts would be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and welfare for the affected population including temporary housing for displaced persons.

There are eleven major dams either in or adjacent to Merced County with known populations in their respective inundation areas. Virtually no urban area in the County is free from flooding in the event of dam failure. This vulnerability warrants a program to educate the general public of impending danger and existing evacuation plans. Maps of existing dams and potential inundation areas are found in Maps 12a to 12c. This information is also presented in the County's Multi-Hazard Functional Plan prepared by the Office of Emergency Services (OES). The OES is the County's centralized emergency response agency responsible for organizing and directing emergency services and disaster programs. This agency comes under the administration and management of the California Department of Forestry who has also been contracted by the County to provide fire fighting services. The OES receives updated dam inundation information from the State Office of Emergency Services and is responsible for identifying evacuation routes based on this data. The OES will also receive inundation information after construction of new dams (which may include two proposed dams within the County - Castle and Los Banos Grandes).



Maximum Expectable Earthquake Intensity

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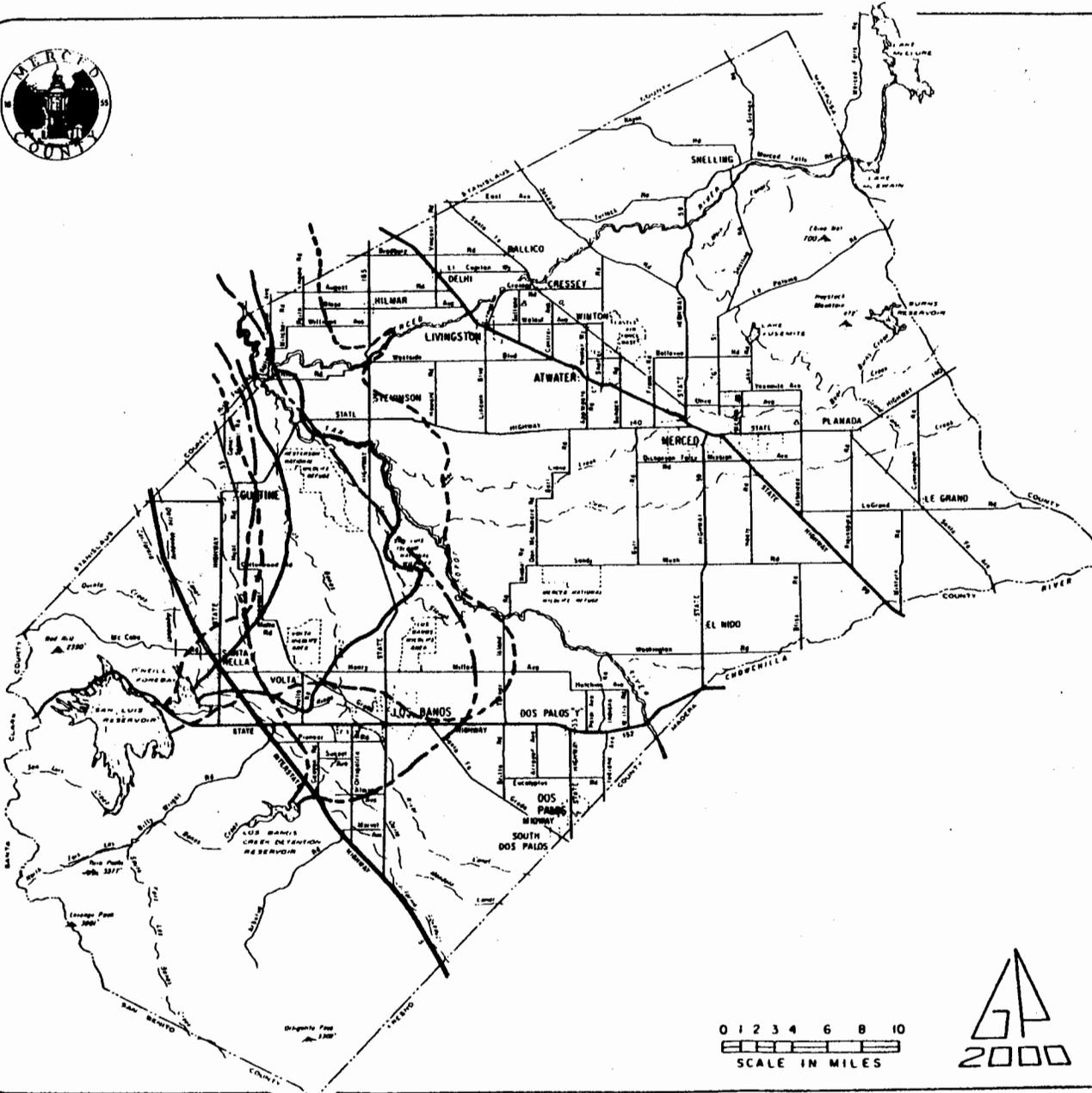
- II MODERATE SEVERITY MODERATE PROBABLE DAMAGE
- III HIGH SEVERITY MAJOR PROBABLE DAMAGE

SOURCE: California Division of Mines and Geology.

0 2 4 6 8 10
SCALE IN MILES



MAP 11
MERCED COUNTY
YEAR 2000 GENERAL PLAN



Potential Dam Failure Inundation Areas

LEGEND:

- SAN LUIS RESERVOIR
- O'NEILL FOREBAY
- - - - LOS BANOS CREEK DETENTION RESERVOIR

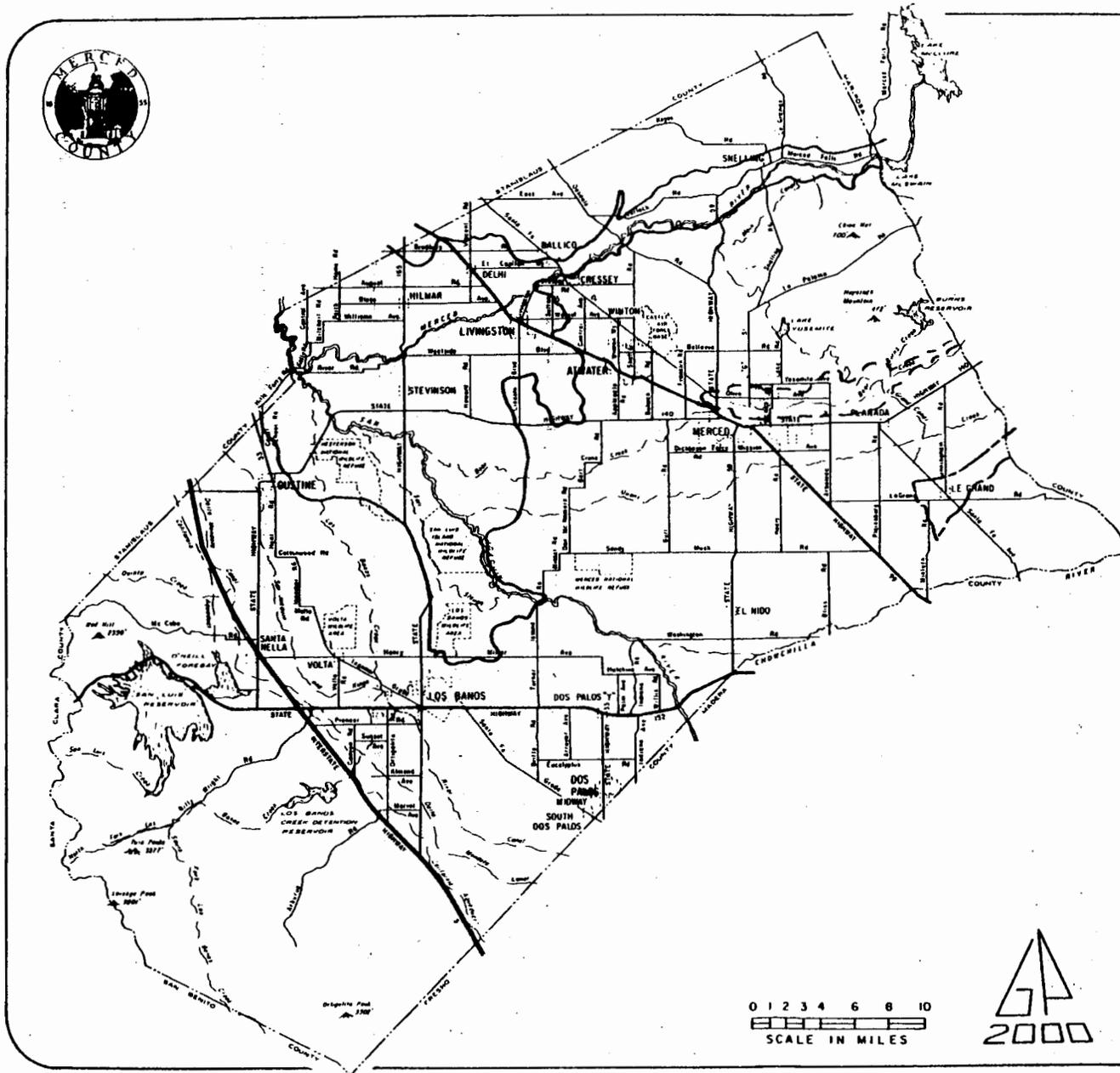
0 1 2 3 4 6 8 10
SCALE IN MILES



SOURCE: Merced Irrigation District and U.S. Army
Corp. of Engineers February 1987

MAP 12a

MERCED COUNTY
YEAR 2000 GENERAL PLAN



Potential Dam Failure Inundation Areas

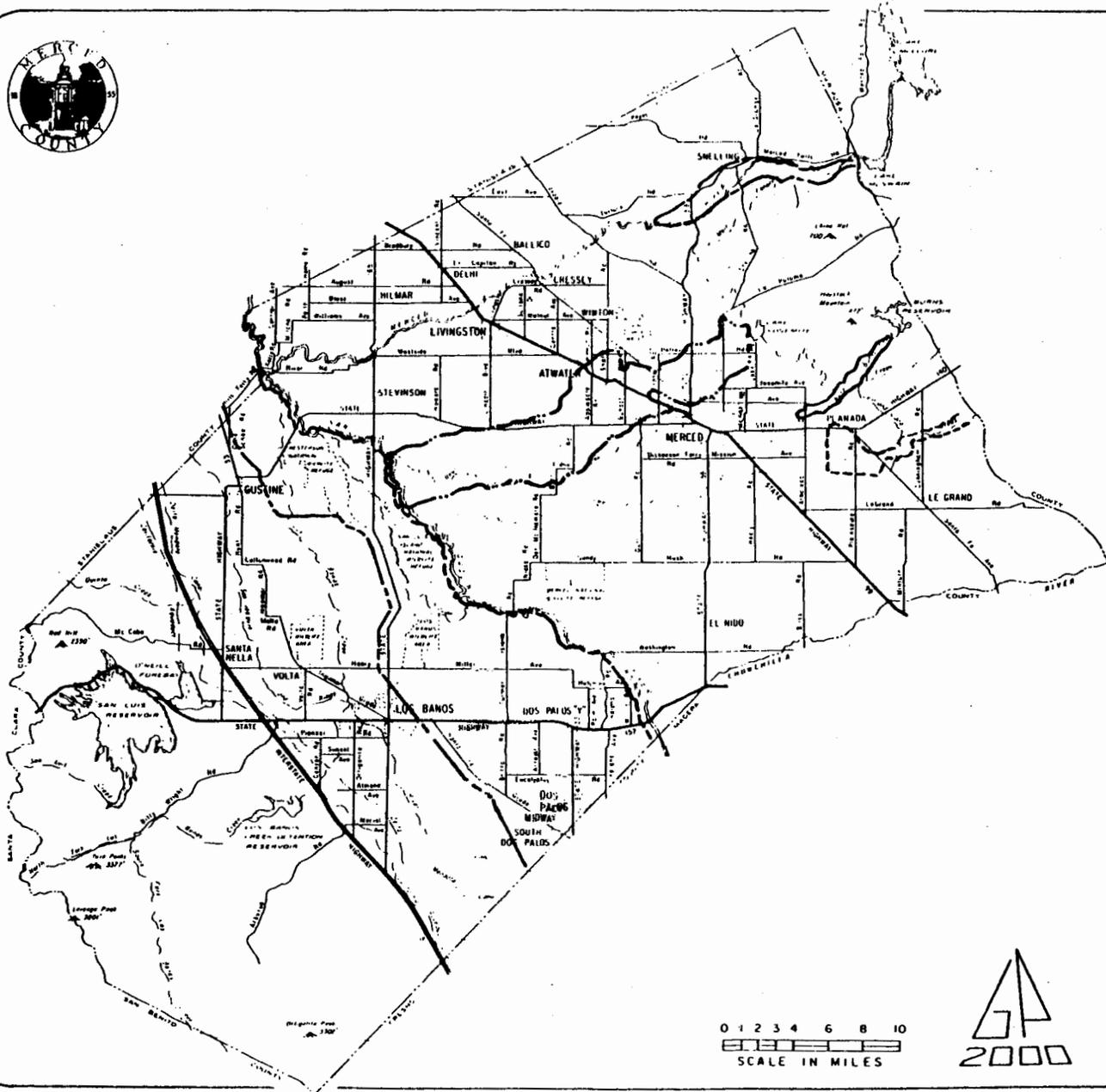
LEGEND:

- MCCLURE RESERVOIR
- BEAR RESERVOIR
- MARIPOSA RESERVOIR

SOURCE: Merced Irrigation District U.S. Army Corp. of
Engineers February 1987

MERCED COUNTY
YEAR 2000 GENERAL PLAN

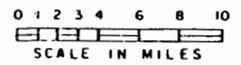




Potential Dam Failure Inundation Areas

LEGEND:

- MCSWAIN RESERVOIR
- LAKE YOSEMITE
- BURNS RESERVOIR
- LITTLE PANOCHÉ RESERVOIR
- OWENS RESERVOIR



SOURCE: Merced Irrigation District and U.S. Army Corp. of Engineers June 1977

MERCED COUNTY **MAP 12c**
YEAR 2000 GENERAL PLAN

The probability of dam failure is heightened by seismic activity in the vicinity of major fault zones. The County currently has one dam that is subject to such activity. The siting of the San Luis Reservoir in the area of the Ortigalita Fault has been compensated for by structural design. The San Luis Dam was built to withstand a magnitude 8.3 occurrence at Hollister, however this does not completely eliminate the possibility of dam failure with resulting floods. Neither the State Office of Emergency Services, nor the Department of Water Resources (DWR), formulates a probability factor for dam failure. Larger dams are inspected by the DWR on an annual basis in order to evaluate structural integrity. The State has judged all of the dams in Merced County to be safe.

It is also necessary to consider the potential for seiches in the event of a major earthquake near San Luis Reservoir. Seiches are waves occurring in confined bodies of water such as lakes, reservoirs or bays, and can be initiated by winds, seismic events or landsliding; such waves can rapidly erode an earthen dam. Seiches can be expected to occur not only on the reservoirs and lakes within the County, but also on those located in adjacent counties, which could flood large areas of Merced County. Because of the proximity to the extremely active San Andreas and Calaveras Faults, and the less active Ortigalita Fault, the San Luis Reservoir with its 2,000,000 acre/feet of water would probably pose the greatest danger for our County in respect to seiches.

The Los Banos Grandes Dam proposed to be located south of the San Luis Reservoir would be subject to the same seismic hazards; however, it would be constructed with current technology. When complete, inundation maps for this and other dams will be filed with the State Office of Emergency Services as required by Senate Bill 896, Section of the Government Code 8589.5.

3. Slope Instability

Landslides are common to Merced County and represent a safety hazard to property and residents. A landslide is the downhill movement of masses of earth material under the force of gravity. Movement may be very rapid, or so slow that a change of position can be noted only over a period of weeks or years. The size of a landslide can range from several square feet to several square miles.

The west side of Merced County, lying within the Coast Range, has a high potential for landslides which could impact development (see Map 13). The factors contributing to landslide potential are steep slopes, unstable terrain and proximity to earthquake faults. These impacts could be analyzed and lessened with detailed engineering site studies.

The 1970 Uniform Building Code outlines a grading ordinance which has minimum standards for slope stability. This code offers guidelines applicable to construction in the foothills.

4. Subsidence

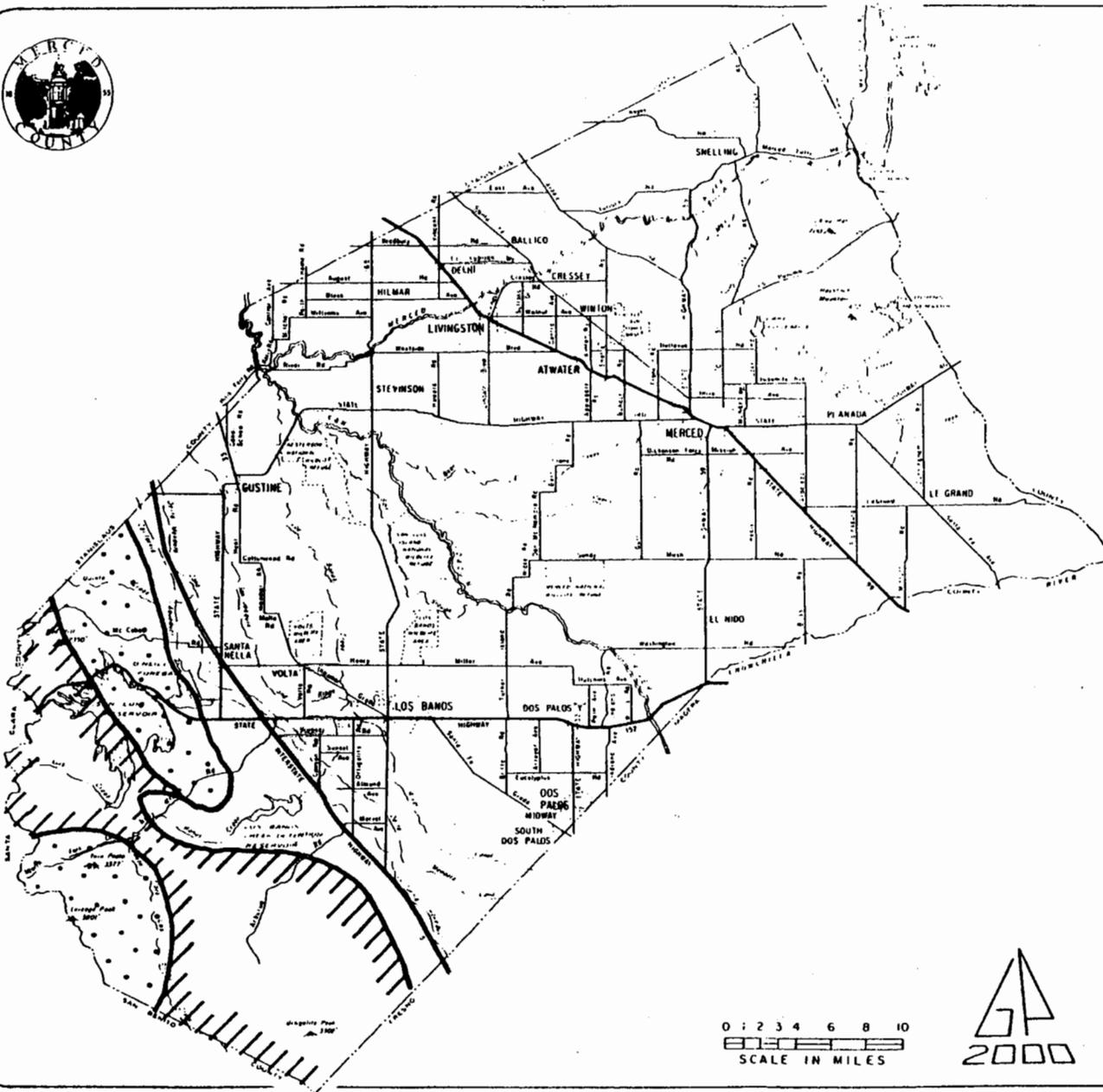
Subsidence of the ground is occurring in many areas in California, including Merced County. It is very important to recognize potential subsidence areas and the possible magnitude of effects at the land surface before development of any kind is undertaken. Subsidence is the settling or sinking of parts of the earth's crust. There are various causes of subsidence most of which happen slowly over a long period of time. The exception is tectonic subsidence, which occurs suddenly and is the compaction of soils due to groundshaking during earthquakes. Merced County is most affected by subsidence caused by groundwater withdrawal, hydrocompaction, and earthquakes.

The west side of the San Joaquin Valley has been recognized as the world's largest area of subsidence due to groundwater withdrawal. Approximately 423 square miles have settled more than one foot since the 1950s. Every 10 foot drop in the water table could result in one foot of subsidence. For many years groundwater has been overdrawn in the County, and subsidence has occurred in the vicinity of Los Banos. A newly subsiding area has also been discovered near El Nido, east of the San Joaquin River. Map 14 indicates areas subject to subsidence from groundwater withdrawal in Merced County.

Hydrocompaction occurs when open-textured soils become saturated with water for the first time, lose their strength and consolidate under their own weight. In California, about 124 square miles of land surface has experienced, or is subject to, subsidence due to hydrocompaction. Subsidence of 3 to 5 feet is common and has damaged ditches, canals, roads, pipelines, electric transmission towers and buildings. Hydrocompaction on the west side of the San Joaquin Valley required special consideration and engineering treatment during construction of the California Aqueduct. In contrast, the Delta-Mendota Canal was built without knowledge of the problem and subsidence of certain portions has required expensive repair.

Differential settlement resulting in the compaction of loose, less cohesive soils may be caused by earthquakes (tectonic subsidence) and could occur in many parts of Merced County. The most likely areas are those in which the groundwater surface is deep, (otherwise liquefaction would be more likely), the soils are loose to medium dense, and the soil profile includes strata of loose and uniformly graded sand. There is insufficient data to make a definite outline of the areas of the County which would be most susceptible to differential settlement. The potential for ground subsidence due to earthquake motion is largely dependent on the magnitude, duration and frequency of the earthquake waves.

Just as special consideration was given to aqueduct construction, so too should the County's policies reflect a conscientious approach to minimize or eliminate damage from subsidence.



Landslide Hazard Areas

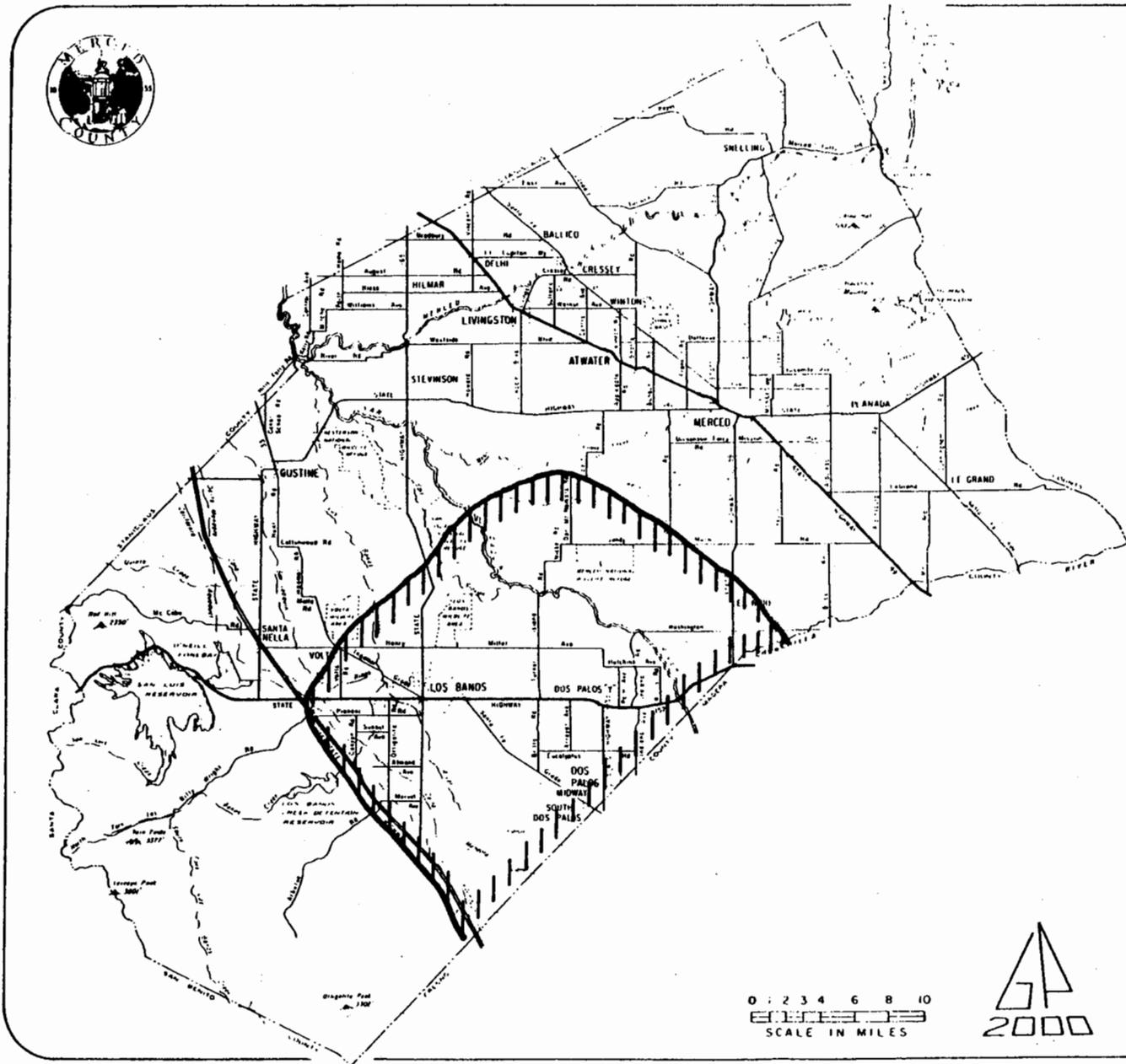
LEGEND

 LOW POTENTIAL

 MEDIUM POTENTIAL

SOURCE Urban Geology Master Plan California Division of mines and Geology, 1973

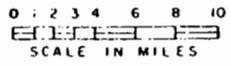
MERCED COUNTY **MAP 13**
YEAR 2000 GENERAL PLAN



Subsidence Area

LEGEND

 SUBSIDENCE AREA



SOURCE: Urban Geology Master Plan. California Division of Mines and Geology, 1973
MERCED COUNTY **MAP 14**
YEAR 2000 GENERAL PLAN

5. Flood Plains/Flooding

Flooding continues to be the most widespread weather related safety hazard in the United States and accounts for greater average annual property losses than any other single hazard.

Flooding is a natural occurrence in the Central Valley because it is a natural drainage basin for thousands of acres of Sierra and Diablo foothill and mountain lands. Approximately 750,000 acres in the San Joaquin Sub-basin are prone to flooding. In Merced County, the Flood Plains of the San Joaquin and Merced Rivers and their tributaries encompass nearly one half of the Valley floor. Map 15 illustrates the areas of Merced County subject to 100 year frequency floods, which includes roughly 380,010 acres of land. The Flood Insurance Rate Maps (F.I.R.M.) identify flood-prone areas which were required to be recognized by the Federal Flood Disaster Protection Act. These maps are the source of more detailed flood information for Merced County and are periodically updated to reflect new information.

Merced County and the Central Valley experience two types of floods: 1) general rainfall floods occurring in the late fall and winter in the foothills and on the valley floor, and 2) snowmelt floods occurring in the late spring and early summer. Most floods in Merced County are produced by extended periods of rainfall during the winter months. Dam failure is another source of flooding which was addressed separately in a previous section of this Chapter.

Losses from flooding have continued to increase because of expanded development in downstream flood plains. Changes in land use from agriculture to urban have profound effects on runoff and erosion of the land surface. Urbanization is commonly accompanied by paved and other impervious surfaces and the construction of storm sewers which collect runoff and usually discharge it directly into stream channels. Impervious surfaces and storm drains increase the frequency of floods and the size of flood peaks. The volume of runoff from new urban areas is far greater than under preexisting conditions.

The County has required the construction of individual storm water percolation detention basins with new development. Percolation basins are designed to collect storm water and filter it before it is absorbed into the soil and reaches groundwater tables. Detention basins are designed to temporarily collect runoff so it can be metered at acceptable rates into canals and streams. However, irrigation districts and Federal and State agencies are becoming increasingly unwilling to accept urban runoff into natural channels and canals because of contaminants. Percolation basins are inefficient because they tend to waste urban land and are difficult and expensive to maintain. Community wide flood control systems are preferable to individual basins in separate developments, and could help improve existing problems by utilizing common facilities and sewage treatment plants to remove possible contaminants. Such systems currently exist in many cities and communities

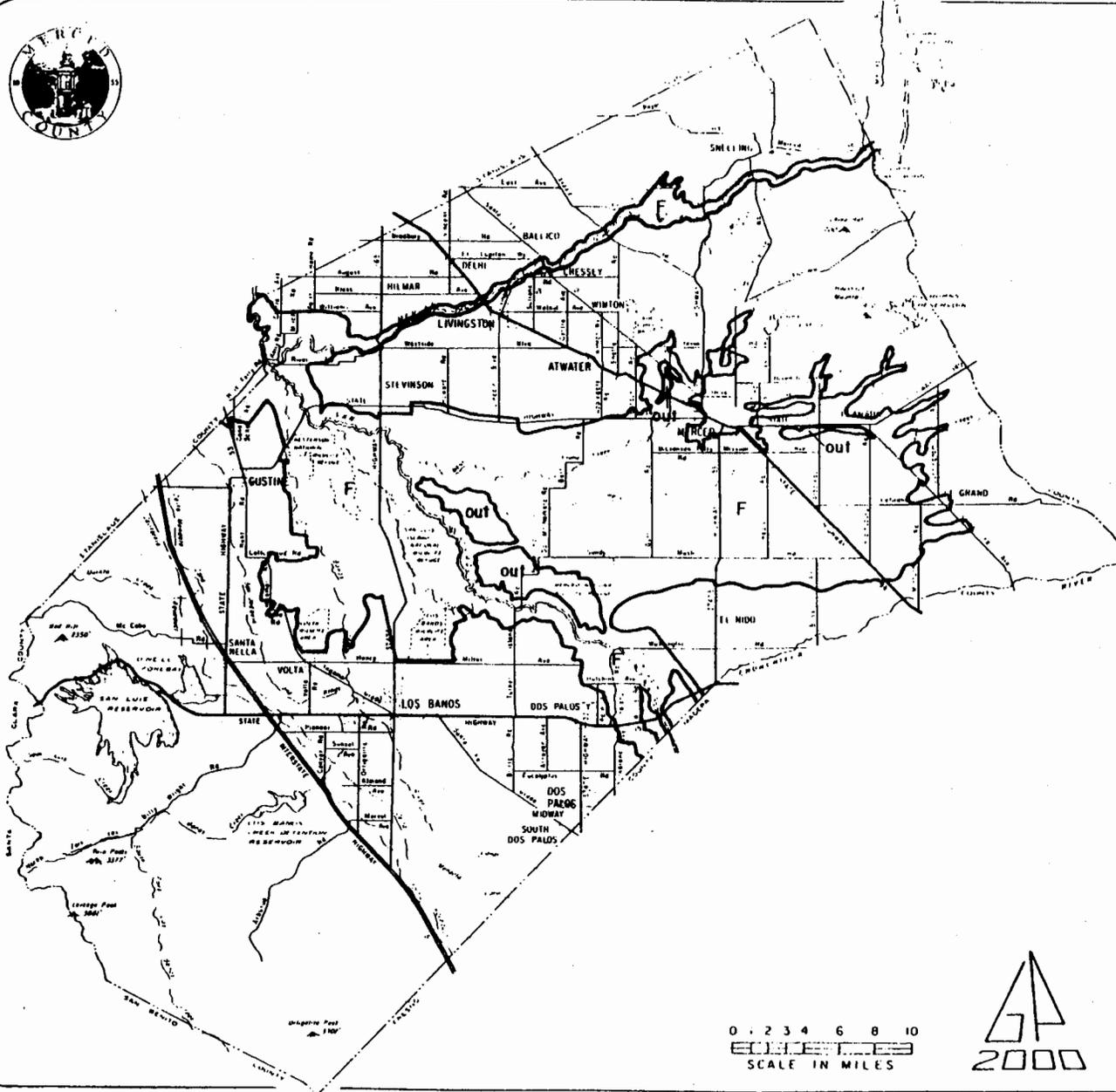
in the County and a new system is being planned for the Community of Planada.

On a more regional level, extensive flood control improvements have been undertaken in this County that have greatly reduced the amount of land subject to flooding. Further flood control efforts are planned for the east side of the County in the "Merced County Streams Group Project". The project consists of: two new detention dams (Castle on Canal Creek and Haystack Mountain on Black Rascal Creek); enlargement and modification of the Bear Creek detention dam; construction and modification of 32 miles of levees and channels on the Bear Creek Stream Group (Fahrens, Black Rascal, Cottonwood and Bear Creeks, Black Rascal Slough, and El Capitan Canal); a protective easement on 2,800 acres of marsh and grasslands; and a few environmental and recreation projects. The project would provide standard project flood protection to most of urban Merced, and about 25-year flood protection to agricultural areas downstream of the city. As effective as the existing flood control measures have been however, flood problems still exist in some areas. The proposed enlargement of existing reservoirs and construction of new dams that will control streams through the County should reduce flood damage considerably, but will not eliminate it.

A major problem with flooding occurs in the streams below dams where channel capacity is so restrictive that releases often exceed flood stage, thus damaging agricultural and urban areas. The problems are especially serious along the streams of the "Merced County Streams Group" because this area has erosion and sediment problems associated with flooding. As stream banks erode and soil is washed into channels and canals, water level and velocity increase creating even more damage. The County's level topography also increases flood hazards because in many places the Flood Plain elevation is equal to that of the valley floor and major floods spread out unimpeded over large areas (sheet flooding) damaging structures and ruining crops. The flood problems in the County could increase in the future, due to pressures of population and economic growth and resulting increase of development in the flood plains. Nonstructural flood plain management measures will therefore become most important in land use planning for known flood-prone areas.

Federally subsidized insurance is available in flood-prone areas of Merced County where certain land use restrictions and construction standards are adopted and stringently enforced to minimize property damage due to flooding. Should the County fail to enforce restrictions and standards it runs the risk of losing Federal insurance monies.

Stricter evaluation of development in all flood hazard zones would strengthen the Flood Insurance Program and provide greater protection from future flooding. As an example of regulated development, certain higher occupancy or critical facilities, such as schools or hospitals, should be discouraged in flood plains and stringently reviewed where placement within a flood plain is necessary. Agriculture, recreation areas and parks, represent logical uses of



Flood Prone Areas

LEGEND.

F AREA SUBJECT TO 100 YEAR FLOOD

SOURCE: U.S. Dept. of Housing and Urban Development Flood Insurance Rate Maps, 1988

MAP 15

MERCED COUNTY
YEAR 2000 GENERAL PLAN

0 2 3 4 6 8 10
SCALE IN MILES



flood plains.

6. Fires

The County is susceptible to fires occurring in both urban and wildland areas which each pose distinct hazards to residents of the County. Urban fires involve the uncontrolled burning of residential, commercial, or industrial properties in developed areas. All urban areas are at risk to personal injuries, fatalities or property damage caused by fire. Factors contributing to rapid fire spread are poor building construction, lack of "built-in" fire protection such as sprinklers, highly flammable contents, delay in detection and alarm, inadequate fire protection equipment and lack of sufficient water supply.

The County Fire Code (Section 10.301 (c)) requires developers to provide approved water supplies capable of delivering adequate fire flow for fire protection to all premises upon which buildings or portions of buildings are constructed. Water supply may consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of supplying the required fire flow. In setting the requirements for fire flow, the Fire Chief may be guided by the standards published by the Insurance Services Office, "Guide for Determination of Required Fire Flow." (The Housing Chapter identifies unincorporated communities which have fire flow problems in Table III-17.)

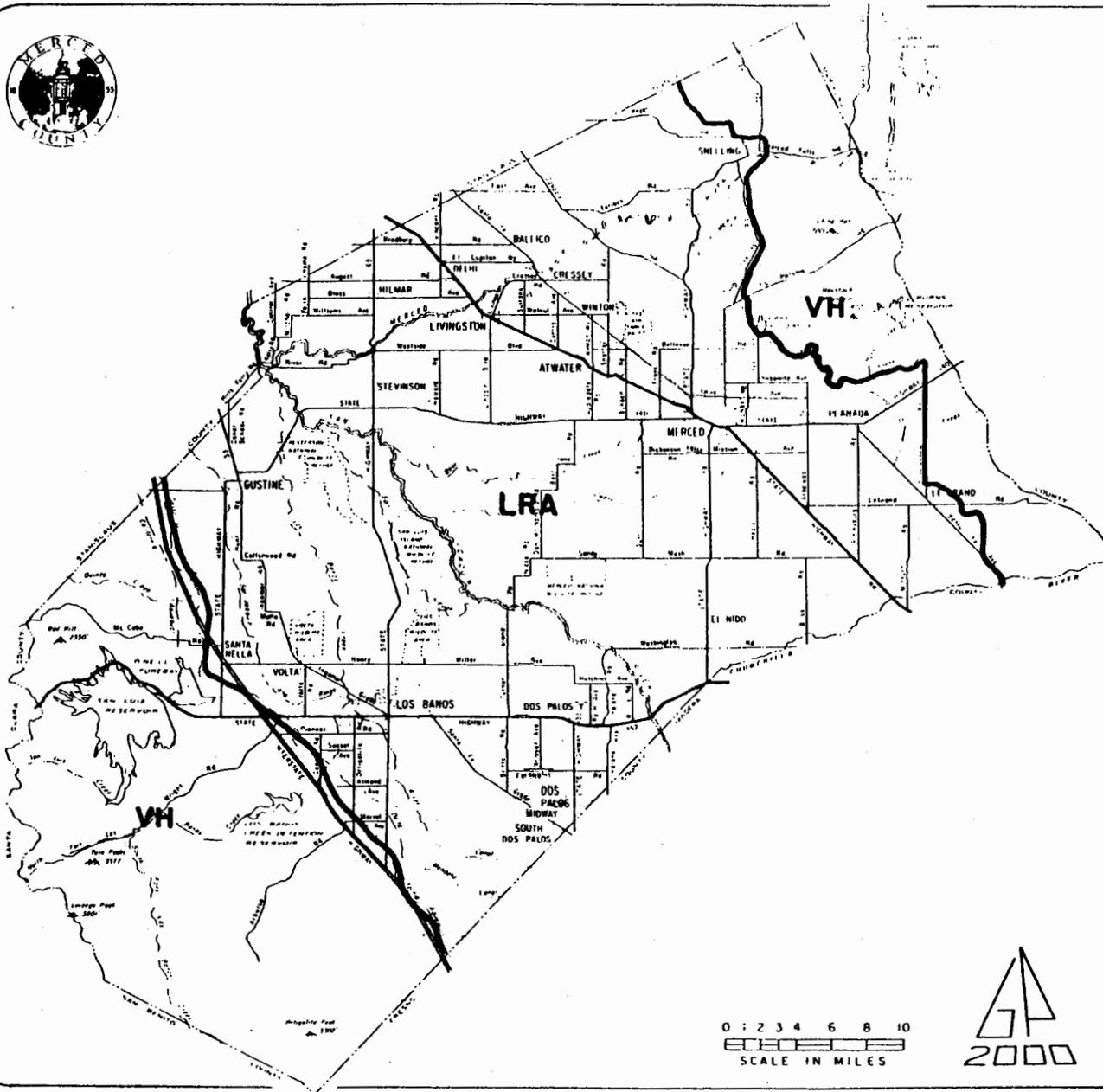
Residential development in Rural Residential Centers (RRCs) is serviced by water tenders (tankers) as are ranches and farm houses in rural areas. New building construction must meet more stringent fire code requirements thus reducing the rapid spread of fire. In Merced County the possibility of major urban fires exists primarily within the unincorporated communities (SUDPs) reflected by fire insurance ratings which are generally poorer than in the incorporated cities. The County presently reviews development plans in SUDPs for safe circulation, and a minimum of two access points is required for larger developments. This ensures escape and emergency service options for most hazards. The fire services within the County are comprised of the California Department of Forestry and Fire Protection (CDF) which is primarily responsible for providing basic wildland fire protection to those lands classified: State Responsibility Area (SRA). The CDF is under contract with the County to provide life and property fire protection to County Responsibility Areas, various municipal fire departments which may share County/City facilities, and one independent fire district serving the City of Atwater. These agencies are organized and equipped to handle major fires utilizing a well developed mutual aid system. However, with the increased use of hazardous materials of all types and the ever present threat of arson caused incidents, it is clearly evident that Merced County is not immune from experiencing a major urban fire. Emergency response actions and water supply peak loads are presented in the appendices of the Office of Emergency Services (OES) Multi-Hazard Functional Plan. Evacuation routes are described in Section B.7. of this chapter.

California has a wildland fire potential equal to anywhere in the country. The combination of highly flammable vegetation, long and dry summers, rugged topography, and people who live, work or recreate in the wildlands, adds up to a situation which results in several thousand wildfires each year. Depending on local burning conditions, these fires can and do occur in any month of the year throughout the state.

Wildland fire hazards exist in varying degrees over approximately 90% of Merced County or on that portion of the County's 1,984 square miles not covered by 200 square miles of water and urban uses. The fire season extends approximately 5 to 6 months, from late spring to fall, and hazards arise from a combination of climatic, vegetative and physiographic conditions. There is some fuel loading in the County's westside hills in those watershed areas unaffected by fire for many years. The County is fortunate to have relatively few homes built on slopes with vegetation in close proximity. This situation reduces the hazard to County residents and their personal property. (Map 16 identifies high fire hazard areas in the County.)

Irrigated agricultural land is less susceptible to wildland fires than grazing areas. The rolling foothills on the County's east side are well grazed but are not immune to extensive burning. In hilltop areas water supplies can be rapidly depleted, hampering fire control efforts. Structures with wood shake roofs ignite easily and produce embers which can contribute to fire spread. The aftermath of wildland fire produces areas of potential landslide because burned and defoliated areas are exposed to winter rains. Although their occurrence is inevitable, most wild fires can be controlled within the first few hours by a fire protection system that includes Federal, State and local government fire protection agencies.

The major wildland firefighting organization for State Responsibility Areas (SRA) is the California Department of Forestry and Fire Protection (CDF). In addition, the CDF contracts with local governments in areas of urban/rural interface to provide urban fire suppression which, as noted above, includes Merced County. The Fire Plan is the key document for the State's fire protection effort as it relates to Merced County. Emergency response actions are presented in the appendices of the OES Multi-Hazard Functional Plan while evacuation routes are described in the following section of this chapter. All weather roads provide access to more remote wildlands and the County requires the construction of such roads in conjunction with the approval of use permits and land divisions. The potential for fire increases as residential and recreational developments encroach further into the wildlands. Many steps can be taken to reduce this potential loss to life and property by wildfire: enforcement of proper building codes; elimination of woodshake roofs; use of green belting (removal of vegetation around structures or replacement with more fire resistant vegetation); prescription burning to control fuel load; implementation of fire safe practices, including proper road construction and adequate water systems, and perhaps most importantly, proper land use planning and zoning.



Fire Hazard Severity Zones

LEGEND

- VH - VERY HIGH
- LRA - LOCAL RESPONSE AREA (Area serviced by Merced County Fire Departments and in which Fire Hazards are reduced because of fire prevention measures.)

SOURCE: California Department of Forestry and Fire Protection 1985

MERCED COUNTY **MAP 16**
YEAR 2000 GENERAL PLAN

0 2 3 4 6 8 10
SCALE IN MILES



7. Emergency Evacuation Routes

Earthquakes, fires and flooding are all hazards that necessitate planned evacuation routes in order to move people away from risk hazard areas. It is not possible to know with certainty how many people will actually evacuate in any given crisis situation. Similarly, the rate at which people would begin evacuating, the number that would spontaneously evacuate before being instructed to, and the specific routes of travel and ultimate destinations, are subject to wide variation. Therefore, a series of assumptions have been adopted under the Merced County Crisis Relocation Movement Plan that are considered conservative in the sense that even if the assumptions are in error by plus or minus 20 percent, the movement would still be feasible. The major assumptions are that:

- (1) Eighty percent of the population in a defined risk area will evacuate in accordance with the official instructions issued by the government.
- (2) The distribution of starting times for individual families to begin moving out of the risk area will follow a "normal" distribution.
- (3) Both air and bus transportation will be provided by the State, or originating jurisdictions, for the limited mobility population who are without access to their own private automobile.

Given these assumptions, it is likely that freeways and major County roads would become the primary evacuation routes. These roadways are better maintained, routinely handle large traffic volumes, and could be expected to carry evacuees and emergency service vehicles to and from risk areas.

The Circulation Chapter identifies freeways, arterials and major/minor collectors in the County and these would be used as evacuation routes. The State Highways would all serve as primary routes and include Highways 99, 59, 165, 33 and Interstate 5 which run in a north-south direction. The east-west State routes are Highways 140 and 152.

Because some hazards are more predictable than others, planning emergency response actions may vary. In the case of flooding, water channels are often well defined and have been mapped in accordance with the Federal Emergency Management Agency (FEMA), or in compliance with California State Senate Bill 896 (maps of dam inundation areas). Knowledge of the inundation areas aides County officials in preparing evacuation routes well ahead of a flood event. The County reservoirs and streams are generally accessible to the public from County or State roads and these are among the routes that would be used to move people away from flood hazards to major highways.

Fires are predictable to the extent that they can be contained within a given area. Once emergency services arrive, County residents can be directed along



Traffic Control Points

LEGEND

□ TRAFFIC CONTROL POINTS

SOURCE: Merced County Crisis Relocation Movement
Plan Office of Emergency Services

0 1 2 3 4 6 8 10
SCALE IN MILES



MAP 17
MERCED COUNTY
YEAR 2000 GENERAL PLAN

local streets to other neighborhoods. A minimum 50-foot road width and 60 foot cul-de-sac bulb, are required County road improvement standards that ensure an adequate opportunity for ingress and egress. The County also requires 20-foot all-weather access roads which are capable of handling emergency vehicles in the foothills and other rural areas. La Paloma Road extending northeast of the City of Merced exceeds the minimum width but is a good example of an unpaved, all-weather road.

The most difficult hazard to predict is an earthquake and its associated groundshaking activity. As stated in an earlier section, geologic hazard (groundshaking) areas are not well defined. Consequently, Merced County residents will be dependent upon public address systems (radio and television broadcasts) to direct them to designated evacuation routes. These routes, which again are major highways, would be regulated by the California Highway Patrol (CHP) as specified in the County's "Crisis Relocation Movement Plan." Traffic control points have been established at highway intersections (Map 17) and are intended to direct evacuees away from geologic risk areas. The "Crisis Relocation Movement Plan" and "Multi-Hazard Functional Plan", prepared by the Office of Emergency Services, contain more specific procedures for diverting County residents away from risk hazard areas.

C. SAFETY CHAPTER GOALS, OBJECTIVES, POLICIES AND IMPLEMENTATION

GOAL 1:

Merced County residents protected from known seismic and geologic hazards.

Objective 1. A.:

New structures are protected from seismic and geologic hazards.

Policies:

1. All habitable structures shall be located and designed in compliance with the Alquist/Priolo Special Studies Zone Act of 1972.

Implementation:

All building permits within the Special Studies Zone will be reviewed for compliance with the provisions of the Act.

2. Special precautions to ensure earthquake resistant design should be considered for proposed critical structures such as hospitals, fire stations, emergency communication centers, private schools, high

occupancy buildings, bridges and freeway overpasses, and dams.

Implementation:

All standards contained in the Uniform Building Code and other construction regulations will be utilized as the minimum standard for critical structures.

3. Encourage educational programs to inform the public of earthquake dangers in Merced County.

Implementation:

The County Office of Emergency Services is responsible for emergency education programs.

4. If significant earthquake damage should occur anyplace in the County, rebuilding the structure at a geologically safer location shall be considered before rebuilding the damaged building at its previous location.

Implementation:

A determination as to site suitability will be made in the building permit review process.

Objective 1. B.:

Existing structures are protected from seismic and geologic damage by the year 2000.

Policies:

5. The County should initiate a program to identify earthquake hazards to existing structures, such as unreinforced masonry buildings, and determine the appropriate method for correction.
6. Existing critical structures, as identified in Policy 2, which were constructed after 1948 should be evaluated for their structural integrity.

Implementation:

As part of the County's building rehabilitation efforts, structures will be identified which are susceptible to earthquake damage.

GOAL 2:

Merced County residents free from unacceptable risks resulting from dam failure.

Objective 2. A.:

The risk of personal injury from dam failures is minimized by the year 2000.

Policies:

1. Encourage educational programs to inform the public of identified dam inundation areas and evacuation plans.

Implementation:

The County Office of Emergency Services is responsible for emergency education programs.

2. Use "Mutual Aid" resources to augment local resources in order to perform rescue operations, secure utilities, cordon inundated areas and control traffic in event of dam failure.

Implementation:

The County Multi-hazard Functional Plan will include provision for mutual aid efforts.

3. The location of new dams within the County should be evaluated to determine the effects of inundation on existing and projected populated areas.

Implementation:

Pertinent information will be required in the environmental review of new dams.

GOAL 3:

Merced County residents free from personal injury and property damage resulting from unstable soils.

Objective 3. A.:

Structures within areas of known or suspected unstable soil are appropriately located, designed and constructed.

Policies:

1. Habitable structures shall not be located in areas subject to landslides unless designed and constructed to minimize hazards to occupants.
2. Chapter 70, Volume I of the Uniform Building Code, 1970 Edition, known as the "Model Grading Code", shall be used as a guide for projects subject to hazards from slope instability.
3. All proposed structures, utilities, or public facilities within recognized near-surface subsidence or liquefaction areas should be located and constructed in a manner to minimize or eliminate damage.

Implementation:

All standards contained in the Uniform Building Code related to construction on unstable soils will be enforced during the building permit review process.

GOAL 4:

Merced County residents and structures protected from harmful effects of flooding.

Objective 4. A.:

People and structures in areas subject to flood hazards are protected.

Policies:

1. Information provided by the Federal Emergency Management Agency shall be used to identify areas subject to 100-year frequency floods.
2. All habitable and most accessory structures constructed within areas subject to 100-year frequency floods, or in other identified flood hazard areas, shall include appropriate flood proofing measures and/or elevation above the base flood level.
3. Within areas subject to 100-year frequency floods, all development shall be done in a manner that will not cause floodwaters to be diverted onto adjacent property or increase flood hazards to property located elsewhere.
4. Within areas subject to 100-year frequency floods, all public utilities and facilities, such as roads, sewage disposal, gas,

electrical and water systems, should be located and constructed to minimize or eliminate flood damage to the facilities.

Implementation:

In review of all building permits, discretionary applications and capital improvement projects, a determination will be made whether the project is within the 100-year flood plain identified by the Federal Emergency Management Agency. For all projects within the flood plain, provisions of the County "Flood Damage Prevention Code" will be applied. (Discretionary applications generally include: general plan amendments, zone changes, conditional use, location and development, tentative subdivision and administrative permit applications.)

5. Open space uses should be encouraged in all flood-hazard areas.

Implementation:

Identify whether property is within the 100-year flood plain in review of general plan amendment and zone change applications to redesignate land from rural to urban uses.

GOAL 5:

The risk of injury and property damage resulting from wildland and urban fires is minimized.

Objective 5. A.:

An adequate level of fire safety is provided in urban areas.

Policies:

1. Minimum peak-load water supply standards for developments in urban areas with public water systems, should be established.
2. In urban areas where a public water system does not exist, ensure adequate water supplies are available for fire suppression prior to occupancy of any structure.
3. Sprinkler systems shall be considered in areas where the Fire Department determines alternate fire protection measures are not adequate.

Implementation:

All buildings and structures shall be reviewed during the building

permit stage to ensure that they are constructed to fire safety standards prescribed in the Building Code and the County Fire Prevention Ordinance. Where minimum fire flow water pressure is not available to satisfy Fire Department standards, alternate fire protection measures shall be identified and incorporated into the development.

Objective 5. B.:

An adequate level of protection from wildland fires is provided in rural areas.

Policies:

4. In the review of subdivisions and building permits in rural areas, provision shall be made for safe all-weather access for fire and other emergency equipment.
5. In areas designated as having a very high fire hazard severity, the establishment of safe all-weather access for fire and emergency equipment shall be encouraged to serve existing residential uses.

Implementation:

A determination shall be made at the building permit or subdivision review stage in "Agricultural" and "Foothill Pasture" designated areas that all-weather access to a public road exists, or can be provided, for emergency equipment. Generally, this involves a minimum 20-foot access right-of-way. The County will assist property owners of existing residences in very high fire hazard zones in identifying appropriate access routes and improvements necessary to meet all-weather requirements.

6. In areas designated as having a very high fire hazard severity, the establishment and maintenance of "clear zones" around new and existing residential structures shall be encouraged.

Implementation:

The County Fire Department will assist property owners in identifying appropriate clear areas around residences and how they should be maintained.

D. SAFETY CHAPTER APPENDIX

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