San Luis Obispo County
Local Hazard Mitigation Plan

November 2005

Revision 1

Per the Board of Supervisors meeting of November 1, 2005, this document contains minor changes made after that date. This document is referenced as "Revision 1", November 2005

Adoption by Local Governing Body: §201.6(c)(5)

November 1, 2005

To the Citizens, Visitors, Employees, and Officials of San Luis Obispo County:

As the costs of damage from natural disasters continue to increase, the County of San Luis Obispo realizes the importance of identifying effective ways to reduce vulnerability to disasters. Natural hazard mitigation plans assist communities in reducing risk from natural hazards by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities.

As a result the County of San Luis Obispo has developed this Local Hazard Mitigation Plan (LHMP) which provides guidance on how to reduce risk from natural hazards. This LHMP works in conjunction with other County plans, including the General Plan, and hazard mitigation plans developed for specific programs such as flood control and fire prevention.

This letter promulgates the San Luis Obispo County Local Hazard Mitigation Plan and constitutes the adoption of the Plan. This Local Hazard Mitigation Plan becomes effective on approval by the San Luis Obispo County Board of Supervisors on the date indicated below.

Original signed by Shirley Bianchi

Chairperson, Board of Supervisors
County of San Luis Obispo

November 1, 2005

Table of Contents

Appendix I is an attachment at the end of this document with LHMP development documentation. Since Appendix I is for review and approval purposes only, not all copies of this LHMP include the appendix pages.

Non-paper versions of this LHMP contain the appendix pages as separate jpeg files.

LHMP Evaluation Requirements Cross Reference Table

Category of Requirement	Federal Emergency Management Agency (FEMA) / California Office of Emergency Services (OES) Evaluation Requirement and Statutory Authority	San Luis Obispo County LHMP Response
Prerequisite	Adoption by Local Governing Body: §201.6(c)(5)	Precedes Table of Contents
Planning Process	Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Pages 2 - 4
	Local Capabilities Assessment: §201.4(c)(ii) and §201.6(c)(1)	Pages 5 – 7
Risk Assessment	Identifying Hazards: §201.6(c)(2)(i)	Pages 16 – 18
	Profiling Hazards: §201.6(c)(2)(i)	Pages 21 – 142
	Assessing Vulnerability: Overview: §201.6(c)(2)(ii)	Pages 21 – 142
	Assessing Vulnerability: Structures: §201.6(c)(2)(ii)(A)	Pages 21 – 142
	Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Pages 21 – 142
	Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Pages 21 – 142
Mitigation Strategy	Local Hazard Mitigation Goals: §201.6(c)(3)(i)	Pages 143 – 147
	Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)	Pages 148 – 153
	Implementation of Mitigation Actions: §201.6(c)(3)(iii)	Pages 148 – 153
Plan Maintenance Process	Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Pages 164 – 165
	Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Page 164-165
	Continued Public Involvement: §201.6(c)(4)(iii)	Page 165

Note: Assets at Risk can be found beginning on page 154

1. Purpose / Vision / Values

Purpose of LHMP

The County of San Luis Obispo has developed this Local Hazard Mitigation Plan (LHMP) to create a safer community. The San Luis Obispo County LHMP is the representation of the County's commitment to reduce risks from natural and other hazards, and serves as a guide for decision-makers as they commit resources to reducing the effects of natural and other hazards. The San Luis Obispo County LHMP serves as a basis for the State Office of Emergency Services (OES) to provide technical assistance and to prioritize project funding. (See CFR §201.6.) This document is for the County of San Luis Obispo as an entity, and thus is not adopted for any local jurisdiction other than the County. Other local governments are developing LHMP specific to their jurisdiction.

While the Disaster Mitigation Act of 2000 ("DMA 2000") requires that local communities address only natural hazards, the Federal Emergency Management Agency (FEMA) recommends that local comprehensive mitigation plans address man-made and technological hazards to the extent possible. Towards that goal, San Luis Obispo County has addressed an expansive set of hazards.

For disasters declared after November 1, 2004, San Luis Obispo County must have an LHMP approved pursuant to §201.6 in order to receive FEMA Pre-Disaster Mitigation (PDM) project grants or to receive post-disaster Hazard Mitigation Grant Program (HMGP) project funding. The LHMP is written to meet the statutory requirements of DMA 2000 (P.L. 106-390), enacted October 30, 2000 and 44 CFR Part 201 – Mitigation Planning, Interim Final Rule, published February 26, 2002.

Support of Broader County Vision

The LHMP supports the broader vision and values of San Luis Obispo County, reflected in their Mission Statement:

The County's elected representatives and employees are committed to serve the community with pride to enhance the economic, environmental and social quality of life in San Luis Obispo County.

Guiding Principles
Sense of Pride
Aim for Excellence
Respect for Others
Response to Change
Fiscal Responsibility
Community Service

2. The Planning Process

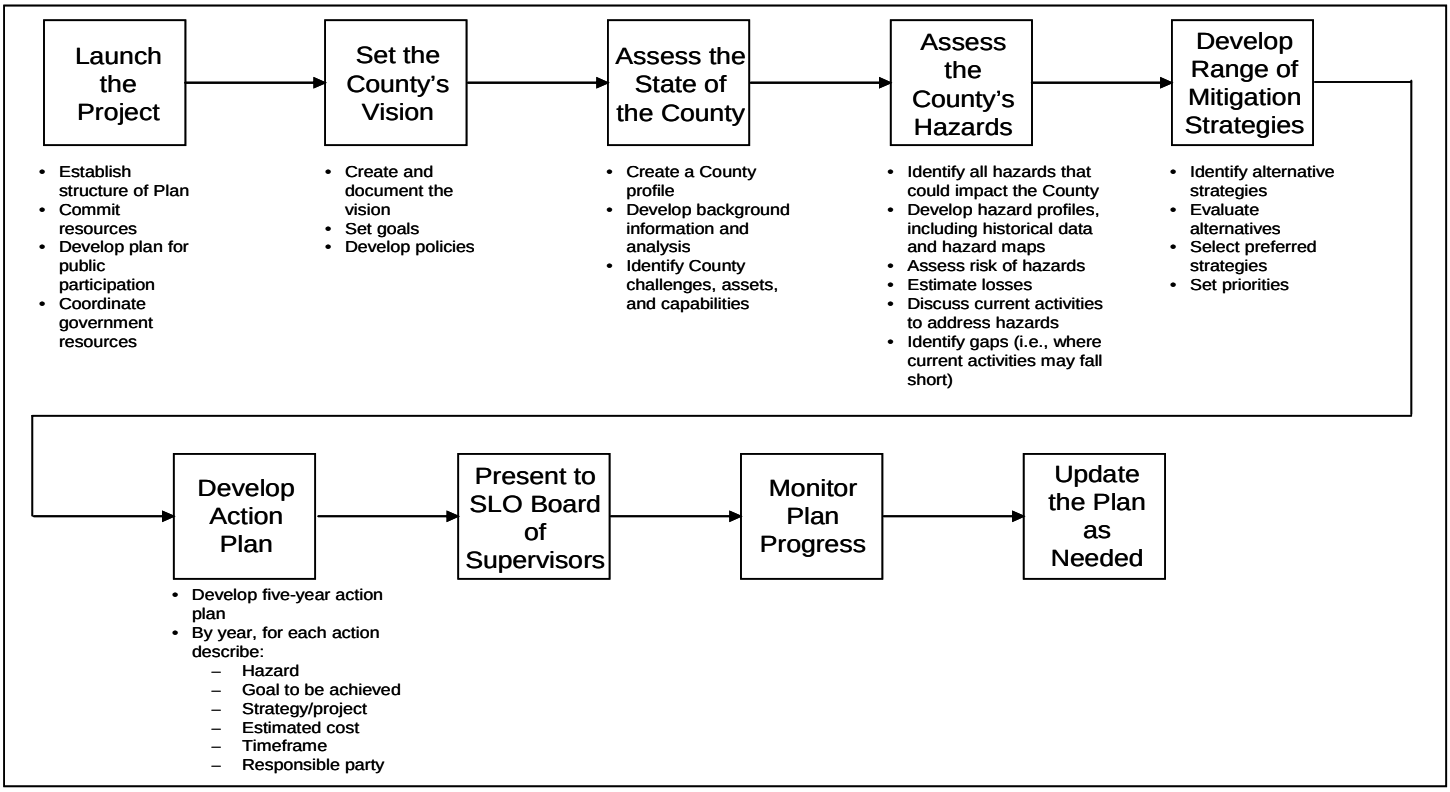
Planning Process Requirements Cross-Reference Table

Element	Requirement	County of San Luis Obispo LHMP Response
A	Narrative Description of the Process Followed to Prepare the Plan	Pages 2 – 4
B	Documentation of Who Was Involved in the Planning Process	Page 2
C	Documentation of How the Public was Involved in Process	Page 3
D	Documentation of Opportunity for Neighboring Communities, Agencies, Businesses, Academia, Nonprofits, and Other Interested Parties to be Involved in the Planning Process	Page 3
E	Description of Review and Incorporation, if Appropriate, of Existing Plans, Studies, Reports, and Technical Information	Page 3

The County of San Luis Obispo Office of Emergency Services was responsible for the development of the LHMP. The County hired a consultant, Bluecrane Inc., to assist in the preparation of the plan. The Office of Emergency Services formed a Planning Team with representatives from:

- County Office of Emergency Services
- Department of Planning and Building
- Department of Planning and Building – Geographic Technology and Design
- County Public Works Department
- CDF / County of San Luis Obispo Fire Department - Division Chief, Operations
- CDF / County of San Luis Obispo Fire Department – Battalion Chief, Fire Marshal
- County Department of Agriculture and Weights and Measures

The planning process utilized by the County of San Luis Obispo is depicted in the figure below.



Following the County Board of Supervisors' approval of the project, the effort was launched in March 2005 in a meeting of the Planning Team. The Planning Team has participated actively in the LHMP's development, meeting every two to three weeks throughout the process to review draft documents and assess progress on the plan.

In addition to the steps shown in the diagram above, an effort was made to solicit public input during the planning process by allowing the completed plan to be viewed for 10 days per the Brown Act by the public prior to going in front of the County Board of Supervisors for review and adoption.

The County of San Luis Obispo currently utilizes the General Plan, which includes a comprehensive Land Use Element, Open Space Element and Safety Element which are closely linked and the CDF/San Luis Obispo County Fire Management Plan. The Land Use Element designates the general distribution of land uses within the planning area, as well as standards for population density and building intensity. One of the purposes of the Open Space Element is to preserve open space for public health and safety, including areas that require special management and regulation because of hazardous or special conditions (e.g. earthquake fault zones, flood plains, unstable soil areas, and high-fire risk

areas). The Safety Element provides a general evaluation of potential public safety hazards on a county-wide basis. The Safety Element also provides the direction and resources to help reduce death, injuries, property and environmental damage, and the economic and social dislocation resulting from natural hazards.

CDF/San Luis Obispo County Fire Department annually completes a Fire Management Plan. The Plan is a road map and action plan for reducing the damaging effects of wildfire in San Luis Obispo County. It does this by identifying the high value high-risk areas in the County that can be destroyed by fire. It determines a comprehensive course of action to mitigate the threat and reduce the losses. The plan then identifies the necessary resources to implement improvements.

Local Capabilities Assessment

The tables below are an inventory of key capabilities and assets for the County of San Luis Obispo.

Fire Departments	
Asset / Capability	**Inventory**
Rolling Stock	**State Fire Protection** • 12 Engines (plus four reserves) • 3 Bulldozer / Transport Units • 1 CDF Airbase w/Type 1 Air Tanker and Air Attack • 1 Mobile Field Kitchen **San Luis Obispo County Fire Department** • 15 Engines / 2 ALS Engines (plus four reserves) • 1 OES Engine • 3 Water Tenders • 1 Aircraft Crash / Rescue • 6 Rescues (plus one reserve) • 1 Mobile Communications Unit • 2 Fire Boats • 1 Patrol • 1 Mobile Air Unit
Personnel	• 176 Permanent (3FC / 6FAE paramedics) • 67 Seasonal / Limited-Term • 238 Inmate and Ward Firefighters • 245 Paid-Call Firefighters (County) • 45 Volunteers in Prevention (CDF)
Facilities	• 20 Fire Stations • 3 Conservation Camps • 5 Field Battalions (1 local government-funded)

Sheriff's Department	
Asset / Capability	**Inventory**
Rolling Stock	• 46 Patrol vehicles • 7 Custody vans • 5 Patrol SUVs • 53 Undercover vehicles • Various bomb task force, search and rescue, mobile command units, and related special needs vehicles
Personnel	• 159 Sworn Personnel • 121 Correctional Staff • 121 Civilian Personnel • 400 Volunteers • 1 Canine
Facilities	• County Jail • 911 / Communications Center
Technical Assets	• 200 Computers • 390 Users • 12 Major Systems • Livescan; Picture Link and Cal-Photo; CAD; Megan's Law; TRAK; AFIS; CLETS; Records Management System (RMS); CivilServ; PetWhere

Local Ordinances and Regulations	
Uniform Fire Code	This Code may be adopted by local jurisdictions, with amendments, and provides minimum standards for many aspects of fire prevention and suppression activities. These standards include provisions for access, water supply, fire protection systems, and the use of fire resistant building materials.
California Health and Safety Code and the Uniform Building Code	The Health and Safety Code provides regulation pertaining to the abatement of fire related hazards. It also requires that local jurisdictions enforce the Uniform Building Code, which provides standards for fire resistive building and roofing materials, and other fire-related construction methods.
Title 19 of the California Code of Regulations	These regulations pertain to fire prevention and engineering measures for new construction.
Title 14 of the Public Resources Code	These regulations provided additional fire prevention and suppression standards.
Assembly Bill 337 (Bates Bill)	In response to the Oakland Hills, California fire of 1991, this bill was passed in 1992. It requires brush clearance and fire resistant roof material (Class A or B) to be used on all new construction that is located in areas designated as being a “Very High Fire Severity Zone.”
Section 22 / 23 et seq. of the Land Use Ordinance and Coastal Zone Land Use Ordinance	These sections of Titles 22 and 23 contain standards pertaining to the preparation and review of fire safety plans, fire safety standards, site access, and drive way requirements. In addition, the provisions of the Uniform Fire Code have been adopted by San Luis Obispo County.

3. San Luis Obispo County Community Profile

Background on San Luis Obispo County

San Luis Obispo County, the 16th largest County in California, is one of the original 27 California counties created by Act of the State Legislature on February 18, 1850. The county's name comes from the Mission San Luis Obispo de Tolosa, which was established by Padre Junipero Serra in 1772. The mission was named for Saint Louis, the Bishop of Toulouse (France).

Located along California's Central Coast, San Luis Obispo County is midway (190 miles/306 kilometers) between Los Angeles and San Francisco, and is accessible north-to-south by U.S. Highway 101 and scenic Highway 1. Routes from the east include State Highways 41, 46, 58 and 166. San Luis Obispo County is bordered by Santa Barbara County to the south, Monterey County to the north and Kern County to the east.

San Luis Obispo covers an area of about 3,316 square miles. Agriculture, State institutions, tourism and recreation make up the principal economic background. With the ocean and mountains, the Spanish and historical flavor, the friendly climate and the relative freedom from urban hassles, over 260,000 residents call San Luis Obispo County home.

Over a dozen towns and cities, including the city of San Luis Obispo, plus Arroyo Grande, Atascadero, Avila Beach, Cambria, Cayucos, Grover Beach, Los Osos - Baywood Park, Morro Bay, Nipomo, Paso Robles, Pismo Beach, San Miguel, San Simeon near Hearst Castle, Templeton and others create a single extended community.

The strong local economy is dominated by Cal Poly San Luis Obispo with its 18,000 students, viticulture and agriculture, fishing, tourism and a growing sector of information and technology businesses.

Based on a January 1, 2005 California Department of Finance estimate, the population of San Luis Obispo County is 260,727. The following city populations are also based on January 1, 2005 estimates:

Arroyo Grande	16,537
Atascadero	27,596
Grover Beach	13,228
Morro Bay	10,511
Paso Robles	27,964
Pismo Beach	8,644
San Luis Obispo	44,163
Unincorporated Area	111,728

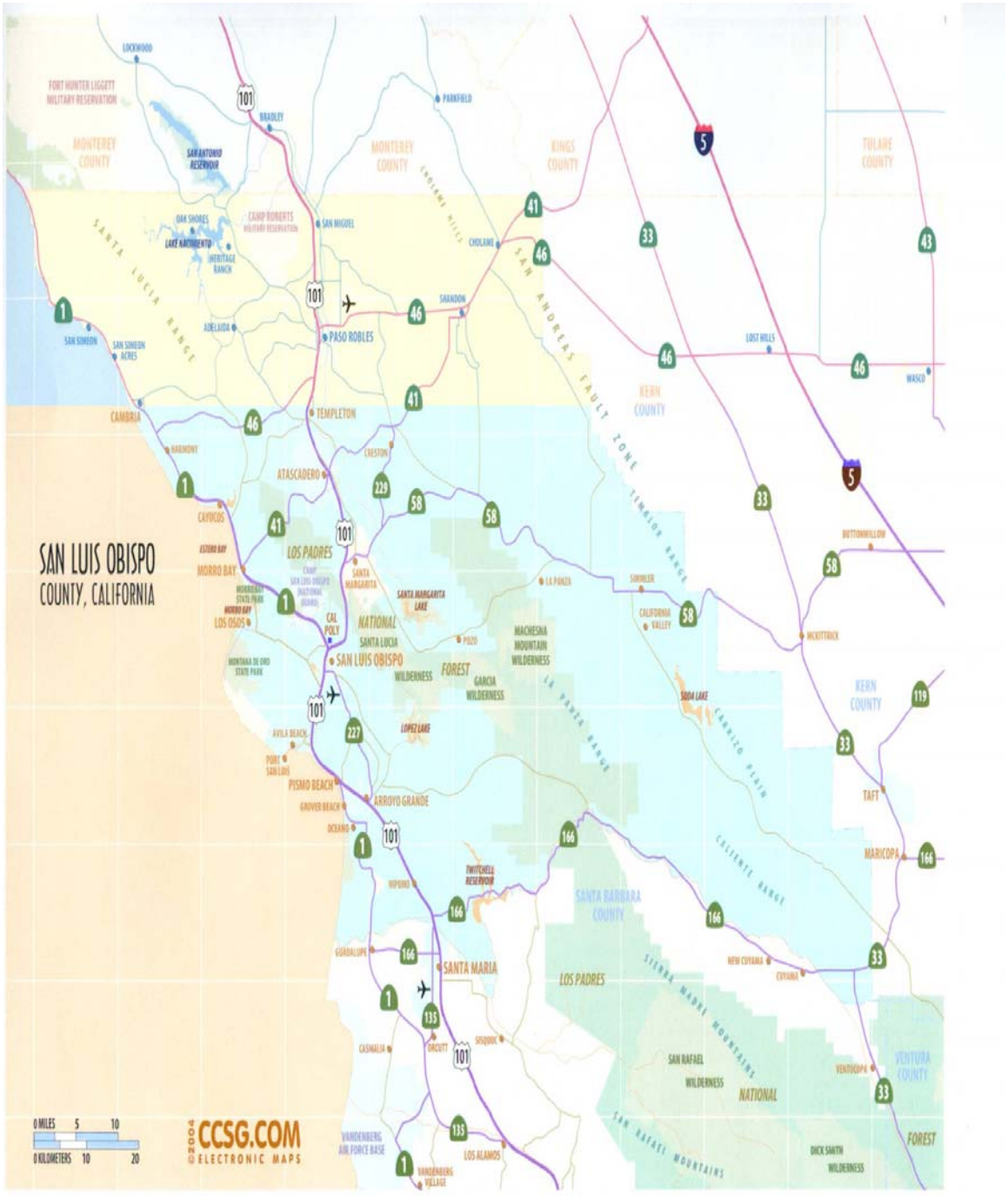
San Luis Obispo County
Population and Components of Change From 1980

Year	Population	% of Change	Total Population Change
1980	155,435	3.0	4,535
1981	161,886	4.2	6,451
1982	166,563	2.9	4,677
1983	171,365	2.9	4,802
1984	177,566	3.6	6,201
1985	185,248	4.3	7,682
1986	192,497	3.9	7,249
1987	199,345	3.6	6,848
1988	204,261	2.5	4,916
1989	213,314	4.4	9,053
1990	217,162	1.8	3,848
1991	219,895	1.3	2,733
1992	221,848	0.9	1,953
1993	223,370	0.7	1,522
1994	226,228	1.3	2,858
1995	229,370	1.4	3,142
1996	232,976	1.6	3,606
1997	236,601	1.6	3,625
1998	240,020	1.4	3,419
1999	243,480	1.4	3,460
2000	246,681	1.3	3,201
2001	250,760	1.7	4,079
2002	252,064	0.5	1,304
2003	253,118	0.4	1,054

Source: U.S. Bureau of Census

Note: Decade years represent April 1, Census data, not the mid-year estimates.

The following Maps provide a perspective on the size of the County.


SAN LUIS OBISPO
COUNTY, CALIFORNIA
PASO ROBLES
ATASCADERO
TEMPLETON
CAMBRIA
MORRO BAY
LOS PADRES
SAN LUIS OBISPO
SANTA MARIA
ARROYO GRANDE
PISMO BEACH
GROVER BEACH
SANTA BARBARA COUNTY
KERN COUNTY
TULARE COUNTY
KINGS COUNTY
MONTEREY COUNTY
VENTURA COUNTY
SAN ANDREAS FAULT ZONE
SANTA LUCIA RANGE
SAN RAFAEL WILDERNESS
MACHESNA MOUNTAIN WILDERNESS
GARCIA WILDERNESS
SIERRA MADRE MOUNTAINS
CALIENTE RANGE
TEHACHAPI MOUNTAINS
TAFT
MARICOPA
WASCO
LOST HILLS
BUTTONWILLOW
MCKITTRICK
CALIFORNIA VALLEY
SODA LAKE
LOPEZ LAKE
TWITCHELL RESERVOIR
SAN ANTONIO RESERVOIR
LAKE NACIMIENTO
VANDENBERG AIR FORCE BASE
LOS ALAMOS
CASMALIA
GUADALUPE
NEW CUYAMA
CUYAMA
VENTUCOPA
©2004 CCSG.COM ELECTRONIC MAPS


SAN LUIS OBISPO
COUNTY, CALIFORNIA
LOCKWOOD
FORT HUNTER LIGGETT MILITARY RESERVATION
BRADLEY
PARKFIELD
MONTEREY COUNTY
KINGS COUNTY
TULARE COUNTY
SAN ANTONIO RESERVOIR
OAK SHORES
LAKE NACIMIENTO
CAMP ROBERTS MILITARY RESERVATION
HERITAGE RANCH
SAN MIGUEL
CHOLAME
SHANDON
PASO ROBLES
ADELAIDA
SAN SIMEON
SAN SIMEON ACRES
CAMBRIA
HARMONY
TEMPLETON
CRESTON
ATASCADERO
CAYUCOS
ESTERO BAY
MORRO BAY
LOS PADRES
CAMP SAN LUIS OBISPO (NATIONAL GUARD)
SANTA MARGARITA
SANTA MARGARITA LAKE
MORRO BAY STATE PARK
MORRO BAY
LOS OSOS
CAL POLY
NATIONAL
SANTA LUCIA
SAN LUIS OBISPO
WILDERNESS
FOREST
GARCIA WILDERNESS
MACHESNA MOUNTAIN WILDERNESS
POZO
LA PANZA
SIMMLER
CALIFORNIA VALLEY
MCKITTRICK
BUTTONWILLOW
SODA LAKE
CARRIZO PLAIN
LA PANZA RANGE
KERN COUNTY
TAFT
MARICOPA
CALIENTE RANGE
MONTAÑA DE ORO STATE PARK
AVILA BEACH
PORT SAN LUIS
PISMO BEACH
GROVER BEACH
OCEANO
ARROYO GRANDE
LOPEZ LAKE
NIPOMO
TWITCHELL RESERVOIR
SANTA BARBARA COUNTY
GUADALUPE
SANTA MARIA
LOS PADRES
NEW CUYAMA
CUYAMA
SIERRA MADRE MOUNTAINS
CASMALIA
ORCUTT
SISQUOC
SAN RAFAEL WILDERNESS
VENTUCOPA
VENTURA COUNTY
NATIONAL FOREST
SAN RAFAEL MOUNTAINS
DICK SMITH WILDERNESS
VANDENBERG AIR FORCE BASE
LOS ALAMOS
VANDENBERG VILLAGE
SAN ANDREAS FAULT ZONE
TEMBLOR RANGE
LOST HILLS
WASCO
0 MILES 5 10
0 KILOMETERS 10 20
©2004 CCSG.COM ELECTRONIC MAPS

Climate

The climate and air quality of San Luis Obispo County are directly related to its physical characteristics. The coastal lowlands and plains are bounded on the east by the Santa Lucia Mountains and experience a maritime climate. That climate is somewhat modified locally by elevation and distance from the ocean, as well as the mountains. The north and northeastern portions of the County include the upper end of the Salinas Valley, where the maritime climate is substantially modified by the intervening mountains. The Carrizo Plain in the east and southeastern portion of the County is climatically high desert. Because the County is located along the California coast, the weather is normally under the influence of a high pressure system located to the west. As a result, a common weather pattern includes afternoon and evening onshore winds.

San Luis Obispo County has a pleasant, Mediterranean climate year-round, averaging 315 days of sunshine per year.

Winter: 64°F / 31°F - Cool and Sunny
Spring: 75°F / 44°F - Breezy and Cool
Summer: 94°F / 54°F - Warm Coastal Mornings/Sunny Days
Fall: 77°F / 43°F - Warm Days and Cool Nights

Geography

16th largest County in California
3,316 square miles
2,114,750 acres
80 miles of coastline
Highest point: Caliente Mountain (5,104 feet)
Lowest point: Sea level

A series of ancient volcanic peaks, referred to as the “nine sisters”, lie between Morro Bay and San Luis Obispo. Most notable of the peaks is Morro Rock, often called the sentinel of the Pacific Ocean.

Economy

Historically, the economy in San Luis Obispo has been oriented to agriculture, services (including government), and tourism. After 1940, a diversified economy resulted from substantial increases in the services and trade sectors, coupled with the establishment and expansion of three large state institutions: California Polytechnic State University, Atascadero State Hospital, and the California Men's Colony (a California Department of Corrections prison).

Public utilities also employ a substantial number of residents. The trade and services sectors have continued to increase in importance and this trend is expected to persist. The projected employment growth in the trade and services sectors reflects an expanded

tourist economy and a growing local serving retail trade. Agriculture plays a large role in the County's economy, including wine grapes. Tourism and agriculture have vied for the number one industry title within San Luis Obispo County in past years, although in recent years tourism has retained the number one title.

Tourism
Tourism is a $903.9 million industry in San Luis Obispo County, creates jobs for 16,270 residents and generates $60.5 million in local and state taxes. Cities in San Luis Obispo County have a transient occupancy tax (t.o.t.) of 10%, while unincorporated areas of the County levy a 9% t.o.t.

Agriculture
Following are the 2004 top five crops by value:

Wine grapes: $127.4 million
Cattle and calves: $54.4 million
Broccoli: $54.3 million
Vegetable transplants: $30.0 million
Head lettuce: $29.5 million

Transportation Systems
The County contains major transportation arteries including U.S. Highway 101, California State Highways 1, 41, 46, 58, and 166, and the Union Pacific Railroad. The County has a regional airport near the southern portion of the City of San Luis Obispo which offers service to larger commercial airports to the north and south (Los Angeles and San Francisco, as well as flights to Phoenix and Arizona). In addition to air transportation, the County is also served with scheduled rail service by Amtrak, and motor bus service by companies such as Greyhound and Orange Belt Stages, as well as a number of tour coach operators, and local transit systems.

Major Recreation Areas
San Luis Obispo County has diverse and varied choices for recreational activities. In the north coast area of the County, recreation areas include the William Hearst Memorial State Beach and, San Simeon State Beach. In the central coast area of the County recreation areas include Cayucos County Beach, Morro Strand State Beach, Morro Dunes Campground, Morro Rock, Morro Bay, Morro Bay State Park, and Montana De Oro State Park.

In the southern coastal part of the County recreation areas include Port San Luis, Avila Beach, Pismo Beach State Beach, Oceano Dunes State Vehicular Area, Oceano Memorial County Park, and Nipomo Dunes. In addition, activities related to the wine industry, including wine tours and related events occur throughout the County.

Inland activities include Nacimiento Lake, Lopez Lake, Santa Margarita Lake, and Los Padres National Forest.

Top Attractions
Hearst Castle
Missions – Mission San Luis Obispo de Tolosa and Mission San Miguel Arcangel
Beaches – Avila, Cayucos, Morro Strand, Oceano, Pismo, San Simeon
Wineries – Paso Robles and San Luis Obispo Regions
Scenic Highway 1

California Polytechnic State University (Cal Poly), San Luis Obispo, has been rated the best public, largely undergraduate university in the west by *U.S. News & World Report* for 11 consecutive years (1992-2004). Consisting of 9,678 acres, Cal Poly is the second largest land-holding university in California, second only to the University of California, Berkeley. Famous Cal Poly alumni include:

Bobby Beathard, former general manager of the Washington Redskins and San Diego Chargers; **Peter King**, *Los Angeles Times* columnist; **Mike Krukow**, former Major League Baseball pitcher and San Francisco Giants broadcaster; **John Madden**, former coach of the Oakland Raiders and Monday Night Football color analyst; **Monty Roberts**, Author of #1 Bestseller *The Man Who Listens to Horses*; **Ozzie Smith**, former St. Louis Cardinal shortstop and member of the Major League Baseball Hall of Fame; **Frederick W. "Rick" Sturckow**, NASA astronaut; **Bill Swanson**, President and CEO, Raytheon Company; and **"Weird Al" Yankovic**, Grammy-winning parodist and entertainer.

Historical Setting
For 80 centuries, San Luis Obispo County was the heart of the Chumash Indian country. The Chumash had a rich culture and were excellent craftspeople and artists. Exploration of the land by Europeans began in 1769 at the command of Gaspar de Portola of Spain. With Portola came the Franciscan friars to begin founding the California missions and by 1772, Mission San Luis Obispo de Tolosa was established. North of San Luis Obispo along the El Camino Real trail, the 16th of 21 missions, Mission San Miguel Arcangel was built in 1797. Following the independence of Mexico and the secularization of the missions, the central coast entered the period of the rancheros from which many names of towns and places are derived.

San Luis Obispo was claimed for the United States in 1846 by General Fremont. Four years later, in 1850, California was admitted to the United States, and San Luis Obispo became one of the original counties.

Governing Body

The Board of Supervisors serves as the Legislative body of San Luis Obispo County for the planning and provision of services related to public needs and the requirements of State and Federal laws. California law provides for five Supervisors to be elected by district. Each Supervisor is elected for a four-year term. Two of the Supervisors' terms are staggered so that all Supervisors are not standing for election at the same time. As the elected representative of the people of San Luis Obispo County, the Board of Supervisors establishes overall County priorities and sets policy.

4. Hazards Facing San Luis Obispo County

List of Risk Assessment Requirements

Element	Requirement	San Luis Obispo County LHMP Response
Identifying Hazards - A	Description of the Types of Hazards Affecting San Luis Obispo County	See following table for page numbers by hazard
Profiling Hazard Events - A	Location of Hazards Identified	See following table for page numbers by hazard
Profiling Hazard Events - B	Extent of Hazards Identified	See following table for page numbers by hazard
Profiling Hazard Events - C	Information on Previous Occurrences	See following table for page numbers by hazard
Profiling Hazard Events - D	Probability of Future Events	See following table for page numbers by hazard
Assessing Vulnerability: Overview - A	Overall Summary Description of San Luis Obispo County's Vulnerability	See following table for page numbers by hazard
Assessing Vulnerability: Overview - B	Impact of Each Hazard on San Luis Obispo County	See following table for page numbers by hazard
Assessing Vulnerability: Identifying Structures - A	Description of Vulnerability in Terms of Types and Numbers of Existing Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Identifying Structures - B	Description of Vulnerability in Terms of Types and Numbers of Future Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Estimating Potential Losses - A	Description of Vulnerability in Terms of an Estimate of Potential Dollar Losses to Existing Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Estimating Potential Losses - B	Description of Vulnerability in Terms of an Estimate of Potential Dollar Losses to Future Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Analyzing Development Trends - A	Description of Land Uses and Development Trends	Pages 19 - 20

Risk Assessment Requirements Cross-Reference Table

Hazard	Location, Extent, History, Future Event Probability	Vulnerability: General Impact on People, Structures, and Infrastructure	High-level Discussion of Potential Losses
Wildfire	Pages 21 – 33	Pages 34 – 35	Pages 34 - 35
Flooding	Pages 38 - 47	Pages 47 - 48	Pages 47 - 48
Extreme Weather	Pages 51 - 53	Page 54	Page 54
Tsunami	Pages 56 - 59	Pages 59 - 60	Pages 59 - 60
Earthquakes	Pages 61 - 76	Pages 76 - 78	Pages 76 - 78
Fault Rupture / Groundshaking / Liquefaction	Pages 88 - 111	Pages 111 - 112	Pages 111 - 112
Coastal Storm / Coastal Erosion	Pages 114 - 119	Pages 119 - 120	Pages 119 - 120
Landslides / Rockslides	Pages 121 - 130	Page 131	Page 131
Naturally-Occurring Biological Threats	Pages 131 - 138	Page 138	Page 138
Insect Infestation	Pages 139 - 142	Pages 142 - 143	Page 142 - 143

Identification of Hazards

The County of San Luis Obispo is subject to potential negative impacts from a broad range of hazards and threats. There are three broad categories of hazards that threaten any jurisdiction, namely:

- Natural hazards
- Technological hazards
- Domestic security threats

The LHMP for San Luis Obispo County will be addressing natural hazards, which include:

- Wildfires
- Floods
- Extreme Weather
- Tsunami
- Earthquakes
- Fault Rupture / Groundshaking / Liquefaction
- Coastal Storm / Coastal Erosion
- Landslides / Rockslides
- Naturally-Occurring Biological Threats
- Insect Infestation

The following table describes how and why the hazards listed above were identified by San Luis Obispo County in preparing its LHMP.

Hazard	How and Why Identified
Wildfire	History of events
Flooding	History of events
Extreme Weather	History of events
Tsunami	History of events
Earthquakes	History of events; presence of fault line and geologic activity
Fault Rupture / Groundshaking / Liquefaction	History of events
Coastal Storm / Coastal Erosion	History of events
Landslides / Rockslides	History of events
Naturally-Occurring Biological Threats	Presence of biological agents such as Plague, Lyme Disease, West Nile Virus, Sudden Oak Death Syndrome and Pitch Canker
Insect Infestation	History of events

Land Use and Development Trends

Land Use

Existing land use within San Luis Obispo County is a mosaic of varying types of uses, ownership, character, and intensity. Uses include:

- Rural residential
- Single family detached
- Single family attached
- High-density residential (apartments)
- Mobile homes
- Recreational open space
- Other open space
- Heavy industrial
- Warehouse
- Vacant
- Agriculture
- Water
- Utilities
- Public facilities
- Schools
- Retail / Office
- Tourist / Commercial recreation
- Light industrial / Business park
- Mineral extraction

Development Trends

While the population of San Luis Obispo County is expected to continue growing, there are Land Use policies and elements within the County General Plan to help assure orderly development.

In addition, the Local Agency Formation Commission (LAFCO) of San Luis Obispo County is tasked with the mission to provide an orderly pattern of growth that reconciles the varied needs of the County. One of the fundamental principles of LAFCO is to ensure the establishment of an appropriate and logical municipal government structure for the distribution of efficient ad appropriate public services. LAFCO Land Use Objectives include:

- the discouragement of urban sprawl;
- the preservation of the physical and economic integrity of agricultural lands;

- the preservation of open space within urban development patterns;
- the orderly formation and development of agencies by shaping local agency boundaries;
- the minimization of agencies providing services to a given area; and
- the utilization of Spheres of Influence to guide future development of agency boundaries.

Agriculture

In terms of dollar value, agriculture is the largest industry in San Luis Obispo County, providing employment for a significant portion of the County's population. Agriculture faces continual pressure from urbanization, foreign competition, and rising production costs. Despite these pressures, those areas which remain in agricultural production represent a significant open space and economic resource for the County.

The San Luis Obispo County General Plan defines productive agricultural lands as those which are "involved in long-term, substantial investment to agricultural use, and which has a long-term economic viability for agricultural use." Some of the factors affecting the economic viability of these areas include weather, water prices, crop selection, management techniques, commodity prices, new technology, and proximity to developed lands.

Because of the importance of agriculture to San Luis Obispo County, effects on agriculture are assessed for most of the hazard types identified in this LHMP.

Hazard: Wildfires

Severity: High - Very High	Probability: High - Very High

Hazard Definition

A wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated.

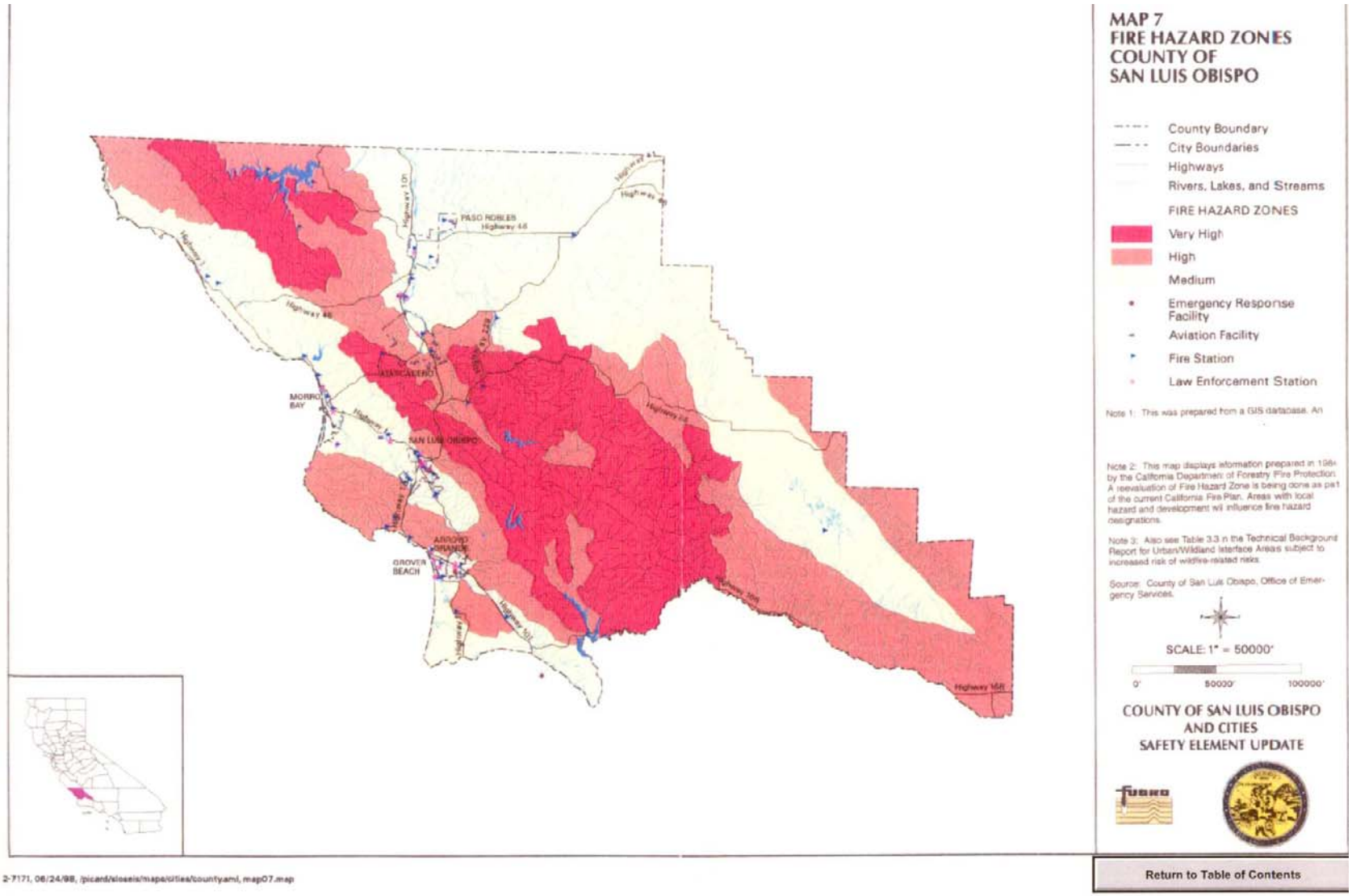
While some wildfires start by natural causes, humans cause four out of every five wildfires. Wildfires started by humans are usually the result of debris burns, arson, or carelessness. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The predominate dangers from wildfires are:

- The destruction of vegetation, property, wildlife; and
- Injury or loss of life to people living in the affected area or using the area for recreational facilities.

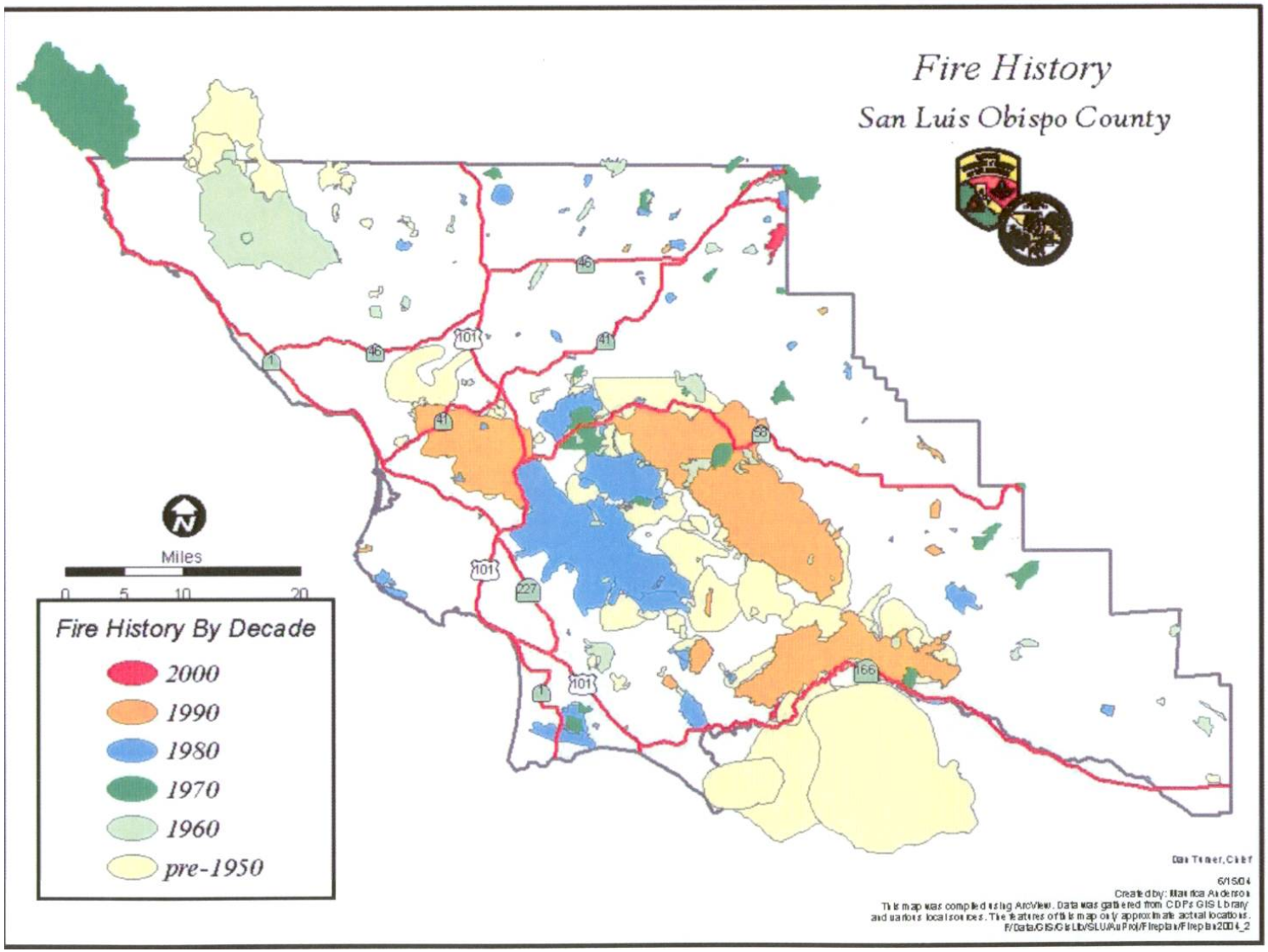
History

The climate in San Luis Obispo County is generally referred to as "Mediterranean" with warm dry summers and relatively cool, moderately wet winters. Rainfall throughout the County occurs primarily between November and April, and ranges between 20-25 inches per year in the coastal areas, to less than 10 inches per year in inland areas. Climatic conditions throughout the County range from the cool, damp coastal areas, to hot and dry inland areas. Because summers are generally warm and dry, the risk of wildfires is highest in late summer and early fall. Fog and cool weather that are common in the coastal regions help to maintain moisture levels in vegetation along the coast, which helps to minimize fire risk. The hot and dry conditions of the Santa Lucia Mountains and the inland plains and valleys of the County, however, can quickly desiccate vegetation resulting in an increased fire risk.

San Luis Obispo County Fire Hazard Zones and Fire History by Decade are shown on the following maps.



Return to Table of Contents


Fire History
San Luis Obispo County
Miles
0 5 10 20
Fire History By Decade
2000
1990
1980
1970
1960
pre-1950
Dan Turner, Cdf
6/15/04
Created by: Maurica Anderson
This map was compiled using ArcView. Data was gathered from CDPs GIS Library and various local sources. The features of this map are approximate actual locations.
F:\Data\GIS\GisLib\SLU\AuProj\Fireplan\Fireplan2004_2

Other weather-related elements can have complex and important effects on wildfire intensity and behavior. Wind is of prime importance because as wind velocity increases, the rate of fire spread also increases. Gusty and erratic wind conditions can cause a fire to spread irregularly, making it difficult to predict its path and effectively deploy fire suppression forces. Relative humidity is also an important fire-related weather factor. As humidity levels drop, the dry air causes vegetation moisture levels to decrease, thereby increasing the likelihood that plant material will ignite and burn.

Fuels and Topography

A large portion of the County is covered by natural vegetation. This vegetation can be grouped into approximately 14 regimes, each of which contributes varying degrees to fire hazard severity. Table 4-1 depicts general vegetation communities that are found throughout the County, and their likely relative fire hazard severity rated by fuel conditions only. The likely fire hazard severity depicted in the table can be influenced by many factors, including the age of vegetation, accumulation of dead plant material, vegetation management programs that may have been implemented, period of time since a stand of vegetation was last burned, historic climate, and topography of the region. Chaparral plant communities present the most significant fire hazard severity, as this type of vegetation burns with intense heat and the amount of fuel available to burn can be very high if the area is not properly managed or has not been recently burned. Controlled burning is one method that can greatly reduce the fire hazard severity for a given area. In developed areas, some ornamental plantings can provide hazardous fuel loading. A significant increase in dead material as the result of insect or disease infestations can lead to a much higher fire hazard. The pitch canker infestation in Cambria is an example of this problem.

Steep terrain also plays a key role in the rate at which wildfires spread, as fires will normally burn much faster uphill. Generally, when the gradient of a slope doubles, the rate of spread of a fire will also double. Steep topography also channels air flow, thereby creating erratic wind patterns. Fire suppression in steep areas is also complicated by limited accessibility, and the effectiveness of firefighters and equipment are hampered by lack of access roads.

Table 4-1: Likely Fire Hazard Severity Rated by Fuel Conditions Only

Very High	High	Moderate
Chaparral	North Coast Scrub	Riparian Woodland
	Foothill Woodland	North Coast Grassland
	Juniper Oak Woodland	Evergreen Forest
		Interior Herbaceous
		Desert Scrub
		Beach-Dune
		Coastal Sand-Plains
		Saline Plains
		Coastal Salt Marsh
		Freshwater Marsh

Historic Wildfires

San Luis Obispo County has one of the worst fire environments in the State of California for large damaging wildfires. The Las Pilitas, Chispa, Highway 41, Highway 58 and the Logan, were all large damaging fires, that combined, consumed approximately 300,000 acres, scores of homes and cost millions of dollars to suppress.

Most recently, the Logan fire that occurred in 1997, burned 50,000 acres and cost $6 million to extinguish. No structures were lost in the Logan fire. Also, the Highway 41 and Highway 58 fires that occurred in 1994 and 1996 caused widespread and substantial damage. The Highway 41 fire resulted in the destruction of 42 homes, 61 other structures, and 91 vehicles. It also cause massive power outages, shut down two major highways for over 24 hours and destroyed public radio and television transmissions. A total of 48,531 acres were burned and an estimated $10,000,000 in property loss damages occurred. The Highway 58 fire burned 106,668 acres and resulted in the loss of homes and 14 other structures.

A summary of major wildfires that have occurred in San Luis Obispo County is provided on Table 4-2. This table, however, does not list the numerous smaller fires that have occurred throughout the County. Several areas of the County that have been subject to a high number of smaller fires 50-500 acres in size include the Santa Margarita area and areas west of Nipomo. Still another location with a high occurrence of wildfires is near the Nacimiento Reservoir, located in the northwest portion of the County.

Table 4-2: Major Wildfires in San Luis Obispo County Since 1931

Location	Date of Incident	Declaration	Intensity	Reported Damage	Number Injured	Structures Affected	Incident Description	Source
Atascadero	?/1931			28,000 acres			Wildfire. Portola Road	SE
San Luis Obispo County	?/1933			15,000 acres			Wildfire. Rinconada Area	SE
San Luis Obispo County	?/1937			10000 acres			Wildfire. Hearst Ranch	SE
San Luis Obispo County	?/1939			15, 000 acres 30,000 acres			Wildfire. Cerro Alto Wildfire. American Canyon	SE
San Luis Obispo County	?/1947			10,000 acres			Wildfire. Cuyama Highway	SE
San Luis Obispo County	?/1950			17,000 acres 33,000 acres 10,000 acres			Wildfire. Pine Ridge Huasna Wildfire. Pilitas Wildfire. Hillman Ranch	SE
San Luis Obispo County	?/1953			13,500 acres			Wildfire. Buckhorn Ranch	SE
San Luis Obispo County	?/1960			50,000 acres			Wildfire. Weffering	SE
San Luis Obispo County	?/1970			44,000 acres 20,000 acres 20,000 acres			Wildfire. Buckeye Wildfire. Shell Creek Wildfire: Alfalfa Ranch	SE
San Luis Obispo County	?/1985			75,000 acres $1.2M		12 homes, loss of some buildings	Wildfire. The Las Pilitas fire burned into the City of San Luis Obispo.	SE
San Luis Obispo County	?/1989			10,000 acres		4 homes, $250,000	Wildfire. Santa Margarita and Chispa Road	SE
San Luis Obispo County	?/1994			49,000 acres $10M		42 homes, 61 other structures, 91 vehicles	Wildfire. Highway 41 fire also caused massive power outages, shut down two major highways for over 24 hours and destroyed public radio and television transmissions. Even vital firefighting communication links were destroyed. The fire burned into the City of Atascadero and threatened the City of San Luis Obispo.	SE/FMP
San Luis Obispo County	?/1996			106,000 acres $1M		13 homes, 14 structures, and vehicles	Wildfire. Highway 58	SE
San Luis Obispo County	?/1997			50,000 acres $6M			Wildfire. Highway 166 (Logan Fire)	SE
San Luis Obispo County	?/2002			1000 acres $500,000		2 homes	Wildfire. Highway 58	
San Luis Obispo County	?/2003			1200 acres $600,000		3 homes	Wildfire. Parkhill	FMP

SE: County Safety Element NCDC: National Climatic Data Center NOAA: National Oceanic & Atmospheric Administration FMP: CDF/San Luis Obispo Fire Management Plan

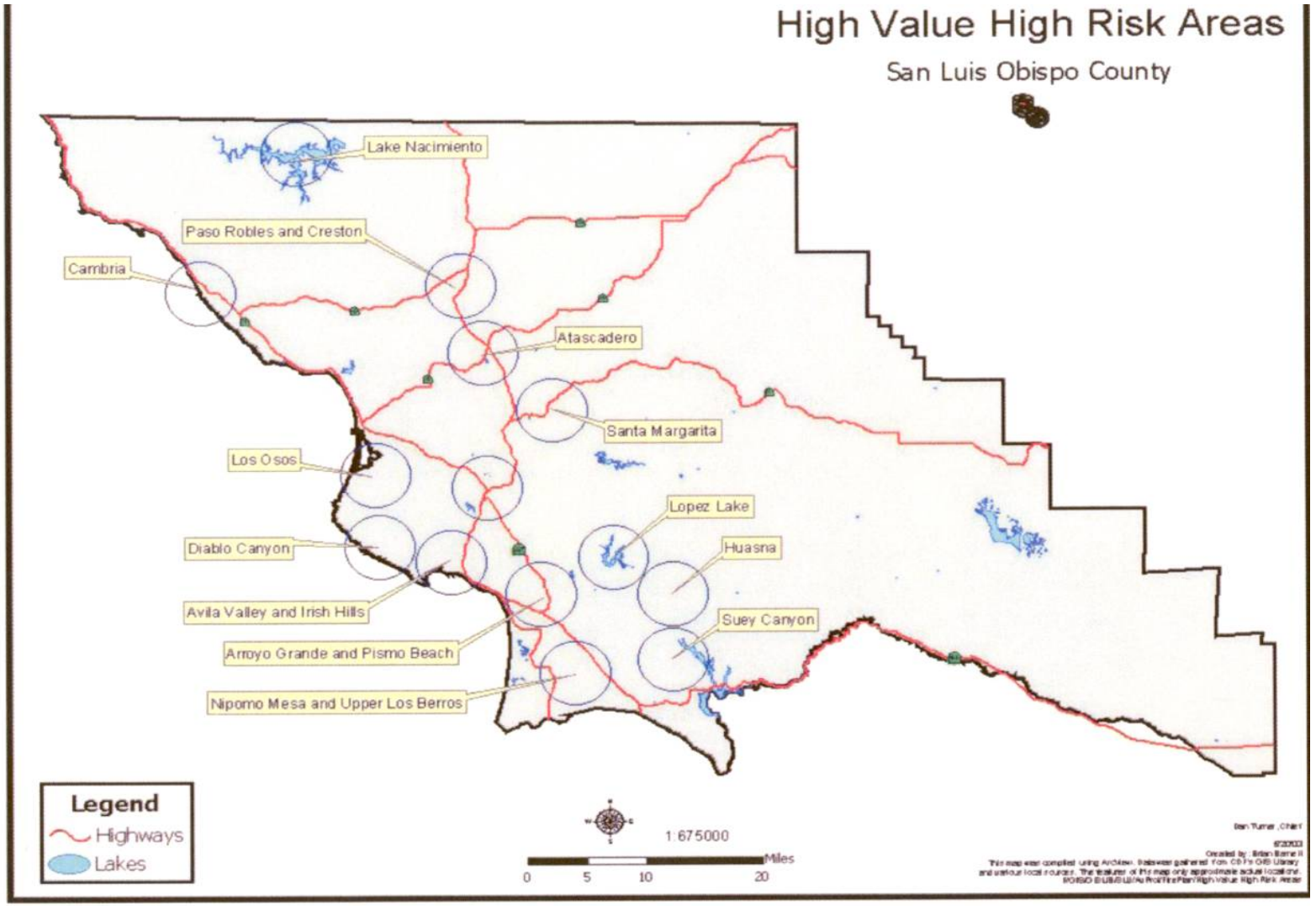
Risk Assessment

San Luis Obispo County is exposed to a variety of wildfire hazard conditions ranging from very low levels of risk along the coastal portions of the County, to extreme hazards in the inland and chaparral covered hillsides of the Santa Lucia Mountains. CDF has undertaken a program to map areas of potential wildfire risk, and to describe the potential for wildfires to occur in a given area, several risk classifications have been used.

Currently, fire hazard severity is a function of fuel conditions, historic climate, and topography. Population density or the number of structures in a particular region are not currently used to determine the fire hazard severity for a particular region. Areas throughout the County have been designated as having a "Very High Severity Hazard," "High Hazard," or "Moderate Hazard." In San Luis Obispo County, most of the area that has been designated as having a "Very High Severity Hazard" is located in the Santa Lucia Mountains, which extend from Monterey County to the north, to Santa Barbara County to the south. These areas exhibit the combination of vegetative fuel, topography, and human proximity that contribute to an extreme fire hazard potential. The fact that an area is in a Moderate Hazard designation does not mean it cannot experience a damaging

fire. It only means that the probability is reduced, generally because the number of days a year that the area has "fire weather" is less.

A wildfire high-value high-risk area map is depicted on the following map.


High Value High Risk Areas
San Luis Obispo County
Lake Nacimiento
Paso Robles and Creston
Cambria
Atascadero
Santa Margarita
Los Osos
Lopez Lake
Diablo Canyon
Huasna
Avila Valley and Irish Hills
Suey Canyon
Arroyo Grande and Pismo Beach
Nipomo Mesa and Upper Los Berros
Legend
Highways
Lakes
1:675000
Miles
0
5
10
20

Unincorporated communities within the County that are subject to increased wildfire risks are generally those communities like Cambria and Atascadero where development has resulted in the creation of an wildland/urban inteface. Table 4-3 on the following page identifies communities that are located in or near wildland areas and that have an increased risk of wildfire-related hazards. These areas are identified in the high-value high-risk area map. When residential development occurs within or adjacent to an area that has a high wildfire hazard severity, the ability of fire fighting forces to combat a fire may also be impaired.

When residences are located in the vicinity of wildfire, typical fire fighting techniques, such as the use of backfires, may not be feasible. Additionally, fire fighting equipment and personnel may be used for structure protection, instead of being used to fight the fire. This results in the need for additional equipment to effectively minimize structural losses and to control the fire. Some unincorporated communities located within the County are not confronted with a high wildfire risk. These communities include much of Cayucos, and Oceano. This low wildfire risk results primarily from the type of vegetation that is dominant throughout these areas. The low-growing native grasses and shrubs found in these communities present a minimal vegetative fuel source and a corresponding low wildfire risk. Additionally, in the coastal communities, cool marine influenced temperatures and relatively high humidity levels help to minimize potential wildfire risks.

Table 4-3: Wildland/Urban Interface Areas of San Luis Obispo County

Location	Description
Cambria	This area contains extensive stands of oaks, laurel, madrone and Monterey Pine. The location of residences intermixed within this vegetation increases the potential wildfire hazard.
Los Osos	Residential development that has occurred in the foothill areas around Los Osos and Montana De Oro State Park are intermixed with native vegetation.
Avila Valley and Irish Hills Areas	Development in the areas around Indian Knob, Squire Canyon, See Canyon, and Perfumo Canyon are intermixed with extensive stands of native vegetation.
Arroyo Grande and Pismo Beach Areas	Development to the north and east of the City of Arroyo Grande is intermixed with dense vegetation and many areas have limited access. The Pismo Heights area has residences build above vegetated steep slopes.
Nipomo Mesa and Upper Los Berros Areas	Residential development in the Nipomo Mesa areas are subject to wildfire risks from extensive stands of eucalyptus trees. As development occurs, however, the removal of eucalyptus trees reduces potential fire risks. The Upper Los Berros area has limited access, is isolated and has dense vegetation and an increasing number of residences.
Suey Canyon	This area is located in the southern portion of the County, north of Highway 166. Development in this area is fairly isolated and removed from fire suppression services.
Huasna	Development in this area is relatively isolated and removed from fire suppression services.
Lopez Lake	Development around the lake is intermixed with native vegetation and often h as access difficult for fire suppression vehicles.
Santa Margarita Areas	Development areas near Santa Margarita, Pozo, La Panza, and Huerhuero, are intermixed with native vegetation and often have steep slopes and difficult access conditions.
Atascadero Area	Development in and around the City of Atascadero is intermixed with large stands of native vegetation.
Paso Robles and Creston Areas	Development west of Paso Robles includes residences that are intermixed with native vegetation.
Lake Nacimiento Areas	Developments in the Heritage Ranch, Oak Shores, Bee Rock, York Mountain, Santa Rita, Adelaide, and Running Dear Ranch include residences that are intermixed with native vegetation.
Diablo Canyon	A nuclear power plant and its critical power grid sit in a densely vegetated canyon with a long response for wildland fire suppression.
San Luis Obispo Areas	The San Luis Obispo City and the surrounding area intermix with the wildlands on all sides.

Local Area Wildfire Hazards

Arroyo Grande area

The majority of Arroyo Grande is located in a generally flat valley that has been developed with urban and agricultural uses. The northern and eastern portions of the City, however, are hilly and contain parcels that are within or contiguous to grassland and forested areas. Fire protection for the residences located within these wildland/urban interface zones may be constrained by heavy fuel loads, steep slopes, limited access, and in some areas, limited water supplies.

Atascadero area

Wildfire and urban fire hazards are closely related in Atascadero as a result of extensive residential development that has occurred in the hilly portions of the City where flammable grassland, chaparral and oak woodland habitat is located. Much of the City can be described as being wildland/urban interface area. Several areas in Atascadero qualify as Bates-rated areas, indicating a very high hazard potential for wildfire at the urban edge. Factors that contribute to an elevated fire risk in these areas are described below.

Microclimate. Localized afternoon winds from the northwest are common in the western portion of the City. These winds are associated with inland valley heating and cooler air currents flowing from the ocean. These gusty winds can cause a grass fire to spread and shift direction in a rapid and unpredictable manner.

Topography. Much of the residential development within the City has occurred in areas with moderate to steep topography. Areas that exceed 30 percent slope are subject to rapid flame spread, and often have poor access for fire suppression equipment.

Vegetation. Areas of the City with dense stands of chaparral vegetation face an elevated risk of wildfire. In areas where chaparral vegetation has not been burned in more than 20 years, fuel loading (the amount of vegetation that is available to be burned) averages from 7 to 10 tons per acre. Drainages with oak woodlands have fuel loading that can exceed 15 tons per acre. Chaparral vegetation contains a variety of compounds, such as waxes, turpentine, and resins that cause this type of vegetation to burn intensely and at extremely high temperatures. Air temperatures in chaparral fires can exceed 1,500 degrees. The intensity of the fire that results from chaparral vegetation makes it difficult to extinguish.

Grover Beach area

Grover Beach is not confronted with a significant wildfire hazard because of its location on the coast away from vegetated hillsides. High humidity levels and cool ocean-influenced temperatures also limit the potential for wildfires to occur. Open areas

containing annual grasses are present in areas throughout the City, but do not represent a major wildfire risk.

Morro Bay area

Morro Bay is not confronted with a significant wildfire risk, primarily due to the type of vegetation that is found throughout the City. Vegetation in the area is mostly limited to low-growing grasses and scattered shrubs, characteristic of disturbed north coastal grasslands habitat. High humidity levels and cool ocean-influenced temperatures also limit the potential for wildfires to occur. Areas of the City near Morro Bay State Park contain some native vegetation that present a moderate wildland/urban intermix fire hazard. However, because these areas are not contiguous to other high fire hazard areas, they do not present a significant wildfire risk.

Paso Robles area

Paso Robles is located in the Salinas River Valley, adjacent to the foothills of the Santa Lucia Mountains. Extensive oak woodlands, grasslands, and chaparral communities occur in the vicinity of Paso Robles, and present a high wildfire risk. The risk of wildfire within the City of Paso Robles, however, is moderate because most development has occurred in the flatter portions of the City, away from the flammable foothill vegetation. Developed areas that are adjacent to significant stands of native vegetation and that may be subject to wildfire hazards are located in incorporated areas west of the City. A fire that begins in this area could migrate towards the City posing potential wildfire risks. Future residential development within the City is most likely to occur in the eastern portion of the City. While not as mountainous as the areas further to the east, this portion of the City is also adjacent to areas containing significant amounts of native vegetation. Therefore, there is the potential for a wildfire to affect this part of the City.

City of Pismo Beach

Wildland fires are a threat to some extent in the City of Pismo Beach.

City of San Luis Obispo area

The City of San Luis Obispo is confronted with one of the more hazardous wildfire risks in the County because of its location near the foothills of the Santa Lucia Mountains and the Irish Hills. For planning purposes, the entire perimeter of the City should be considered as a wildland/urban interface area. Specific areas with an increased wildfire hazard include the foothills northeast and southwest of the City and on Cerro San Luis Obispo, Bishop Peak, Chumash Peak, and Islay Hill. Although the Las Pilitas and Highway 41 fires that occurred in 1985 and 1994 did not result in property losses within the City limits, structures in the City were threatened by these fires. The Fire Prevention Code that has been adopted by the City considers all areas within the jurisdictional limits of the City to be subject to regulations pertaining to hazardous fire areas, such as requiring the installation of fire resistive roofing materials.

Existing Fire Protection Services

San Luis Obispo County

Services to San Luis Obispo County are provided by the California Department of Forestry and Fire Protection (CDF) under contract to provide full service fire protection, the County of San Luis Obispo, fire protection districts, community service districts, and volunteer fire companies. The CDF is responsible for the administration of the fire stations that serve the unincorporated areas of the County not within fire protection or other special districts, and provides equipment and training for the volunteer stations.

Ordinances and Regulations

Several local ordinances direct fire prevention activities within San Luis Obispo County. These include Chapter 19.20, Construction Standards of Title 19, of the County Code; as well as Section 22/23.05.050 et. seq. of the Land Use Ordinance and Coastal Zone Land Use Ordinance. These sections of Titles 22 and 23 contain standards pertaining to the preparation and review of fire safety plans, fire safety standards, site access, and driveway requirements. In addition, the California Fire Code has been adopted by San Luis Obispo County with amendments as part of County Ordinance Title 16.

Other Jurisdictions

Fire suppression and fire prevention services are provided within the following communities by the designated entities:

- Los Osos: Los Osos Community Services District: CDF/County Fire Department through contract services
- Arroyo Grande: City of Arroyo Grande Fire Department
- Atascadero: City of Atascadero Fire Department
- Grover Beach: Grover Beach Fire Department
- Morro Bay: Morro Bay Fire Department
- Paso Robles: Department of Emergency Services
- Pismo Beach: CDF/County Fire Department, through contract services
- San Luis Obispo: City of San Luis Obispo Fire Department
- Avila Beach: CDF/County Fire Department, through contract services

Cayucos, Cambria, Nipomo, and Oceano

Each of these communities is developed with primarily low-density residential uses with supporting commercial uses. With the general absence of dense or hazardous land uses, basic fire protection and response needs are met by providing a minimum level of structural fire protection. However, Cambria and Nipomo's fire needs are greater because their intermixed wooded areas are wildland/urban representing a higher level of

risk than the other coastal communities. Fire protection services could be improved in these communities by providing additional fire fighting equipment, increasing water supplies, and continuing to add full-time professional fire fighting personnel to augment existing volunteer forces. As density increases and if fuel conditions become more hazardous in areas like Nipomo and Cambria, these areas may require additional mitigation measures and fire protection.

- **Effects on people and housing.** In addition to damage to natural environments, wildfires result in a high risk for personal injury, loss of life to inhabitants of the fire area and firefighters, and losses of structures and personal property.

- **Effects on commercial and industrial structures.** As mentioned in the historic wildfires the effects on commercial and industrial structures can be significant. Many of the fires resulted in damaged or destroyed structures.

- **Effects on infrastructure.** Public utilities are often strained by the impacts of wildfire, including depletion of water reserves, downed power lines, disrupted telephone service and blocked roads. Furthermore, flood control facilities may be inadequate to handle an increase in storm runoff, sediment, and debris that is likely to be generated from barren, burned over hillsides.

- **Effects of agriculture.** Effects on agriculture can be devastating. In addition to the obvious impacts on crops and animals, wildfire can have deleterious effects on soil and water that will impact agriculture for an extended period of time.

Relationship to Other Hazards – Cascading Effects

Major wildfires can completely destroy ground cover. If heavy rains follow a major fire, flash floods, heavy erosion, landslides and mudflows can occur. After a wildfire stops burning, the burned land is laid bare of its protective vegetation cover and is susceptible to excessive run-off and erosion from winter storms. The intense heat from the fire can also cause a chemical reaction in the soil that makes it less porous, and the fire can destroy the root systems of shrubs and grasses that aid in stabilizing slope material. These cascading effects can have ruinous impacts on people, structures, infrastructure, and agriculture.

Risk assessment conclusion: In summary, the risk of wildland fire in San Luis Obispo County is High to Very High. The fuels, topography and weather conditions of the County present natural circumstances for wildland fires. This risk is increased when development is located in wildland/urban intermix areas, such as hillside and canyon areas. The additional fire risk associated with residential development in urban fringe areas results from the proximity of structures to flammable vegetation, the increased

distance from fire protection services, limited access, and potential for low fire flows for combating fires.

Plans and Programs

The California Department of Forestry and Fire Protection (CDF), U.S. Forest Service (USFS), and the Bureau of Land Management (BLM) have entered into mutual aid agreements for the purpose of wildfire protection in San Luis Obispo County. Mutual aid agreements are reciprocal arrangements in which fire protection agencies share personnel and equipment during emergency situations. Cities and fire protection districts are also participants in various mutual aid and auto aid agreements, including the State Master Mutual Aid Agreement.

The Public Resources Codes (PRC) 4290 and 4291 are State laws that have a significant impact on the prevention of large losses of life and property in the wildland/urban intermix areas from a destructive wildfire. The intent of these codes is to require new development in wildfire prone areas to be built with adequate road access, water for firefighting, addressing, fire resistive construction, and vegetation clearance. The code also requires the owners to maintain an adequate defensible space around their buildings from an approaching fire. These laws are an important component in the land use approval process in the County as well as in enforcement by the fire department.

A number of steps have been taken by San Luis Obispo County to reduce the potential for wildfires. Although these measures cannot eliminate the risk of wildfire related damages, they will help to substantially reduce the associated risk. Wildfire hazard reduction measures generally include implementation by the County of the following precautions:

Use fire resistant building materials and construction methods. Standards have been adopted to reduce the use of combustible building materials in high fire hazard areas. Standards for fire resistive building materials and construction methods are provided by the California Building Code and the Public Resources Code.

Provide defensible space around structures. This broad measure as implemented in the County includes a number of specific actions that are taken to minimize wildfire risks. Providing a defensible space area around a structure serves a dual function of limiting fuel for the fire to approach the structure, as well as providing a position from which fire fighters can combat the blaze. Wildfire risk reduction and management practices enforced in the County include the removal or thinning of highly combustible vegetation, the use and maintenance of fire resistant plantings, providing clearings around structures and other combustible materials, and the implementation of a variety of other fuel reduction and fire prevention/ suppression measures.

Provide adequate water supply. Water that is used for fire suppression purposes, and the pressure under which it is delivered, is referred to as “fire flow.” The fire flow that

would be required for a specific development is dependent upon a variety of factors, including the type of construction, the use or occupancy of the structure, and the location of surrounding structures. For residential development, the County determines adequate fire flow ranges to be a minimum of 1,000 gallons per minute at 20 psi, for a minimum of two hours.

Provide adequate access. Adequate access to structures includes providing roadways that are passable by large fire-fighting equipment. This requires roadways to have adequate widths, as well as gradients, bridges, and turn-around areas that accommodate fire trucks.

Fire Prevention and Response

Fire prevention is a primary objective and the major activity of fire departments both in urban and rural areas of the County. After a fire starts, it is the objective of the fire department to minimize the damage to life and property.

California Fire Code
This code may be adopted by local jurisdictions, with amendments, and provides minimum standards for many aspects of fire prevention and suppression activities. These standards include provisions for access, water supply, fire protection systems, and the use of fire resistant building materials.

California Health and Safety Code and the California Building Code
The Health and Safety Code provides regulation pertaining to the abatement of fire related hazards. It also requires that local jurisdictions enforce the California Building Code, which provides standards for fire resistive building and roofing materials, and other fire-related construction methods.

Title 19 of the California Code of Regulations
These regulations pertain to fire prevention and engineering measures for State Fire Marshal regulated occupancy.

Public Resources Code and Title 14 of the California Code of Regulations
These regulations provided statewide fire prevention and suppression standards in the wildlands.

Assembly Bill 337 (Bates Bill)
In response to the Oakland Hills fire of 1991, this bill was passed in 1992 and requires brush clearance and fire resistant roof material (Class A or B) to be used on all new construction that is located in areas designated as being a “Very High Fire Severity Zone”. Atascadero is the only city in the County that has an area designated as a Very High Fire Severity Zone.

San Luis Obispo County Fire Prevention and Response Activities

In addition to the measures outlined above to prevent and best respond to fires, the County has undertakes a variety of other activities including an aggressive inspection program, a County-wide Fire Safe Council, a vegetation management program, completing the removal of fuel through a chipping program, creation of community separators and pre-planning major wildfire scenarios in the high and very high fire danger areas (includes evacuation plans and pre-plans).

Fires impact an array of agencies, organizations and citizens known as stakeholders. These stakeholder are represented on the San Luis Obispo County Community Fire Safe Council. The purpose of the Council is to bring these representatives to the table to discuss solutions for the prevention and reduction of losses from fire. The primary objective and purpose of the San Luis Obispo County Community Fire Safe Council is to provide education, exchange information and foster fire prevention and fire safety within the County of San Luis Obispo. The San Luis Obispo County Community Fire Safe Council plays a vital roll in the development and implementation, and reviews all elements of the Fire Management Plan. This practice ensures buy-in from the stakeholders.

Hazard: Flooding

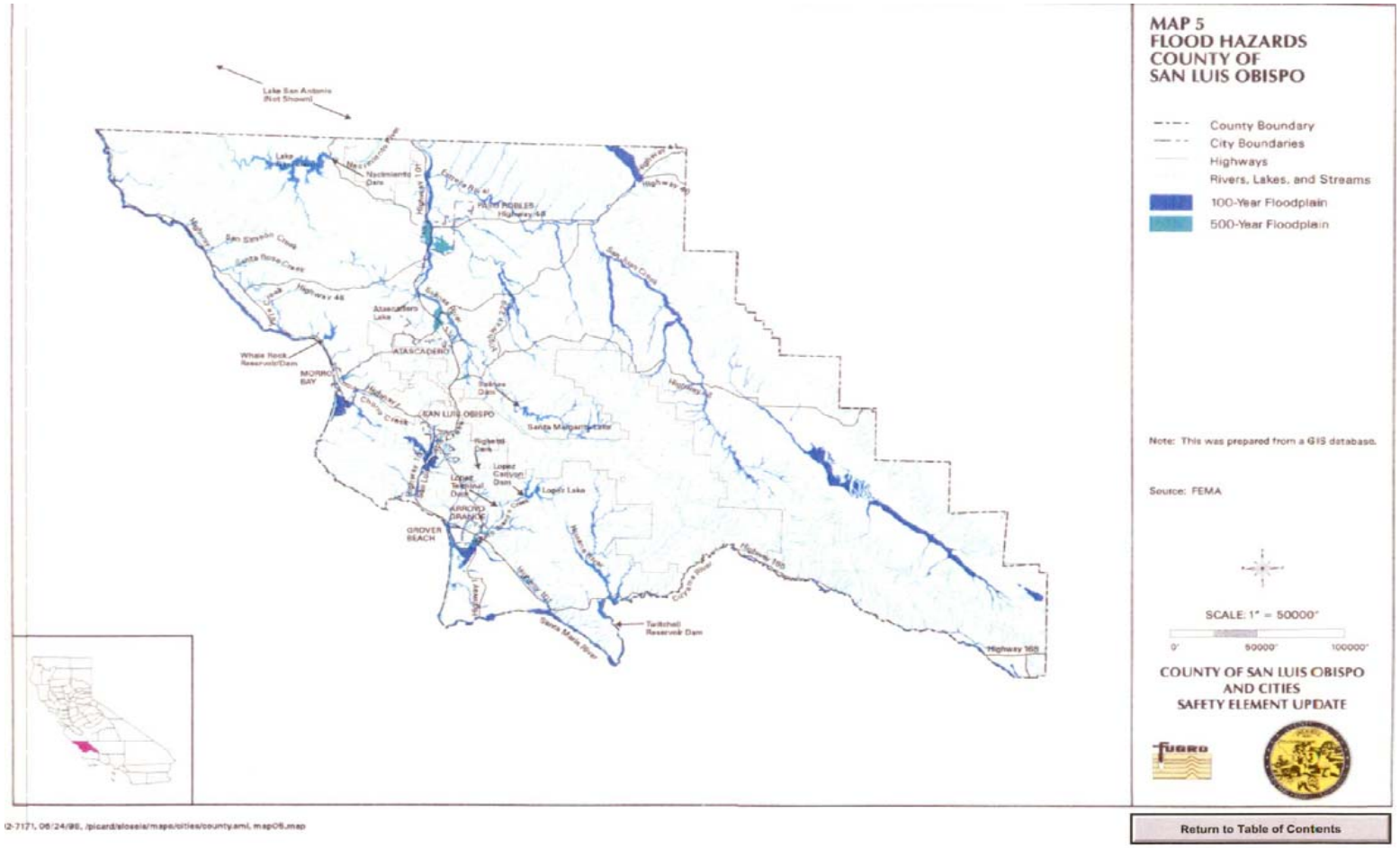
Severity: Medium	Probability: Medium

Hazard Definition

A flood is defined as an overflowing of water onto an area of land that is normally dry. Floods generally occur from natural causes, usually weather-related, such as a sudden snow melt, often in conjunction with a wet or rainy spring or with sudden and very heavy rainfalls. Floods can, however, result from human causes as a dam impoundment bursting.

For floodplain management purposes, the following discussion describes the Federal Emergency Management Agency (FEMA) definition of “100-year flood.” The term "100-year flood" is misleading. It is not a flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1 percent chance of being equaled or exceeded each year. Thus, a 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. A structure located within a special flood hazard area shown on a map has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage.

The following map (Map 5 from the San Luis Obispo County Safety Element) depicts the 100-year and 500-year floodplain.


MAP 5
FLOOD HAZARDS
COUNTY OF
SAN LUIS OBISPO
County Boundary
City Boundaries
Highways
Rivers, Lakes, and Streams
100-Year Floodplain
500-Year Floodplain
Note: This was prepared from a GIS database.
Source: FEMA
SCALE: 1" = 50000'
0'
50000'
100000'
COUNTY OF SAN LUIS OBISPO
AND CITIES
SAFETY ELEMENT UPDATE
Return to Table of Contents
Lake San Antonio
(Not Shown)
Nacimiento Dam
Highway 101
PASO ROBLES
Highway 46
Highway 46
San Simeon Creek
Santa Rosa Creek
Atascadero Lake
ATASCADERO
Whale Rock Reservoir/Dam
MORRO BAY
Highway 1
Chorro Creek
SAN LUIS OBISPO
Santa Margarita Lake
Los Osos Creek
Laguna Lake
Lopez Canyon Dam
Lopez Lake
ARROYO GRANDE
GROVER BEACH
Highway 1
Highway 101
Santa Maria River
Twitchell Reservoir Dam
Highway 166
Salinas River
San Juan Creek

History

San Luis Obispo County has experienced severe flooding events that have resulted in extensive property damage. Flooding hazards are most likely to exist along major river and stream courses including the Salinas River, San Luis Obispo Creek, Santa Rosa Creek, Arroyo Grande Creek, Morro Creek and Huerhuero Creek. Areas that have been recently affected by flooding impacts are the areas most to be likely to be affected by future events. Therefore, a historical perspective of the effects of recent flood events can provide useful insight in land use planning and reduction of future flood hazard risks.

January-February, 1969. In January of 1969, a series of storms delivered rainfall totals that ranged from approximately 12 inches in Paso Robles, to 21 inches in San Luis Obispo over an eight-day period. In February, another series of storms delivered over 5 inches of rain in Paso Robles and 9.5 inches in San Luis Obispo. In a report prepared by the U.S. Army Corps of Engineers, the following account of storm-related damage was provided:

> "The most severe damages to urban property occurred in the City of San Luis Obispo, where the San Luis Obispo Creek channel became clogged with debris and flow in the channel overtopped the channel banks and moved down the main streets of the City. Massive mobilization efforts during and after the January flood by the City of San Luis Obispo and the Corps of Engineers prevented additional damages to urban property during the February flood. Severe damages were sustained by streets, highways, and utilities throughout the County. The water-supply system of Cambria was damaged in the floods and large parts of the town were without electricity; residents were advised to drink only boiled water because of the possibility that the local water supply might be contaminated. The destruction and damage of sewer lines and sewage-treatment plants at many locations posed a threat to the lives and health of many residents.
>
> The sewage-treatment plants at Morro Bay, Avila Beach, and Pismo Beach were inundated by both floods. Debris and raw sewage piled up on the beaches and carried in the streams posed serious threats to health until emergency cleanup operations were completed."

January, 1973. Much like the floods of 1969, the 1973 storm produced a ten-hour period of unusually heavy rainfall. San Luis Obispo Creek, and its tributary, Stenner Creek, overtopped their banks and inundated a wide area of downtown San Luis Obispo.

January and March, 1995. Serious flooding occurred in all coastal and many inland streams. San Luis Obispo Creek caused damage in the City of San Luis Obispo, and especially near the ocean, where the San Luis Bay Golf Course and other properties received extensive damage. Cambria was completely inundated, with water as deep as six feet on Main Street.

Table 4-4: List of Major Floods in San Luis Obispo County

Location	Date of Incident	Declaration	Intensity	Reported Damage	Number Injured	Structures Affected	Incident Description	Source
San Luis Obispo County including Paso Robles, San Luis Obispo, Morro Bay, Avila Beach, Pismo Beach	January - February 1969		12 to 21 inches of rain				Flooding. In January of 1969, a series of storms delivered rainfall totals that ranged from approximately 12 inches to 21 inches over an eight-day period. In February, another series of storms delivered over 5 inches of rain. The most severe damages to urban property occurred in the City of San Luis Obispo, where the San Lus Obispo Creek channel became clossed with debris and flow in the channel overtopped the channel banks and moved down the main streets of the City. Severe damages were sustained by streets, highways, and utilities throughout the County. The water-supply system in Cambria was damaged and large parts of the town were without electricity. The sewage-treatment plants at Morro Bay, Avila Beach, and Pismo Beach were inundated by both floods.	SE
City of San Luis Obispo	January, 1973						Flooding. This storm produced a ten-hour period of unusually h eavy rainfall. San Luis Obispo Creek, and its tributary, Stenner Creek, overtopped their banks and inundated a wide area of downtown San Luis Obispo.	SE
City of San Luis Obispo, Cambria	January and March, 1995						Flooding. Serious flooding occurred in all coastal and many inland streams. San Luis Obispo Creek caused damage in the City of San Luis Obispo, and expecially near the ocean, where the San Luis Bay Golf Course and other properties received extensive damage. Cambria was completely inundated with water as deep as six feet in some areas	SE
Cambria	2/22/1993		2 1/2 inches of rain	$500,000	0	4 businesses and several residences	Flash Flood. Two and one half inches of localized heavy rain in a two hour period caused flooding damage to four business and several residences	NCDC
Southern San Luis Obispo	5/5/1998				0	0	Flash Flood. Heavy rain produced flash flooding and mudslides across Southern San Luis Obispo County and closed portions of Highway 166	NCDC
Coastal Flooding including San Luis Obispo County	1/11/2001				0	0	Coastal Flooding. An extremely large swell, combined with high astronimical tides, produced heavy surf and flooding of coastal areas along Central and Southern California.	NCDC
San Luis Obispo County, including Nipomo, Arroyo Grande, Oceano and Pismo Beach	3/5/2001		2 to 13 inches of rain		0	Over 30 homes and 5 classrooms damaged	Coastal Flooding. A powerful and slow-moving storm brought heavy rain, strong winds and snow to Central and Southern California. Across San Luis Obispo County rainfall totals ranged from 2 to 6 inches over coastal and valley areas to 6 to 13 inches in the mountains. In San Luis Obispo County, the heavy rain produced numerous flooding. In Oceano, the Arroyo Grande Creek overflowed, destroying numerous crops and damaging one home. Also, the Pacific Dunes RV Park was flooded, stranding several residents. In Arroyo Grande, flooding along Corbett Creek damaged 4 homes and 5 classrooms in Arroyo Grande High School. In Pismo Beach, flooding along Pismo Creek damaged some homes in Pismo Court Village. In Nipomo, several small streams flooded, damaging 20 to 30 homes. In Creston, the heavy rain produced widespread urban flooding.	NCDC
Countywide	12/27/2004						Flash Flooding A powerful Pacific storm brought more heavy rain, snow and flash flooding to Central and Southern California. Total rainfall amounts ranged from 1 to 3 inches on the coastal plain to between 3 and 6 inches in the mountains. The heavy rain resulted in numerous reports of urban and rural flooding. Flash flooding closed Highway 101 at Gaviota. In Lopez Canyon near Paso Robles, a 62 year old man was swept down a flooded creek and was presumed dead.	NCDC

SE: County Safety Element NCDC: National Climatic Data Center NOAA: National Oceanic & Atmospheric Administration FMP: CDF/San Luis Obispo Fire Management Plan

Flood Hazard Potential

San Luis Obispo County

A Flood Insurance Study conducted by FEMA for San Luis Obispo County noted that runoff in the streams of the County is small, with appreciable flows occurring only during and immediately after precipitation. However, during large storms, streamflow increases rapidly, and flood waters can contain high amounts of debris, causing major flood damage. For many of the water courses that are located in the County, areas that may be inundated in response to 100-year storm events are located adjacent to or near the stream or river channel. Since many of the County's watercourses are located in mountainous or remote areas with little or no development, flooding events along these rivers and streams generally result in minimal impacts. Other watercourses that are located in the County, however, have floodplains that extend well beyond the defined stream or river channel. When a flood occurs along one of these watercourses, and it is located in or near an area that is urbanized, damage to property and infrastructure can be widespread.

In the southern portion of San Luis Obispo County, Arroyo Grande Creek, San Luis Obispo Creek, and their respective tributaries, are watercourses that pass through urbanized areas and that have caused major floods. The north coast area of the County also contains a number of short, steep-gradient creeks that can experience rapid increases in water flows in response to storm events in Cambria. Santa Rosa Creek is such a watercourse that has caused significant flooding events. The largest water course in the inland portion of the County is the Salinas River, which is located adjacent to numerous incorporated and unincorporated communities. Although the floodplain of the Salinas River can be extensive, it is generally contained within the river channel. Other major inland water courses include the Estrella River and San Juan Creek. Due to the generally remote locations of these watercourses, flooding impacts are generally not significant.

Communities Within San Luis Obispo County

Communities of San Luis Obispo County that have been mapped by FEMA as being located within the 100-year floodplain are described below:

Arroyo Grande

Areas of potential flooding in response to a 100-year storm are located adjacent to Canyon/Meadow Creek on the west side of the City, adjacent to Corbett Canyon and Arroyo Grande Creeks in the eastern portion of the City, and a limited area along Los Berros Creek in the southeastern portion of the City. Areas that would be inundated in response to a 100-year flood along these creeks are generally located along stream channels; however, in isolated areas, adjacent properties could be adversely affected. Near the confluence of Corbett Canyon and Arroyo Grande Creek, the 100-year floodplain widens, resulting in impacts to properties. The floodplain along Arroyo Grande Creek also widens slightly on the north and south sides of U.S. 101. Although

areas subject to flooding from a 100-year flood are limited, floodwater could cause roadways to become impassable, thereby hindering travel and response efforts. Map 5 depicts areas subject to inundation from a 100-year storm, and does not necessarily depict areas that may be affected by local drainage problems. The City has worked to alleviate drainage problems in these areas.

Atascadero

The Salinas River is located in the northeastern and eastern areas of the City. The floodplain of the river is generally removed from the developed areas, however, properties on the east side could be affected by flooding during a 100-year storm. The crossing of Halcon Road over the Salinas River is frequently washed-out in storm events and would be washed-out during a 100-year storm event.

Atascadero Creek extends through the central portion of the City, but has a limited potential for flooding impacts as the 100-year floodplain is generally confined to the channel and adjacent properties. Where Atascadero Creek crosses U.S. 101 and State Route 41, a 100-year flood could cause inundation of the portions of the highways. This would have the potential to result in significant local and regional transportation impacts. Although the 500-year floodplain is not generally used for planning purposes, it should be noted that the area designated as being located within the 500-year floodplain of the Salinas River and Atascadero Creek encompasses approximately 1.5 square miles of the central portion of Atascadero.

In the southeastern portion of Atascadero, flooding hazards could result from 100-year flows in several branches of Paloma Creek. Identified inundation areas are primarily located adjacent to the creek channels, although some more extensive areas could also be affected. In the western portion of the City, flooding along Graves Creek would primarily be restricted to the stream channel.

Map 5 from the San Luis Obispo County Safety Element depicts areas subject to inundation from a 100-year storm, and does not necessarily depict areas that may be affected by local drainage problems. Atascadero has historically experienced drainage and related flooding problems in an area known as the Amapoa/Tecorida Basin, which is located to the east of Atascadero Creek and Morro Road, and south of U.S. Highway 101. This area has been subject to building moratoriums and fee programs to pay for drainage improvements. In recognition of this drainage problem, the lower portion of the basin has a Flood Hazard overlay zoning designation.

The Amapoa/Tecorida drainage basin has been prone to flooding for a variety of reasons. The primary cause of flooding in this area results from storm events which cause water flows in Atascadero Creek, greater that the 17-year design storm, to overtop the Atascadero Lake spillway channel banks and flow into the Amapoa/Tecorida basin.

Other factors that have contributed to inadequate drainage in this area include flat topography and low water velocities increasing run-off volumes due to urban development, undersized drainage culverts and channels, particularly at Highway 101, and the lack of a formal method to maintain existing drainage facilities on private property.

A variety of control strategies for correcting the drainage deficiencies of the Amapoa/ Tecorida area has been proposed. These measures include improvements to the Atascadero Lake spillway, construction of a new storm drain along Highway 41, requiring drainage analysis for projects located within the basin that increase building density, and provision of a mechanism to facilitate the maintenance of drainage facilities on private property. Construction of the storm drain along Highway 41 has already begun.

Grover Beach

Isolated areas of potential flooding in response to a 100-year storm are located in the northern and western portions of the City that are adjacent to Meadow Creek. Flood hazard areas in the northern portion of the City are restricted to an area south of U.S. 101 and north of Nacimiento Avenue. A mobile home subdivision is located in this area. In the western part of the City, flooding could affect areas located west of the Union Pacific Railroad tracks. Map 5 depicts areas subject to inundation from a 100-year storm, and does not necessarily depict areas that may be affected by local drainage problems. Local flooding conditions currently exist in two isolated areas within the City where properties are located below street level. One parcel is subject to flooding from a 50-year storm event if sandbags are not used or if cars are parked on the street. For the second parcel a 75-100 year storm event will flood this property, however, an asphalt berm has been constructed which alleviates flooding under storms of lesser magnitude.

Morro Bay

Flooding in the City of Morro Bay could occur as a result of flows in Morro Creek, Little Morro Creek, Chorro Creek and the several smaller creeks located in the northern portion of the City. Flooding from these creeks could potentially render State Highway 1 bridges over these waterways unusable during a major storm.

During the rains of 1995 Highway 1 was closed through Morro Bay due to flooding. Flooding from Chorro Creek would affect the eastern portion of the City. In 1995, flooding from Chorro Creek inundated Twin Bridges (now Chorro Creek Bridge) for several days, forcing travelers from Los Osos to detour through San Luis Obispo in order to reach Morro Bay. The new Chorro Creek Bridge, completed in 1996, was constructed at a higher elevation than Twin Bridges to avoid future closures due to flooding.

The creeks located in the northern portion of the City traverse areas that have been extensively developed with residential uses. In 1995, houses located along Alva Paul

Creek, and other houses in north Morro Bay, were flooded. Also, the area between Highway 41 and Radcliffe Street flooded in 1995 causing much property damage to both residences and businesses. In the isolated areas where the creek floodplains extend beyond the stream channels, flooding impacts could also be significant.

Paso Robles

Several watercourses are located within Paso Robles that have the potential to cause flooding impacts. The Salinas River is the major watercourse located in Paso Robles, and runs through the center of the City. Flows in the Salinas River that could result from a 100-year storm are primarily contained in the river channel. On the west side of the City, flooding from Mountain Springs Creek could affect isolated residential areas.

The area located adjacent to and west of U.S. 101 could also be inundated by runoff from a 100-year storm. 100-year flooding events could result in the inundation of areas in the southwestern portion of the City. In the eastern portion of the City, several unnamed creeks have 100-year floodplains that would primarily affect the creek channel and adjacent properties. In the northern portion of the City, Huerhuero Creek could cause isolated areas of flooding along the road that leads to the Paso Robles Municipal Airport.

Pismo Beach

The City has two areas with potential flood hazards: the Pismo Creek/Price Canyon and Meadow Creek/Pismo Marsh drainage ways. Since major flooding in 1971, the city, with the aid of the Army Corp of Engineers, has made alterations to Pismo Creek channel to reduce flood hazard. Existing flood plain maps prepared prior to the creek improvements show that substantially developed areas in the city's commercial core and Pismo Creek Planning Areas could be subject to flooding from a 100 year storm.

The majority of the Meadow Creek floodplain within the city limits is contained within the State Department of Fish and Game controlled Pismo Lake Ecological Preserve (Pismo Marsh). The preserve is bounded on all sides by slopes which rise over the 100 year level of flood, thus containing flooding within the preserve boundary. Meadow Creek leaves the preserve at State Highway1 which crosses the creek via a low lying bridge. The creek flows into the North Beach Campground where it divides into two channels one flowing into the ocean and the other flowing southward into the Grover Beach area. The creek channel floods state Highway 1, the commercial property to the north of the creek at State Highway 1, and the North Beach Campground during periods of heavy storm flows. The level of flooding is affected by tidal conditions.

City of San Luis Obispo

The City of San Luis Obispo is traversed by several creeks, including San Luis Obispo Creek and its major tributaries, Stenner Creek, Brizziolari Creek and Prefumo Creek. The 100-year floodplains for these creeks encompass extensive areas of the City on the east and west sides of U.S. 101, including the downtown area. Historic flooding on San

Luis Obispo Creek, such as the floods of 1969, 1973, and 1995, have resulted in substantial property damage and loss of life. Several areas in the downtown of San Luis Obispo are subject to localized flooding.

Unincorporated Communities of San Luis Obispo County

Major unincorporated communities of San Luis Obispo County that have been mapped by FEMA as being located within the 100-year floodplain are described below.

South Bay
The South Bay area of the County (including the communities of Baywood Park, Los Osos, and Cuesta-by-the Sea) has not been identified as being located within a 100-year storm floodplain by the most recent Flood Insurance Rate Maps. Flooding in response to a 100-year storm is generally confined to shoreline areas surrounding Morro Bay. There are locations in this area, however, that are subject to chronic localized flooding. After a significant rain, localized flooding occurs throughout the Los Osos area. Numerous intersections within the community experience flooding during storm events.

Cambria
Santa Rosa Creek has a history of flooding which has caused severe erosion of the creek banks as well as damage to phone and gas lines, water wells, and bridges. Major bank erosion in the past has caused complete interruption of the town's water supply. The 100-year floodplain for Santa Rosa Creek is generally confined to the creek channel and surrounding areas south of Main Street. However, the West Village business area along Main Street has been subjected to severe flooding as a result of recent flood levels that overtopped the banks of Santa Rosa Creek.

Cayucos
100-year flood areas near the community of Cayucos are predominately confined to areas adjacent to Cayucos Creek, Little Cayucos Creek, and Willow Creek. Several limited areas of the community along these areas have been designated as being in a 100-year floodplain.

Nipomo
Flooding in the community of Nipomo occurs primarily along Nipomo Creek and its tributaries, such as Deleissiques Creek and Tefft Road Creek. The 100-year floodplain along these creeks encompasses areas adjacent to the watercourses, along with extensive areas located east of U.S. Highway 101.

Oceano
Flooding in Oceano results from flows in Arroyo Grande Creek and Meadow Creek. The most significant inundation area is near the creeks' confluences with the ocean. Areas subject to flooding as a result of a 100-year storm generally extend south of

Highway 1 and west of Pismo Road. Flooding would occur at the Oceano County Airport and surrounding properties, along with extensive areas located to the south of the community.

San Simeon
Flooding in and near the community of San Simeon Acres could result from flows in Pico Creek and Arroyo Del Padre Juan. Pico Creek is located to the north of the community, while Arroyo Del Padre Juan is located in the southern portion. The 100-year floodplains of these creeks generally follow the creek channel, but due to their location near urbanized areas, they have the potential to result in flooding impacts to developed areas.

San Margarita
Flooding in Santa Margarita has historically occurred. Santa Margarita Creek runs through the community and continues toward and under U.S. 101.

Templeton
Watercourses located in and near the community of Templeton include the Salinas River, which is located to the east of the town and Toad Creek, which is located north of Old County Road near the center of the community. The 100-year floodplain of the Salinas River near Templeton is confined to the river channel and does not significantly affect the community. The floodplain for Toad Creek is not extensive, however, due to its location relative to downtown Templeton, a 100-year flood along this watercourse would have the potential to affect adjacent properties.

San Miguel
The community of San Miguel is located west of the Salinas River, and north of the confluence of the Estrella River with the Salinas River. The 100-year floodplain of the Salinas River near San Miguel is confined to the river channel and does not significantly affect populated areas of the community.

Creston
The community of Creston is located between the west and middle branches of Huerhuero Creek. The 100-year floodplains of these creeks are located adjacent to the western and eastern edges of the community and could have the potential to affect adjacent developed properties.

Shandon
The community of Shandon is located southwest of the confluence of San Juan Creek with the Estrella River. The 100-year floodplains of these watercourses are not located within the town of Shandon, but are located adjacent to developed areas. These water courses also cross State Routes 41 and 46 near the town. Flooding along these

watercourses could have the potential to adversely affect access to and from the community.

Rural Areas

Many areas are isolated or forced into excessively long detours during and after floods due to flood impacts on roads. These access impacts are a significant "flood hazard." In 1997 after the Logan fire, severe rains took out California Highway 166 and two CHP officers and two civilians died, in addition to property loss.

- **Effects on people and housing.** Direct impacts of flooding can include injuries and loss of life, damage to property and health hazards from ruptured sewage lines and damaged septic systems. Secondary impacts include the cost and commitment of resources for flood fighting services, clean-up operations, and the repair or replacement of damaged structures.

- **Effects on commercial and industrial structures.** Flooding can cause damage to commercial and industrial structures, damage to vegetation, crops and livestock. Beach erosion results in the loss of sand from coastal areas. This hazard can accelerate the rate of erosion of coastal bluffs, and can also contribute to increased wave-related damage to coastal structures.

- **Effects on infrastructure.** Flooding can cause damage to roads, communication facilities and other infrastructure.

- **Effects on agriculture.** Effects on agriculture can be devastating. Flooding can damage crops, livestock and dairy stock. In addition to the obvious impacts on crops and animals, flooding can have deleterious effects on soil and the ability to reinvigorate the agricultural activities impacted once the flood waters recede. Damage to water resources such as underground irrigation systems, water storage reservoirs, springs and other natural water bodies could have a serious effect upon crops and livestock.

Relationship to Other Hazards – Cascading Effects

While there are some benefits associated with flooding, such as the replenishment of beach sand, and nutrients to agricultural lands, it is generally considered a hazard to development in floodplains. Floods can cause many cascading effects. Fire can break out as a result of dysfunctional electrical equipment. Hazardous materials can also get into floodways, causing health concerns and polluted water supplies. In many instances during a flood, the drinking water supply will be contaminated.

Risk assessment conclusion: In San Luis Obispo County, runoff in the streams of the County is small, with appreciable flows occurring only during and immediately after precipitation. However, during large storms, stream flow increases rapidly, and flood

waters can contain high amounts of debris, causing major flood damage. For many of the water courses that are located in the County, areas that may be inundated in response to 100-year storm events are located adjacent to or near the stream or river channel. Since many of the County's watercourses are located in mountainous or remote areas with little or no development, flooding events along these rivers and streams generally result in minimal impacts. Other watercourses that are located in the County, however, have floodplains that extend well beyond the defined stream or river channel. When a flood occurs along one of these watercourses, and it is located in or near an area that is urbanized, damage to property and infrastructure can be widespread. This threat is rated as Medium.

Plans and Programs

In San Luis Obispo County, the County Flood Control and Water Conservation District, through the County Public Works Department, is responsible for protecting life and property from flood hazards. The District has the authority to maintain and construct flood control improvements on major drainage facilities located throughout the County.

The County is taking action to:

- Strictly enforce flood hazard regulations both current and revised. FEMA regulations and other requirements for the placement of structures in flood plains shall be followed.
- Maintain standards for development in flood-prone and poorly drained areas.
- Reduce flood damage in areas known to be prone to flooding, such as Los Osos, Avila Valley, Santa Margarita, Cambria, Oceano and others.
- Fire and law enforcement agencies will maintain and improve their ability to respond to water hazard emergencies throughout the County.
- Outline the needs for mapping of high-risk areas of the County.
- Engaging in the flood insurance program.

Ordinances and Regulations

Ordinance Number 366 C.S. of *The Arroyo Grande Municipal Code* establishes the "Flood Hazard" (F-H) zoning district. The purpose of the ordinance is to promote the public health, safety, and general welfare, and to minimize public and private loses due to flood conditions.

The City of Atascadero's Zoning Ordinance, 9-3.600, FH (Flood Hazard) Overlay Zone, identifies areas where terrain would present new developments and their users with potential flood hazards. In addition, Ordinance No. 193, *An Ordinance Adding Chapter 5 to Article 7 of the City of Atascadero Municipal Code Relating to Flood Damage Prevention*, provides further guidance to reduce flood damage. It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private loses due to flood conditions. Also, Ordinance No. 304 amended Title 6, Chapter 13 of the Atascadero Municipal Code to provide a mechanism to allow the Fire Chief to order the removal of weeds, rubbish, and similar material that has the potential to become a flooding hazard.

Sections 7300-7361, *Chapter 3 - Flood Damage Prevention Regulations*, of the Grover Beach Municipal Code addresses flood hazards relative to public health, safety and general welfare. The purpose of these regulations is to minimize public and private loses due to flood conditions.

Local flood regulations for the City of Morro Bay are provided in sections 14.72.010-14.72.060 of *Chapter 14.72- Flood Damage Prevention* contained in the Morro Bay Municipal Code. The intent of these regulations are to reduce public and private loses due to flood damage.

The City of Paso Robles Municipal Code, *Chapter 21.14 Flood Damage Prevention Regulations* specify methods of reducing flood losses. A variety of standards relative to construction, utilities, and manufactured homes are provided to minimize public and private losses due to flood conditions.

Sections 17.84.010-17.84.170 within *Chapter 17.84, Flood Damage Prevention Regulations* of the San Luis Obispo Municipal Code set forth means to reduce losses from floods. These standards focus on areas located within or near the 100-year floodplain. Section 8.12.010-8.12.010 of the Municipal Code provides a mechanism for the City to require the removal of dangerous obstructions in streambeds that have the potential to obstruct water flow.

The *San Luis Obispo County Land Use Ordinance and Coastal Zone Land Use Ordinance* (Titles 22 and 23 of the County Code), provides standards for the preparation and submittal of drainage plans for new development. These regulations specify when drainage plans are required, the contents of an adequate drainage plan, drainage standards, and the plan review and approval process. The Land Use Ordinances also contain the County's Floodplain Ordinance, which specifies development standards for areas that have a Flood Hazard (FH) combining land use designation. The development standards contained in the Floodplain Ordinance pertain to land use permit processing and construction standards for new development located in areas that have the potential to be inundated by a 100-year flood.

Hazard: Extreme Weather / Heavy Rainfall

Severity: Low	Probability: Low

Hazard Definition

Extreme weather could include drought, freeze, hail, high wind, tornados, and thunderstorm.

History

San Luis Obispo County has a history of extreme weather and heavy rainfall hazards as shown on the following Tables 4-5 and 4-6.

Table 4-5: Extreme Weather Events in San Luis Obispo County

Location	Date of Incident	Declaration	Intensity	Reported Damage	Number Injured	Structures Affected	Incident Description	Source
San Luis Obispo County	2/18/1993			$50,000			Thunderstorm Winds. A thunderstorm caused damage to many of the same areas as winds to nearly 50 mph. Pea-sized hail was reported at Pismo Beach. Power outages due to lightning strikes were reported in Nipomo and San Luis Obispo.	NCDC
San Simeon Airport	11/26/1997						Thunderstorm Winds. Aline of severe thunderstorms rumbled across San Luis Obispo County. The storms produced winds gusting up to 71 mph and heavy rain.	NCDC
San Luis Obispo County	2/2/1998 to 2/3/1998						High Wind. The first powerful storm of the month slammed into Central and Southern California. Powerful winds buffeted the entire area. Hearst Castle reported winds gusting to 90 mph. Elsewhere, winds gusting in excess of 70 mph were reported. Hundreds of trees and power lines were blown down, resulting in numerous power outages. Along with the strong winds, heavy rain drenched the entire area. On average, rainfall totals ranged from 2 to 8 inches over coastal areas, up to 12 inches in the mountains. Widespread flooding was reported in all areas.	NCDC
San Luis Obispo County	2/5/1988 to 2/6/1988						High Wind. The second storm of the month struck Central and Southern California. Once again, strong winds, gusting up to 70 mph, knocked down many trees and power lines. Rainfall totals ranged from 1 to 3 inches over coastal areas, up to 6 inches in the mountains. Numerous flooding problems were reported across the area. Highways, including 1 and 101 were closed due to flooding or mudslides.	NCDC
San Luis Obispo County	2/7/1998 to 2/8/1998						High Wind. The third storm of the month brought more weather-related problems to Central and Southern California. Strong winds, gusting up to 70 mph, knocked down many trees and power lines. Rainfall totals ranged from 1 to 4 inches over the coast, up to 7 inches in the mountains. Widespread reports of urban and rural flooding were reported.	NCDC
Templeton	2/19/1998						Thunderstorm Wind. Strong thunderstorms moving across San Luis Obispo County produced strong winds in the Templeton area. A spotter reported winds gusting to 58 mph.	
San Luis Obispo	5/5/1988					4 homes	Tornado. A small tornado developed over the City of San Luis Obispo. The tornado knocked out power to several hundred homes. Also four homes were damaged, including a home struck by a fallen cypress tree.	NCDC
Countywide	12/21/1998 to 12/24/1998			$5.4M Crop Damage			Freeze. An unseasonably cold airmass produced a three-night period of sub-freezing temperatures across Central and Southern California. Agricultural interests suffered heavy crop losses.	NCDC
San Luis Obispo County	4/3/1999 to 4/4/1999						High Wind. Strong northwest winds developed across Central and Southern California. Sustained wind speeds of at least 35 to 45 mph with gusts up to 65 mph were reported. Widespread power outages and felled trees were reported.	
San Luis Obispo County	2/11/2000 to 2/12/2000						High Wind. A powerful cold frong brought strong winds to parts of Central and Southern California. In Morro Bay, southeast winds, gusting to 60 mph ahead of the front, knocked down numerous trees and power lines.	NCDC
San Luis Obispo County	12/17/2000 to 12/18/ 2000						High Wind. Gusty offshore winds buffeted coastal section of San Luis Obispo Couty. In the City of San Luis Obispo, the winds bvlew out the windows in an unoccupied mobile home, as well as destroyed part of a car port. In Nipomo, a weather spotter reported sustained winds of 35 mph with gusts to 55 mph. Also, the strong winds produced widespread power outages.	NCDC
Atascadero	1/10/2001						Thunderstorm Wind. A strong thunderstorms produced damaging winds in northern San Luis Obispo County. Across southern sections of Atascadero, trees were uprooted as well as damage to fences and decks.	NCDC
San Luis Obispo County	3/4/2001 to 3/6/2001						High Wind. A powerful and slow-moving storm brought heavy rain, strong winds and snow to Central and Southern California. Across San Luis Obispo County, rainfall totals ranged from 2 to 6 inches over coastal and valley areas to 6 to 13 inches in the mountains. In San Luis Obispo County, the heavy rain produced numerous flooding. In Oceano, the Arroyo Grande Creek overflowed, destroying numerous crops and damaging one home. Also, the Pacific Dunes RV Park was flooded, stranding several residents. In Arroyo Grande, flooding along Corbett Creek damaged 4 homes and 5 classrooms in Arroyo Grande High School. In Pismo Beach, flooding along Pismo Creek damaged some homes in Pismo Court Village. In Nipomo, several small streams flooded, damaging 20 to 30 homes. In Creston, the heavy rain produced widespread urban flooding.	
Santa Margarita	3/6/2001						Hail. A severe thunderstorm produced dime size hail in the community of Santa Margarita	NCDC
San Luis Obispo County	11/24/2001						High Wind. A strong cold front moved though San Luis Obispo County, producing strong and gusty winds. Weather spotters and the Morro Bay Fire Department reported sustained winds between 35 and 45 mph with gusts as high as 62 mph. Numerous small trees and power lines were blown down between Morro Bay and Atascadero.	NCDC
San Luis Obispo County	12/7/2001						High Wind. Gusty northeast winds knocked down power lines and small trees in the community of Morro Bay. Wind speeds were estimated between 25 and 35 mph with local gusts as high as 60 mph.	NCDC
San Luis Obispo County	12/19/2002						High Wind. A powerful early season storm brought high wind, heavy snow and severe thunderstorms to Southern California. Across San Luis Obispo County, southeast winds gusting to 60 mph knocked down numerous power lines and small trees.	NCDC
Oceano	2/2/2004						Tornado. A waterspout, which developed offshore of Oceano Dunes, came onshore as a weak tornado. The weak tornado hit a Park Ranger in his truck. The Park Ranger was not injured and his truck sustained no reportable damage.	NCDC
San Luis Obispo County	2/25/2004						High Wind. A very powerful Pacific storm brought heavy rain, and gusty winds to Central and Southern California. The storm dumped between 1.50 and 6 inches of rainfall across the area. Along with the precipitation, gusty southeast to south winds buffeted the area.	NCDC

SE: County Safety Element NCDC: National Climatic Data Center NOAA: National Oceanic & Atmospheric Administration FMP: CDF/San Luis Obispo Fire Management Plan

Table 4-6: Heavy Rainfall Events in San Luis Obispo County

Location	Date of Incident	Declaration	Intensity	Reported Damage	Number Injured	Structures Affected	Incident Description	Source
Santa Margarita	2/20/1996						Heavy Rain. 4 to 6 inches of rain in the San Luis Obispo County mountains caused urban and small stream flooding and associated mudslides in the steep terrain and along Hwy 1 and 101	NCDC
Countywide	1/10/2001 to 1/12/2001						Heavy Rain. A powerful winter storm brought heavy rain, heavy snow and strong winds to Central and Southern California. Total rainfall amounts ranged from 2 to 5 inches across coastal areas, with between 5 to 10 inches of liquid equivalent precipitation in the mountains. Due to very dry soil conditions, flash flooding did not occur.	NCDC
Countywide	2/11/2001 to 2/13/2001						Heavy Rain. A powerful Pacific storm brought heavy rain, heavy snow and gusty winds to Central and Southern California. Overall, 2 to 8 inches of rain fell across the area, producing numerous reports of urban flooding. With the storm, snow levels fell to around 1500 feet in some areas. Ski resorts reported between 3 to 7 feet of new snowfall. With such low snow levels, the Cuyama and Antelope Valleys reported between 4 to 8 inches of snowfall. Along with the precipitation, gusty south winds of 40 to 60 mph developed in the mountains.	NCDC
Countywide	2/24/2001 to 2/26/2001						Heavy Rain. A Pacific storm brought more rain, snow and wind to Central and Southern California. Overall, rainfall totals were between 1 to 4 inches, producing numerous reports of urban flooding. In the mountains, snowfall totals were 8 to 16 inches, mainly above 6000 feet. Along with the snow, south winds gusting to 50 mph developed in the mountains.	NCDC
Countywide	3/4/2001 to 3/6/2001						Heavy Rain. A powerful and slow-moving storm brought heavy rain, strong winds and snow to Central and Southern California. Across San Luis Obispo County rainfall totals ranged from 2 to 6 inches over coastal and valley areas to 6 to 13 inches in the mountains. In San Luis Obispo county, the heavy rain produced numerous flooding. In Oceano, the Arroyo Grande Creek overflowed, destroying numerous crops and damaging one home. Also, the Pacific Dunes RV Park was flooded, stranding several residents. In Arroyo Grande, flooding along Corbett Creek damaged 4 homes and 5 classrooms in Arroyo Grande High School. In Pismo Beach, flooding along Pismo Creek damaged some homes in Pismo Court Village. In Nipomo, several small streams flooded, damaging 20 top 30 homes. In Creston the heavy rain produced widespread urban flooding.	NCDC
Countywide	12/27/2004 to 12/28/2004						Heavy Rain. A powerful Pacific storm brought heavy rain, snow and tornados to Central and Southern California. Total rainfall amounts ranged from 2 to 8 inches on the coastal plain to between 6 and 13 inches in the mountains. With such heavy rain, there were many hydrologic problems. Urban flooding was widespread across all of San Luis Obispo County.	NCDC
Countywide	12/30/2004 to 12/31/2004				1 Fatality		Heavy Rain. A powerful Pacific storm brought more heavy rain, snow and flash flooding to Central and Southern California. Total rainfall amounts ranged from 1 to 3 inches on the coastal plain to between 3 and 6 inches in the mountains. The heavy rain resulted in numerous reports of urban and rual flooding. Flash flooding closed Highway 101 at Gaviota. In Lopez Canyon near Paso Robles, a 62 year old man was swept down a floded creek and was presumed dead.	NCDC

SE: County Safety Element NCDC: National Climatic Data Center NOAA: National Oceanic & Atmospheric Administration FMP: CDF/San Luis Obispo Fire Management Plan

Risk Assessment

Effects on people, housing, commercial/industrial structures and infrastructure.

Drought / Freeze / Snow Fall. Although drought and freeze in and of themselves are not a serious threat to property and life, the indirect effects can be monumental. The costs to the County for heavy freezes and snow fall, in particular, can endanger plants, have detrimental effects on oak forests and agriculture and can have an impact in the millions of dollars.

Extreme Summer Heat. Extreme heat could pose a significant threat to health primarily if the County simultaneously experienced a massive power interruption. Otherwise, the risks are currently well-managed.

Hailstorms / High Winds. It is highly unlikely that a hailstorm or high wind event constituting significant property damage or loss of life will occur in the County.

Heavy Rainfall. When severe storms occur in the County, they can have devastating effects in terms of property damage, injuries and even loss of life. The danger is multiplied by the risks of power and communications line downing, floods, and landslides/mudslides.

Effects on agriculture. Severe weather can have adverse effects on agriculture up to and including destruction of crops and even animals.

Relationship to Other Hazards – Cascading Effects

Drought leads to the weakening and ultimately death of trees which constitute increased fire hazard. Heavy rainfall carries the risks of power and communications outages, floods and landslides/mudslides.

Risk assessment conclusion. San Luis Obispo County is at some risk for drought. Extreme summer heat in the inland portions of the County is a hazard but is generally well-mitigated by air conditioning and avoidance of prolonged direct exposure. Heavy rainfall has caused damage to the County in the past and will no doubt occur again in the future. Hailstorms constitute a minimal risk. Other severe weather hazards are not relevant to San Luis Obispo County. This threat is rated as Low.

Plans and Programs

In San Luis Obispo County, the County Agriculture Department alerts growers of impending sever weather such as freeze, high winds and heavy rains in concert with bulletins from NOAA and the State Office of Emergency Services.

Hazard: Tsunami and Seiche

Severity: Low - Medium	Probability: Low

Hazard Definition

A tsunami is a wave caused by a displacement of the ocean floor, usually by movement along a fault. In deep ocean water, tsunamis may travel as fast as 600 miles per hour. As the wave approaches shore, it increases in size and can cause extensive damage to coastal structures.

Seiche (pronounced seish) is defined as oscillations of enclosed and semi-enclosed bodies of water, such as bays, lakes, or reservoirs, due to strong ground motion from seismic events, wind stress, volcanic eruptions, and local basin reflections of tsunami. Seiches can result in the creation of long-period waves which can cause water to overtop containment features or cause seiche runup on adjacent land masses, similar to tsunami runup.

History

The threat of tsunami-related damage is primarily confined to low-lying coastal areas. San Luis Obispo County could be affected by tsunami caused by fault-related ground displacement on a local offshore fault, or on a more distant fault. Several small tsunami events have been recorded in San Luis Obispo County. Previous studies have predicted a maximum tsunami wave "runup" of approximately 9.5 feet above sea level for a 100-year event. Wave runup could be increased substantially if a tsunami occurred during a major storm.

Although faults are near several of the reservoirs in San Luis Obispo County, seiche is not considered a significant risk. Large waves in these water-bodies are not anticipated because they are not large enough. Seiches could occur in any reservoir located in the County, and in Morro and San Luis bays. The extent of potential seiche runup within Morro Bay is unknown, but is thought to be less in magnitude than the affects of potential tsunami.

The following Table 4-7, list historical tsunamis in San Luis Obispo County.

Table 4-7: Historical Tsunamis

Location	Date of Incident	Declaration	Intensity	Reported Damage	Number Injured	Structures Affected	Incident Description	Source
Morro Bay	1868		Unknown				Unknown	NOAA
Cayucos	4/16/1877		Height (meters): 3.6				California	NOAA
Morro Bay	1878 Reportedly overtopped sand spit between the bay and the ocean		Unknown				Unknown	NOAA
Pismo Beach	1927		Height (meters): 1.8				California	NOAA
Avila Beach	4/1/1946		Height (meters): 1.3 Source magnitude: (Ms) 7.3				Tsunami. Source location: Alaska. Source event: E. Aleutian Islands. Travel time: 5 hours 36 minutes.	NOAA
Morro Bay	4/1/1946		Height (meters): 1.5 Source magnitude: (Ms) 7.3				Tsunami. Source location: Alaska. Source event: E. Aleutian Islands. Travel time: 5 hours 36 minutes.	NOAA
Avila Beach	11/4/1952		Height (meters): 1.4 Source magnitude: (Ms) 8.2, (Mw) 9				Tsunami. Source location: Russia. Source event: Kamchatka. Travel time: 8 hours 36 minutes.	NOAA
Pismo Beach	5/22/1960		Height (meters): 1.4 Source magnitude: (Mw) 9.5				Tsunami. Source location: Chile. Source event: Central Chile	NOAA
Avila Beach	3/28/1964		Height (meters): 1.6 Source magnitude: (Mw) 9.2				Tsunami. Source location: Alaska. Source event: Gulf of Alaska. Travel time: 5 hours 10 minutes.	NOAA

SE: County Safety Element NCDC: National Climatic Data Center NOAA: National Oceanic & Atmospheric Administration FMP: CDF/San Luis Obispo Fire Management Plan

In San Luis Obispo County coastal areas near Port San Luis, Cayucos, and San Simeon are examples of areas designated as having a "potential danger" from tsunami although this potential hazard level was at the lowest risk designated. The potential for damage to coastal structures would be increased if the tsunami event were to coincide with a high tide.

As noted in the above table, the historic record shows tsunamis generated from far-field sources. It has been estimated that the 100- and 500-year tsunami runups in the study area are based on far-field source generation locations (such as the Aleutian or Chile-Peru Trenches). Estimated tsunami runup along the Cayucos/Morro Bay coastline is approximately 9.5 feet to 24.2 feet for the 100-year and 500-year events, respectively.

Those runups were calculated using astronomical high tides, and compare well with recorded tsunamis that have occurred in other locations along the California coast. However, the worst case scenario would occur if a tsunami occurred during a meteorological high tide (storm surge), which would add an estimated 14.5 feet (4.5 meters) to the runup values calculated. Thus, with a worst case scenario, the estimated tsunami runup for the 100-year and 500-year would be approximately elevation 24 and 39 feet above mean sea level, respectively.

Tsunami Hazard Potential

San Luis Obispo County

The tsunami hazard for the San Luis Obispo County coastal areas is greatest for those communities or portions of communities located below the estimated elevations for the 100- to 500-year events, that is, below elevation 24 and 39 feet above mean sea level, respectively. In general, much of the coast of San Luis Obispo County is protected from tsunami hazards by wide beaches, coastal dunes, or sea cliffs that provide protection to coastal developments. Coastal developments most vulnerable to the tsunami hazards are those located near mouths of coastal streams that drain into the Pacific Ocean, such as San Simeon Creek in San Simeon; Cayucos Creek, Little Cayucos Creek, Old Creek and Willow Creek in Cayucos; Morro Creek and Alva Paul Creek in Morro Bay; Chorro Creek in Morro Bay and the South Bay area; San Luis Obispo Creek in Avila; Pismo Creek in Pismo Beach, and Meadow Creek and Arroyo Grande Creek in Oceano. The severity of the exposure to the tsunami hazard will vary locally depending on specific natural and artificial coastal conditions.

Arroyo Grande

The City of Arroyo Grande has no coastal exposure and is therefore not vulnerable to tsunami hazards.

Atascadero

The City of Atascadero has no coastal exposure and is therefore not vulnerable to tsunami hazards.

Grover Beach

Specific analyses have not been performed for Grover Beach to estimate the potential tsunami runup height. The tsunami hazard is greatest for that portion of the community located below elevations of the 100-year to 500-year events, that is, below elevations 24 and 39 feet below mean sea level, respectively. Additional areas of potential hazard are along the mouth of Meadow Creek. In general, portions of coastal Grover Beach are protected from tsunami hazards by wide beaches and coastal dunes. The severity of the exposure to the tsunami hazard will vary locally depending on specific natural and artificial coastal conditions.

Morro Bay
Specific analyses have not been performed for Morro Bay to estimate the potential tsunami runup height. The tsunami hazard is greatest for that portion of the community located below elevations of the 100-year to 500-year events, that is, below elevations 24 and 39 feet below mean sea level, respectively. Additional areas of potential hazard are along the mouths of Morro Creek and Alva Paul Creek, and within the bay at Chorro Creek. In general, much of the coast of Morro Bay is protected from tsunami hazards by wide beaches, coastal dunes, or bluffs that provide protection to coastal developments. The severity of the exposure to the tsunami hazard will vary locally depending on specific natural and artificial coastal conditions.

Paso Robles
The City of Paso Robles has no coastal exposure and is therefore not vulnerable to tsunami hazards.

Pismo Beach

Like other areas along the coastline, Pismo Beach has actually experienced a small tsunami in relatively recent history. An estimated 1.4 meter tsunami occurred in May of 1960 that originated from a large earthquake in Chile. Coastal developments most vulnerable to the tsunami hazards are those located near mouths of streams that drain into the Pacific Ocean, such as Pismo Creek.

San Luis Obispo
The City of San Luis Obispo has no coastal exposure and is therefore not vulnerable to tsunami hazards.

- **Effects on people and housing.** There is a low probability that a tsunami event constituting significant property damage or loss of life will occur in San Luis Obispo County.

- **Effects on commercial and industrial structures.** A tsunami event occurring in the County can have devastating effects in terms of property damage, injuries and even loss of life.

- **Effects on infrastructure.** A tsunami event can cause damage to roads, communication facilities, and other infrastructure.

- **Effects on agriculture.** Effects on agriculture can be devastating if flooding occurs as a result of tsunami.

Relationship to Other Hazards – Cascading Effects

The threat of tsunami-related damage is primarily confined to low-lying coastal areas. If the gradient is shallow, tsunami waves can travel upstream into river channels and creek beds causing flooding. The primary effects of a tsunami can be widespread destruction and damage to coastal structures.

Risk assessment conclusion: In San Luis Obispo County, coastal areas near Port San Luis, Cayucos, and San Simeon were designated as having a "potential danger" from tsunami although this potential hazard level was at the lowest risk designated. The potential for damage to coastal structures would be increased if the tsunami event were to coincide with a high tide. This threat is rated as Low.

Plans and Programs

Plans are in place to access information to increase the understanding and response to tsunamis. Programs include: Working with Federal and State agencies to better understand and prepare for the hazard of tsunamis and to improve the ability to respond to tsunami warnings provided by NOAA's Alaska Tsunami Warning Center.

Hazard: Earthquakes

Severity: Medium - High	Probability: Low - Medium

Earthquakes

Hazard Definition

An earthquake is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

The major form of direct damage from most earthquakes is damage to construction. Bridges are particularly vulnerable to collapse, and dam failure may generate major downstream flooding. Buildings vary in susceptibility, dependent upon construction and the types of soils on which they are built. Earthquakes destroy power and telephone lines; gas, sewer, or water mains; which, in turn, may set off fires and/or hinder firefighting or rescue efforts.

The hazard of earthquakes varies from place to place, dependent upon the regional and local geology. Ground shaking may occur in areas 65 miles or more from the epicenter (the point on the ground surface above the focus).

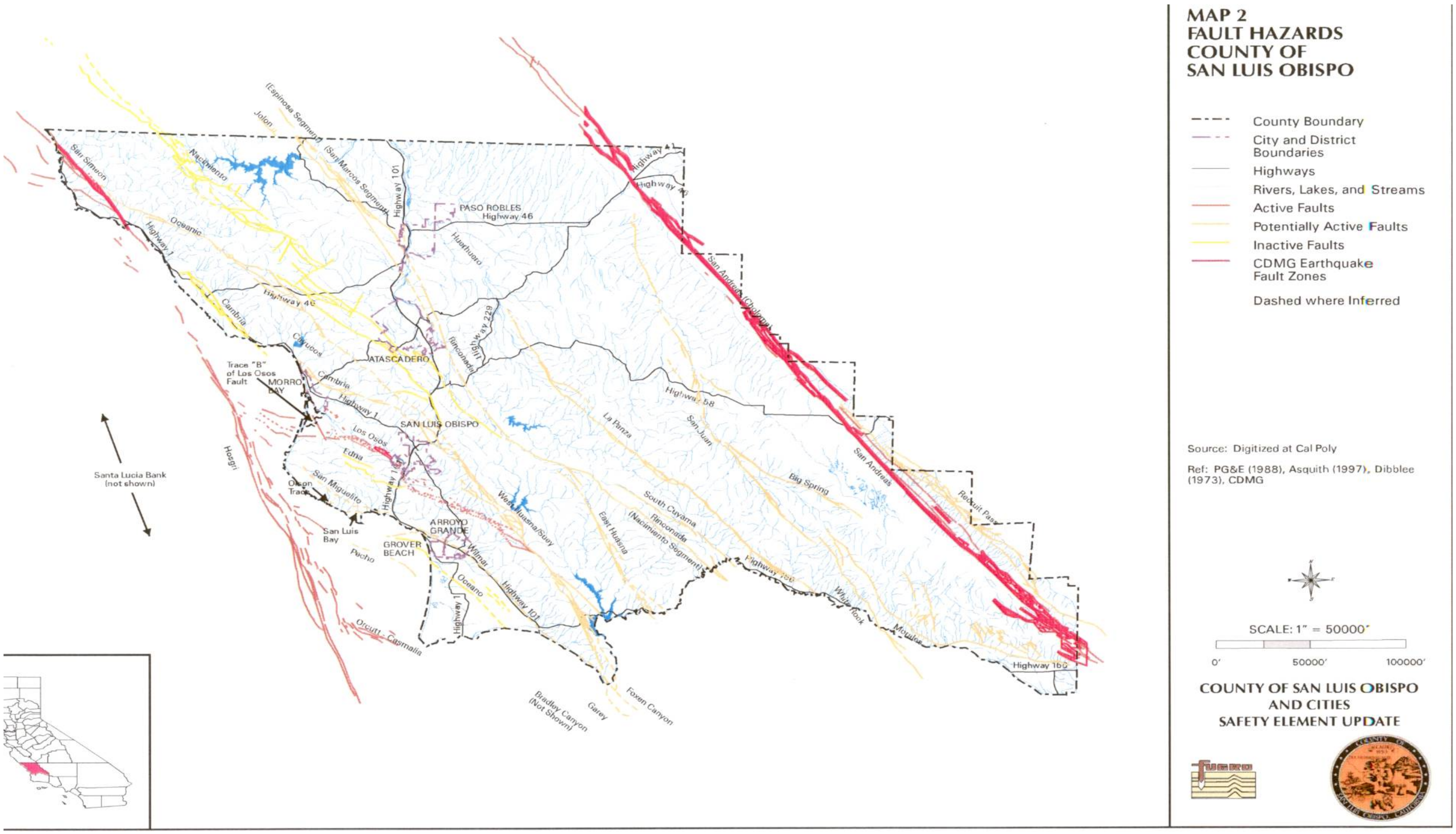
Ground shaking can change the mechanical properties of some fine grained, saturated soils, whereupon they *liquefy* and act as a fluid (liquefaction).

Where earthquakes have struck before, they will strike again. Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night.

Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking. Much of the damage in earthquakes is predictable and preventable.

History

San Luis Obispo County is located in a geologically complex and seismically active region. Active and potentially active faults in San Luis Obispo County are shown on following map (Map 2 from the San Luis Obispo County Safety Element). The central California coast has a history of damaging earthquakes, primarily associated with the San Andreas fault. However, there have been a number of magnitude 5.0 to 6.5 earthquakes on other faults which have affected large portions of the Central Coast. Recent events include the December 2003 - 6.5 magnitude San Simeon Earthquake and the September 2004 - 6.0 magnitude Parkfield Earthquake.


MAP 2
FAULT HAZARDS
COUNTY OF
SAN LUIS OBISPO
County Boundary
City and District Boundaries
Highways
Rivers, Lakes, and Streams
Active Faults
Potentially Active Faults
Inactive Faults
CDMG Earthquake Fault Zones
Dashed where Inferred
Source: Digitized at Cal Poly
Ref: PG&E (1988), Asquith (1997), Dibblee (1973), CDMG
SCALE: 1" = 50000'
0'
50000'
100000'
COUNTY OF SAN LUIS OBISPO
AND CITIES
SAFETY ELEMENT UPDATE
PASO ROBLES
ATASCADERO
SAN LUIS OBISPO
MORRO BAY
ARROYO GRANDE
GROVER BEACH
Highway 101
Highway 46
Highway 1
Highway 229
Highway 58
Highway 166
San Andreas
San Simeon
Hosgri
Santa Lucia Bank (not shown)
Trace "B" of Los Osos Fault
Los Osos
Edna
San Miguelito
San Luis Bay
Pecho
Oceano
Wilmar
Casmalia
Orcutt
La Panza
San Juan
Big Spring
South Cuyama
East Huasna
West Huasna/Sur
Rinconada
Cambria
Oceanic
Nacimiento
Jolon
Huerhuero
White Rock
Morales
Foxen Canyon
Garey
Bradley Canyon (Not Shown)

Historic Earthquakes

Following are historic earthquakes that had an affect on San Luis Obispo County:

1830 San Luis Obispo Earthquake. The 1830 earthquake is noted in the annual report from the Mission, and had an estimated magnitude of 5. The location of the event is poorly constrained and cannot be attributed to a specific fault source, but the earthquake reportedly occurred somewhere near San Luis Obispo.

1906 San Francisco Earthquake. This earthquake has been studied in detail and the effects in San Luis Obispo County have been documented. Modified Mercalli intensity ratings ranged from III-IV in the inland and north coast portions of the County, and IV-V in the south coast areas. The higher intensities were felt in areas underlain by alluvial soil, while the lower intensities occurred in areas underlain by bedrock formations.

1916 Avila Beach Earthquake. This magnitude 5.1 event occurred offshore of Avila Beach in San Luis Bay. The earthquake reportedly resulted in tumbling smokestacks of the Union Oil Refinery at Port San Luis, and a landslide that blocked the railroad tracks. The maximum intensity appears to be approximately VI, but the available descriptions of the shaking are somewhat limited.

1952 Arvin-Tehachapi Earthquake. This 7.7 magnitude earthquake occurred on the White Wolf fault, located south and west of Bakersfield. Throughout most of the San Luis Obispo County, ground shaking intensities of VI were felt. Intensities of IV-V were experienced in the northwest portion of the County, and magnitude VIII intensities were felt in the Cuyama area, in the southeast portion of the County. The higher intensities were likely due to closer proximity to the earthquake epicenter.

1952 Bryson Earthquake. This magnitude 6.2 earthquake likely occurred on the Nacimiento fault, and resulted in intensity ratings of VI throughout most of the western portion of the County. Intensities of IV-V were experienced in the eastern portion of the County. Higher intensities were generally felt in the coastal valley areas that are underlain by alluvial soils.

1934, 1966 and 2004 Parkfield Earthquakes. These earthquakes had magnitudes of 6.0 and 5.5, respectively, and occurred on the San Andreas fault in or near the northeast corner of the County. Earthquake intensities generally conformed to anticipated characteristics for events of this size, with intense shaking (VII-VIII) being limited to a relatively small area near the epicenters of the quakes. Moderate shaking was experienced in most of the central and western parts of the County. A variation from the expected intensity characteristics was experienced in the La Panza area during the 1934 earthquake. La Panza is approximately 40 miles south of the fault rupture area, but experienced earthquake intensities of VII.

2003 San Simeon Earthquake. The San Simeon Earthquake struck at 11:15 a.m. on December 22, 2003. The magnitude 6.5 earthquake is attributed to having occurred near the San Simeon/Oceanic/Hosgri Fault system. The epicenter was approximately six miles from the community of San Simeon. In addition to significant property and other damages, two fatalities resulted from damages caused by the earthquake.

A number of historical earthquakes with a magnitude of 5.0 or greater that affected San Luis Obispo County are summarized on Table 4-8 on the following page.

Earthquakes which have occurred outside yet felt in the County during the last century include events such as the 7.0 Lompoc earthquake in 1927, and the 7.7 Arvin-Tehachapi earthquake of 1952. Other more recent earthquakes, such as the 1983 - 6.7 Coalinga earthquake, 1989 - 7.1 Loma Prieta earthquake, 1992 - 7.5 Landers earthquake and the 1994 - 6.6 Northridge earthquake were felt in San Luis Obispo County, however, there was no damage to structures.

Table 4-8: Historical earthquakes with a magnitude of 5.0 or greater.

Location	Date of Incident	Declaration	Mercalli Intensity	Richter Intensity	Number Injured	Structures Affected	Incident Description	Source
Santa Maria Basin/San Luis Range Domain								
Los Alamos area	7/28/1902		VIII	5.4				SE
Los Alamos area	12/12/1902		VII	5				SE
Arroyo Grande area	10/20/1913			5				SE
Los Alamos area	1/20/1915		VIII	5.8				SE
Avila area	12/1/1916		VI	5			This event occurred offshore of Avila Beach in San Luis Bay. The earthquake reportedly resulted in tumbling smokestacks of the Union Oil Re finery at Port San Luis, and a landslide that blocked the railroad tracks. The maximum intentist appears to be approximately IV, but the available descriptions of the shaking are somewhat limited.	SE
Santa Maria area	11/18/1927		VI	5				SE
Orcutt Frontal fault	5/29/1930		V	5.1				SE
Coastal Franciscan Domain								
San Luis Obispo area	??/??/1830		VII	5			The 1830 earthquake is noted in the annual report from the Mission. The location of the event is poorly constrained and cannot be attributed to a specific fault source, but the eqrthquake reportedly occurred somewhere near San Luis Obispo.	SE
San Simeon area	2/1/1853		VI	5				SE
Lopez Canyon area	7/9/1917		VI	5				SE
Bryson area	11/22/1952		VII	6.2			This earthquake likely occurred on the Nacimiento fault, and resulted in intensity ratings of VI throughout most of the western portion of the County. Intensities of IV-V were experienced in the eastern portion of the County. Higher intensities were generally felt in the coastal valley areas.	SE
San Simeon area	8/29/1983		VI	5.4				SE
San Simeon area	12/22/2003	Y	VII	6.5	42	75	Two people killed and about 40 buildings collapse or severely damaged at Paso Robles. At least 40 people injured in the Paso Robles-Templeton areas. Buildings damaged and small fires occurred at Cambria and Morro Bay. The airport at Oceano was closed due to cracks in the runway. More than 10,000 homes and businesses were without power in the Paso Robles area.	USGS
Salinian Domain								
Poor location	1852			6				SE
San Ardo area	2/26/1932		IV	5				SE
	9/27/1938		V	5				SE
San Ardo area	11/2/1955		VI	5.1				SE
Point Sur area	1/23/1984			5.2				SE
Western San Joaquin Valley Domain								
	3/6/1882		VI	5.7				SE
Paicines area	8/6/1916		VII	5.5				SE
Idria area	7/25/1926		VI	5				SE
Coalinga area	12/27/1926		VI	5				SE
	2/5/1947		VI	5				SE
Ned Idria area	10/25/1982		VI	5.4				SE
Coalinga	5/2/1983		VIII	6.7				SE
Coalinga aftershock	7/22/1983		VI	6				SE
Kettleman Hills	8/4/1995			5.7				SE

Location	Date of Incident	Declaration	Mercalli Intensity	Richter Intensity	Number Injured	Structures Affected	Incident Description	Source
San Andreas Fault and Vicinity								
Fort Tejon	1/9/1857		IX+	7.9				SE
San Andreas Fault	2/2/1881		VIII	6.6				SE
San Andreas Fault	3/31/1885		VII	5.5				SE
San Andreas Fault	4/2/1885		V-VI	5.4				SE
San Andreas Fault	4/12/1885		VII	6.2				SE
San Andreas Fault	11/13/1892		VII	5.6				SE
San Andreas Fault	7/22/1899		VII	5.5				SE
San Andreas Fault	7/22/1899		VIII	6.5				SE
Parkfield area	3/3/1901		VIII	5.5				SE
San Andreas Fault	9/20/1907		VII	6				SE
Hollister area	12/31/1910		VII	6				SE
Tejon Pass area	10/23/1916		VII	6				SE
Tejon Pass area	10/23/1916		VI	5.5				SE
Tejon Pass area	2/16/1919		VII	5				SE
Choalame Valley area	3/10/1922		IX	6.5				SE
Choalame Valley area	8/18/1922		VII	5				SE
Parkfield area	6/5/1934		V	5				SE
Parkfield area	6/8/1934		VIII	6			The Parkfield earthquakes had magnitudes of 6 and 5.5 respectively, and occurred on the San Andreas fault in the northeast corner of the County. Earthquake intensities generally conformed to anticipated characteristics for events of this size, with intense shaking (VII-VIII) being limited to a relatively small area near the epicenters of the quakes. Moderate shaking was experienced in most of the central and eestern parts of the County. A variation from the expected intensity characteristics was experienced in the La Panza area. La Panza is approximately 40 miles south of the fault rupture area, but experienced earthquake intensities of VII.	SE
Parkfield area	12/24/1934		IV	5				SE
Hollister area	6/24/1939		VII	5.5				SE
Parkfield area	12/28/1939		V	5				SE
Cuddy Valley area	9/21/1941		VI	5.2				SE
Southeast of Mulberry	7/29/1951		VI	5				SE
Southwest of Coalinga	11/16/1956		VI	5				SE
South of Hollister	1/20/1960		VI	5				SE
Parkfield sequence	6/28/1966			5.1				SE
Parkfield sequence	6/28/1966		VII	5.5			The Parkfield earthquakes had magnitudes of 6 and 5.5 respectively, and occurred on the San Andreas fault in the northeast corner of the County. Earthquake intensities generally conformed to anticipated characteristics for events of this size, with intense shaking (VII-VIII) being limited to a relatively small area near the epicenters of the quakes. Moderate shaking was experienced in most of the central and eestern parts of the County. A variation from the expected intensity characteristics was experienced in the La Panza area. La Panza is approximately 40 miles south of the fault rupture area, but experienced earthquake intensities of VII.	SE
Lytle Creek area	9/12/1970		VII	5.4				SE
Southeast of Hollister	2/24/1972		VI	5				SE
Parkfield area	9/28/2004			6				USGS

SE: County Safety Element NCDC: National Climatic Data Center NOAA: National Oceanic & Atmospheric Administration

Area Faults

Like other areas of California, there are a number of active or potentially active fault systems throughout the San Luis Obispo County. Small earthquakes, in the range of magnitude 2.0 - 2.7 and smaller, occur quite often throughout and near the County. Larger earthquakes do occur occasionally, as indicted by the 6.5 magnitude December 2003 San Simeon Earthquake and the 6.0 September 2004 Parkfield Earthquake centered just north of the Monterey County line.

There are a number of faults throughout the County believed to possibly be capable of damaging earthquakes, including those shown below. The source of fault activity and maximum moment magnitude information is from the Safety Element of the San Luis Obispo County General Plan.

Cambria Fault

The northwesterly trending Cambria fault is approximately 64 kilometers long, including an 8 kilometer projection across Estero Bay. The fault is shown to coming back onshore near Morro Bay, and converging with the Oceanic and West Huasna fault near San Luis Obispo. The Cambria fault is considered potentially active. The Safety Element of the San Luis Obispo County General Plan lists the maximum moment magnitude as 6.25 for the Cambria.

East Huasna Fault

The East Husana fault zone trends north-northwest for a distance of about 70 kilometers from near Sisquoc in Santa Barbara County northward until it intersects with the South Cuyuma fault about 20 kilometers east of the city of San Luis Obispo. The fault is considered potentially active.

La Panza Fault

The northwest trending La Panza fault has been mapped for 71 kilometers along the western base of the La Panza Range. The La Panza fault has been identified as a thrust or reverse fault. The La Panza fault is considered potentially active. The Safety Element of the San Luis Obispo County General Plan lists the maximum moment magnitude as 5.0 - 7.5 for the La Panza.

Los Osos and Edna Fault Zones

The Los Osos fault zone has been mapped generally in an east/west orientation, along the northern flank of the Irish Hills. The western end of the onshore fault zone is located near the community of Los Osos, and the eastern end located near U.S. Highway 101. To the east of U.S. Highway 101, the fault may continue along the northeast flank of the Irish Hills as the Edna fault zone. Assuming an overall length of 35 miles, the Los Osos fault has the potential to generate and earthquake with about a magnitude 6.75.

Nacimiento Fault Zone
The Nacimiento fault zone has been mapped as a regional fault by many investigators, however it is not included as part of the data base of California faults by the California Geological Survey (CSG). While the fault is considered the Bryson earthquake of 1952 is sometimes assigned to the Nacimiento fault zone, and would make the fault seismically active. The Bryson earthquake, which occurred in a rural area of northern San Luis Obispo County, is poorly understood and may be attributed to movement on other faults such as the active San Simeon or potentially active Riconada fault zones. The faults that make up the Nacimiento fault zone enter the County in the vicinity of Nacimiento Lake. Faults, or portions of the faults, related to this system trend southwest near the city of Paso Robles, parallel Highway 101, pass through or near Templeton, through or near the city of Atascadero, through the area in and near Santa Margarita, and continues south. Given the fault's proximity to major population centers, structures, dams, transportation and pipeline routes, it could pose a serious threat to the County.

Rinconada Fault Zone
The Riconada fault zone has been mapped as a regional fault zone about 189 kilometers long located along the western margin of the La Panza Range. The Rinconada fault is inferred to be part of a zone of faults including the Jolon, San Marcos, Espinosa, and Reliz faults that extends from Monterey Bay southward to its juncture with the Nacimiento fault. The California Geologic Survey considers the Rinconada fault to be potentially active. The Safety Element lists the maximum moment magnitude as 7.3 for the Riconada.

San Andreas Fault
The San Andreas is a historically active fault thought to be capable of an earthquake up to and above the 8.0 magnitude range and generally runs along the eastern county border. It enters the County near the Cholame area, passes through the Carrizo Plain, and exits the county near Maricopa. As it passes through the County, three relatively distinct portions of the fault have separate potentials for causing a damaging earthquake. The portion of the fault that runs from Monterey County into San Luis Obispo County to an area near Cholame has commonly been known as the Parkfield segment of the San Andreas fault system. That portion of the fault system is the one that has an approximate 5.6 – 6.0 magnitude earthquake from time to time. A segment of the system that runs from approximately the Cholame area to about the northern edge of the Carrizo Plain area has been commonly known as the Cholame segment. The portion running from the northern Carrizo Plain area and out of the County into Kern County has been commonly know as the Carrizo segment.

It is believed that in 1857 a large (possible 7.8 or larger) earthquake occurred on the San Andreas fault that possibly originated in the Parkfield area and stretched along the fault to the area near San Bernardino. This is perhaps an illustration of the potential for the San Andreas to cause a very powerful earthquake and the need to be prepared.

A major earthquake along any section of the San Andreas Fault could result in serious damage within San Luis Obispo County. An earthquake of 8.0 or greater magnitude would result in severe ground motion, and could cause damage throughout the County. Small earthquakes do occur in the area of the San Andreas within the County from time to time, perhaps most frequently in the Parkfield and nearby areas. Generally, they are so small or in such isolated areas that they are not felt, or are felt only very close by.

San Simeon - Hosgri Fault Zone
The San Simeon-Hosgri fault system generally consists of two fault zones: the Hosgri fault zone represented by a series of faults that are mapped off the San Luis Obispo County coast; and the San Simeon fault zone, which appears to be associated with the Hosgri, and comes onshore near the pier at San Simeon point. The San Simeon fault is considered to be active. The Hosgri fault zone has been interpreted to extend from the northern termination west of the southern San Simeon fault in the Cambria/Point Estero area to its southern termination offshore of Point Perdernales, which is south of the Santa Maria River, off of Santa Barbara County. The Safety Element of the San Luis Obispo County General Plan lists the maximum moment magnitude as 7.3 for the Hosgri-San Simeon.

A description of all of the mapped faults within San Luis Obispo County follows:

Arroyo de Oso Fault. See San Simeon-Hosgri fault zone.

Arroyo Laguna Fault. See San Simeon-Hosgri fault zone.

Blind Thrust Faults. Several large thrust faults are postulated beneath southern California. Based on evaluation of geophysical data, subsurface oil well data, and previous geologic surface mapping, it has been hypothesized that there is the presence of several blind thrust faults beneath the Santa Maria basin and San Luis Obispo County area, including the coastal cities and San Luis Obispo. These faults are concealed, low angle thrusts referred to as the Black Mountain fault, La Panza fault, Point San Luis fault, Purisima-Solomon fault, and the San Lucia fault. Blind thrust faults could pose a significant seismic risk throughout the County.

Big Spring Fault. See San Juan fault.

Cambria Fault. The northwesterly trending Cambria fault is approximately 64 kilometers long, including an 8 kilometer projection across eastern Estero Bay. The fault comes back onshore near Morro Bay, and converging with the Oceanic and West Huasna fault near San Luis Obispo. The fault, located within the Coastal Franciscan domain, has been mapped locally as a reverse or thrust fault. The Cambria fault is considered potentially active.

Casmalia Fault (Orcutt Frontal-Pezzoni Fault). Several authors have hypothesized the presence of a fault zone along the northeast flank of the Casmalia Range and Solomon Hills and running offshore just south of the mouth of the Santa Maria River. The Orcutt Frontal fault has been defined as a high angle, southwest-dipping reverse fault on the basis of subsurface oil well. The Orcutt frontal fault is considered potentially active. The 1980 magnitude 5.1 earthquake that occurred offshore, near the mouth of the Santa Maria River, is plotted along the offshore segment of the Orcutt frontal fault as mapped which suggests that the fault could be seismically active.

Cayucos Fault. The Cayucos fault is mapped trending northwest though the community of Cayucos between the Oceanic and Cambria fault zones. Geologic mapping by CSG indicates that the Cayucos fault is considered inactive.

Chimineas Fault. See San Juan fault.

East Huasna Fault Zone. The East Huasna fault zone trends north-northwest for a distance of about 70 kilometers from near Sisquoc in Santa Barbara County northward through the central portion of the Coastal Franciscan domain until it intersects with the South Cuyama fault about 20 kilometers east of the City of San Luis Obispo. Geologic mapping by CSG indicates that the East Huasna fault is considered potentially active.

Edna Fault. See Los Osos and Edna fault zones.

Espinosa Fault. See Rinconda fault.

Foxen Canyon Fault. See Santa Maria River and Foxen Canyon faults.

Hosgri Fault. See San Simeon-Hosgri fault zone.

Indian Knob Fault. See Los Osos and Edna fault zones.

Jolon Fault. See Rinconada fault.

La Panza Fault. The northwest trending La Panza fault has been mapped for 71 kilometers along the western base of the La Panza Range. The La Panza fault is considered potentially active.

Los Osos and Edna Fault Zones. The western end of the onshore fault zone is located near the community of Los Osos, and continues along the northeast flank of the Irish Hills as the Edna fault zone. Los Osos fault zone as including both the Los Osos and the Edna faults, is considered to be potentially active. Studies indicate the Edna fault is considered potentially active. Assuming an overall fault length of 35 miles, the Los Osos fault has the potential to generate an earthquake with a magnitude 6.75

Morales Fault. The Morales fault zone is mapped as an east-west to northwest trending reverse thrust fault that runs along the Cuyama Valley in the southeast area of the County. The fault is manifested as a complex array of faults of diverse types and orientations that run for about 50 km from the San Andreas fault to the east to the southern end of the San Juan - Big Spring fault zone. Studies indicates that the Morales fault is potentially active.

Morro Bay Fault. See Cayucos fault.

Nacimiento Fault Zone. The Nacimiento fault zone is described as an ill-defined, complex array of northwest trending faults of diverse types and ages. Based on mapping it appears that the Nacimiento fault zone is not a single fault line of specific age, but rather a complex zone of branching and discontinuous faults of diverse orientations, movement and ages. The fault is considered inactive. However, the Bryson earthquake of 1952 is sometimes assigned to the Nacimiento fault zone and may be attributed to movement on other faults such as the active San Simeon or potentially active Rinconada fault zones.

Oceano Fault. The Oceano fault is a 20-kilometer-long northwest-striking reverse fault that extends from north of Santa Maria westward into the San Luis Obispo Bay. The Oceano fault is conservatively considered to be potentially active by current state standards.

Oceanic Fault. See West Huasna/Oceanic fault zone.

Olson Trace. See San Miguelito fault.

Orcutt Frontal-Pezzoni Fault. See Casmalia fault.

Pecho Fault. The northwest-trending Pecho fault lies entirely offshore west and south of Point San Luis. The fault is considered to be potentially active.

Pezzoni Fault. See Casmalia fault

Pismo Fault. The Pismo fault runs northwest along the base of the hills that form the western margin of the Santa Lucia Range. The Pismo fault is inactive.

Reliz Fault. See Rinconada fault.

Rinconada Fault. The Rinconada fault is characterized by a linear, narrow, near-vertical zone of faults about 189 kilometers long that is located along the western margin of the La Panza Range. The Rinconada fault is inferred to be part of a zone of faults including the Jolon, San Marcos, Espinosa, and Reliz faults that extends from Monterey Bay southward to its juncture with the Nacimiento fault. The Rinconada fault zone is well defined over most of its length and is recognized as one of several closely spaced, parallel

to branching faults that clearly truncate all pre-Quaternary geologic units. Studies indicate that the Rinconada fault to be potentially active.

San Andreas Fault Zone. The San Andreas fault zone is located along the eastern border of San Luis Obispo County. This historically active fault has a length of over 960 kilometers and forms the tectonic boundary between the Pacific Plate to the west and the North American Plate to the east. Numerous major earthquakes have been recorded on the San Andreas fault, and it is generally considered to pose the greatest earthquake risk to California. The San Andreas fault is likely capable of producing a maximum credible earthquake of magnitude 8.25.

The San Andreas fault has been divided into several segments. The Cholame segment extends from Cholame southeastward for about 62 kilometers. The Carrizo segment of the San Andreas fault extends from southeast of Cholame for approximately 145 kilometers. The estimated recurrence interval for earthquakes along this segment is 206 years. Studies predicts an 18 percent probability of a rupture on the Cholame and Carrizo segments of the San Andreas fault for the period between 1994 and 2024.

San Bernardo Fault. See Cayucos fault.

San Juan Fault. The San Juan fault branches southeasterly from the San Andreas fault. The San Juan fault is classified as potentially active.

San Luis Bay Fault. On the basis of onshore geologic studies, offshore drill holes, and geophysical data, the San Luis Bay fault is interpreted to be a west-northwest striking reverse fault located along the coast near Avila Beach. Geologic data presented suggests that the San Luis Bay fault has a maximum length of about 19 kilometers (including both onshore and offshore segments). The onshore portion of the fault is estimated to have a length of 4.5 kilometers. Studies indicate that this fault is considered potentially active.

San Luis Range Margin. See San Luis Bay, Wilmar Avenue, Olson, and Santa Maria River faults.

San Marcos Fault. See Rinconada fault.

San Miguelito Fault. The San Miguelito fault is a 9-kilometer-long, west-northwest-striking zone within the San Luis Range located along the southwestern margin of the San Luis Obispo syncline. Studies and detailed mapping indicates that the San Miguelito fault is considered inactive. West of the mapable trace of the San Miguelito fault, the Olson Trace has been mapped on the basis of a disruption in the marine terrace sequence. The Olson Trace is considered inactive.

San Simeon-Hosgri Fault Zone. The San Simeon-Hosgri fault system generally consists

of two fault zones: the Hosgri fault zone represented by a series of faults that are mapped off of the San Luis Obispo County coast; and the San Simeon fault zone, which appears to be associated with the Hosgri, and comes onshore near the pier at San Simeon Point. Studies map a western trace of this fault zone as the Arroyo del Oso fault and the eastern-most trace of the faults as the Arroyo Laguna fault.

Studies have determined that the San Simeon fault zone is considered to be active, and a Earthquake Fault Zone has been established along strands of the fault by the Division of Mines and Geology under the Alquist-Priolo act.

The Hosgri fault zone has been interpreted to extend from the northern termination west of the southern San Simeon fault in the Cambria/Point Estero area to its southern termination offshore of Point Pedernales. The fault is located entirely offshore.

Santa Lucia Bank/Offshore Faults. Mapping has identified a zone of deformed marine platforms interpreted to be the Santa Lucia Bank fault zone. The zone trends northward off the coast of San Luis Obispo County. Studies indicate portions of the Santa Lucia Bank fault zone to be active.

In addition to the Santa Lucia Bank fault zone, there are numerous unnamed offshore faults shown on regional geologic maps. These faults typically are depicted as extensions of onshore faults or as discontinuous, fairly short thrust fault segments that are generally less than five kilometers in length. As with the Hosgri and Pecho faults, there is a high degree of difficulty involved with evaluating these faults because they can not be directly observed.

Santa Maria River and Foxen Canyon Faults. The Santa Maria River and Foxen Canyon faults are buried northwest-striking reverse faults that extend from south of Sisquoc in Santa Barbara County about 40 kilometers northward to north of Nipomo. The fault trace is buried and is inferred to parallel the Santa Maria River and U.S. Highway 101 on the basis of interpretation of oil well and seismic data. The fault zone is mapped as extending into the southern end of the Wilmar Avenue fault zone, and shows the Santa Maria River fault as potentially active.

Serrano Fault. See West Huasna/Oceanic fault zone.

South Cuyama Fault. The South Cuyama fault is located in the Salinian domain. It extends from roughly New Cuyama northwest to Garcia Mountain, a distance of approximately 61 kilometers. The South Cuyama fault is a west dipping thrust or reverse fault responsible for the uplift of the Sierra Madre Range and is potentially active.

Sur-Nacimiento Fault. See Nacimiento fault zone.

West Huasna/Oceanic Fault Zone. The West Huasna/Oceanic fault zone trends north-northwest for approximately 100 kilometers through the central portion of the Coastal Franciscan domain. The fault extends from approximately the Santa Maria River on the south to San Simeon on the north. The West Huasna fault extends about 30 kilometers from the Santa Maria River northward to near San Luis Obispo. The Oceanic fault continues northward from near San Luis Obispo to San Simeon. Studies indicate that the West Huasna fault is considered potentially active.

Whiterock Fault. The Whiterock fault is mapped as a parallel thrust to the Morales fault towards the westerly end of the Cuyama Valley. Studies indicate that the Whiterock fault is inactive.

Wilmar Avenue Fault. The western segment of the Wilmar Avenue fault strikes west northwest and extends westward from Arroyo Grande Creek about seven kilometers to an area offshore near Pismo Beach, where the fault is exposed in the seacliff. At Arroyo Grande Creek, the eastern segment of the fault extends in a southeasterly direction following U.S. Highway 101 to the Santa Maria River. The eastern section of the fault is not exposed at the surface and is interpreted as a blind reverse fault. The Wilmar Avenue fault should be considered as potentially active.

However, the fault is part of the seismogenic southwestern boundary zone of the San Luis/Pismo block system and could pose a seismic hazard to nearby communities. Although there is no evidence for surface movement along the eastern fault segment southeast of Arroyo Grande Creek, that portion of the fault is interpreted to be a blind thrust fault that has not propagated to the surface. If that interpretation is correct, there is a potential for the eastern portion of the fault to generate damaging earthquakes. Additional studies are needed to further evaluate the seismogenic potential of the fault.

Structural Hazards

Unreinforced Masonry Buildings

Unreinforced masonry building type structures consist of buildings made of unreinforced concrete and brick, hollow concrete blocks, clay tiles, and adobe. Buildings constructed of these materials are heavy and brittle, and typically provide little earthquake resistance. In small earthquakes, unreinforced buildings can crack, and in strong earthquakes, they have a tendency to collapse. These types of structures pose the greatest structural risk to life and safety of all general building types.

Non-structural items and building components can also influence the amount of damage that buildings suffer during an earthquake. Unreinforced parapets, chimneys, facades, signs, and building appendages can all be shaken loose, creating a serious risk to life and property.

As described above, unreinforced masonry buildings generally perform poorly in strong earthquakes, and have a high potential to suffer extensive damage. Due to the public safety risks that are posed by unreinforced masonry buildings, the California legislature passed Senate Bill 547 (Government Code section 8875 et seq.). This legislation went into effect January 1, 1987, and required all cities and counties located in Seismic Zone 4, which includes San Luis Obispo County, to conduct an inventory of potentially hazardous structures, including unreinforced masonry buildings.

To comply with the requirements of SB 547, the County of San Luis Obispo adopted the Uniform Code for Building Conservation as part of Title 19 (Building and Construction Ordinance) of the County Code. Surveys that were conducted to identify potentially unsafe unreinforced masonry buildings identified about 80 structures that required modifications to meet specified earthquake resistance structural standards. Identified structures that require seismic retrofit are generally located in various areas, mostly urban. The County's ordinance implementing SB 547 requires the owners of identified unreinforced buildings to demolish the structures or complete modifications, depending upon the building's use and number of occupants. As of April 2005, only eight structures remain to be retrofitted, including the historical San Miguel Mission for which preliminary plans have been submitted.

Risk Assessment

Located within San Luis Obispo County are several known active and potentially active earthquake faults, including the San Andreas, San Simeon and Los Osos faults. In the event of an earthquake, the location of the epicenter as well as the time of day and season of the year would have a profound effect on the number of deaths and casualties, as well as property damage.

Research centers devoted to the detection and logging of earthquake events post a continuous string of activity in San Luis Obispo County faults.

A moderate earthquake occurring in or near San Luis Obispo County could result in deaths, casualties, property damage, agricultural and environmental damage, and disruption of normal government and community services and activities. The effects could be aggravated by collateral emergencies such as fires, flooding, hazardous material spills, utility disruptions, landslides, and transportation emergencies.

- **Effects on people and housing.** In any earthquake, the primary consideration is saving lives. Time and effort must also be dedicated to providing for mental health by reuniting families, providing shelter to displaced persons, and restoring basic needs and services. Major efforts will be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and temporary housing for affected citizens.

A survey of local, State, and Federal government emergency plans indicate that although there is a general capacity to respond to small and intermediate-sized earthquakes, it is unlikely that any of these governmental units will be able to cope with the *immediate* impact of a great quake, such as an M 8.3 event on the south-central San Andreas fault. The general public must realize that the assistance that they have been used to expecting simply will not be immediately available. In fact, in the event of an earthquake of such magnitude, citizens must be prepared to wait for up to 72 hours or more for any type of organized response.

- **Effects on commercial and industrial structures.** After any earthquake, individuals are likely to lose wages due to the inability of businesses to function because of damaged goods and/or facilities. With business losses, the County of San Luis Obispo will lose revenue. Economic recovery from even a minor earthquake will be critical to the communities involved.

- **Effects on infrastructure.** The damage caused can lead to the paralysis of the local infrastructure: police, fire, medical and governmental services.

- **Effects on agriculture.** Earthquakes can cause loss of human life, loss of animal life, and property damage to structures and land dedicated to agricultural uses. The most significant long-term impacts on agriculture from earthquakes are those that arise from the cascading effects of fire and flood.

Relationship to Other Hazards – Cascading Effects
Earthquakes can cause many cascading effects such as fires, flooding, hazardous material spills, utility disruptions, landslides, and transportation emergencies. Ground shaking may cause seiche, the rhythmic sloshing of water in lakes or bays.

Risk assessment conclusion. San Luis Obispo County is located in a geologically complex and seismically active region. There are numerous active and potentially active faults in the County. The County has a history of damaging earthquakes, including those associated with the San Andreas fault, but there have also been a number of magnitude 5.0 to 6.2 earthquakes which have affected large portions of the County. While it is impossible to accurately predict the next earthquake event, the probability for future damaging earthquakes in San Luis Obispo County is rated as Low to Medium.

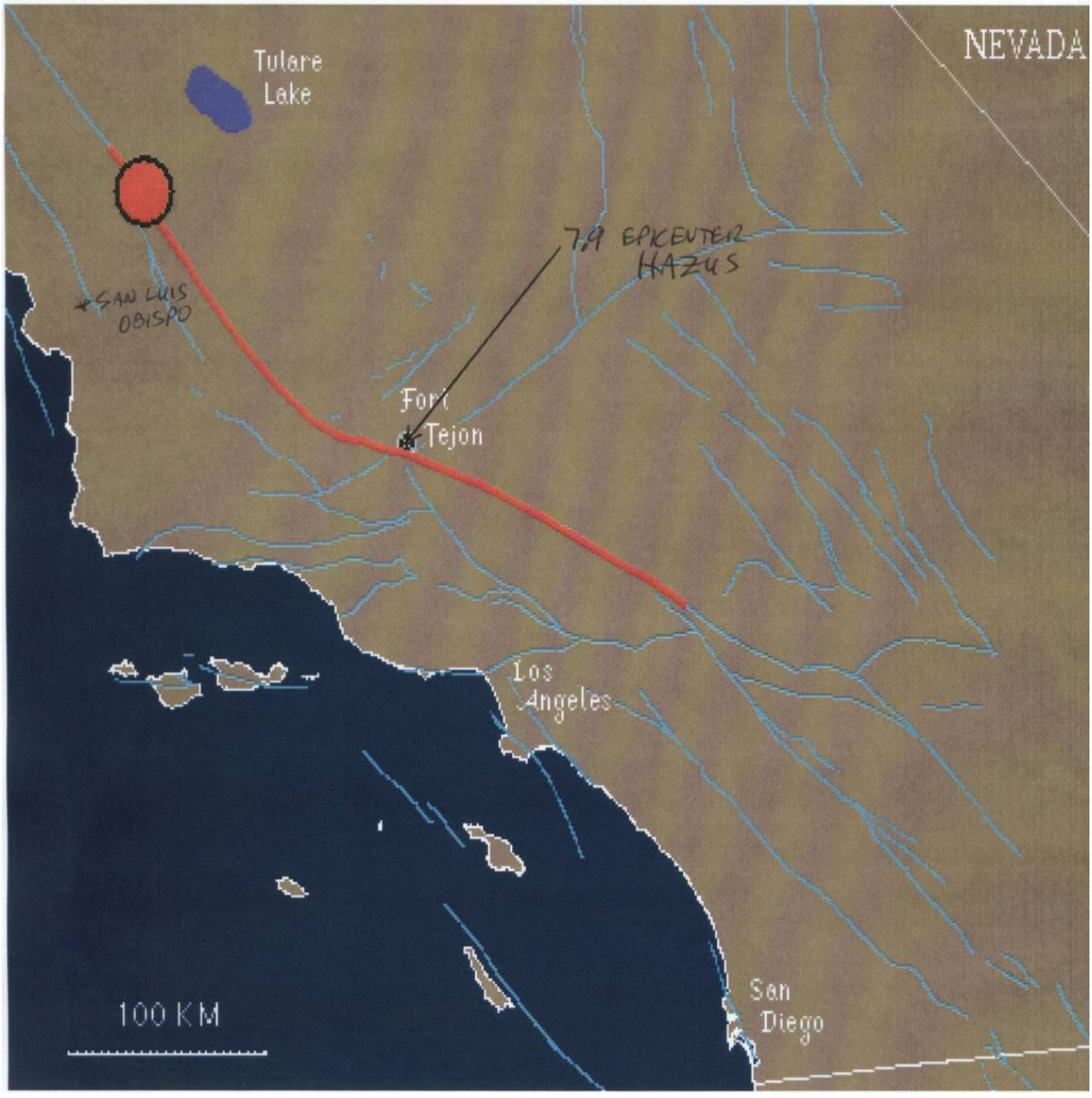
HAZUS Analysis – Number 1

As part of the development of this LHMP, an earthquake scenario was created in HAZUS-MH, the FEMA-approved software program for estimating potential losses from disasters.

For the HAZUS Analysis – Number 1 scenario, a magnitude 7.9 earthquake on the San Andres Fault was simulated with an epicenter at Fort Tejon (approximately 45 miles south of Bakersfield and 65 miles north of Los Angeles) – replicating the historical 1857 earthquake. The following Map indicates the Fort Tejon 1857 epicenter.

The results produced by HAZUS are reported by census tract. The summarized results for San Luis Obispo County are presented on the pages immediately following.

HAZUS Analysis – Number 1



SUMMARIZED HAZUS RESULTS

HAZUS Analysis – Number 1

Jurisdiction: San Luis Obispo County

Scenario: San Andres Fault Earthquake 7.9

Direct Economic Loss Estimates (thous. $)	
Structural Damage	$78
Non-Structural Damage	$312
Building Damage	$390
Contents Damage	$47
Inventory Loss	$1
Relocation Cost	$3
Income Loss	$10
Rental Income Loss	$16
Wage Loss	$12
Total Loss	$478

Commercial Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Commuting Casualties for Daytime Event

Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Educational Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Hotels Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Industrial Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Other Residential Casualties for Daytime Event	
Medical Aid	0

Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Single Family Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Total Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

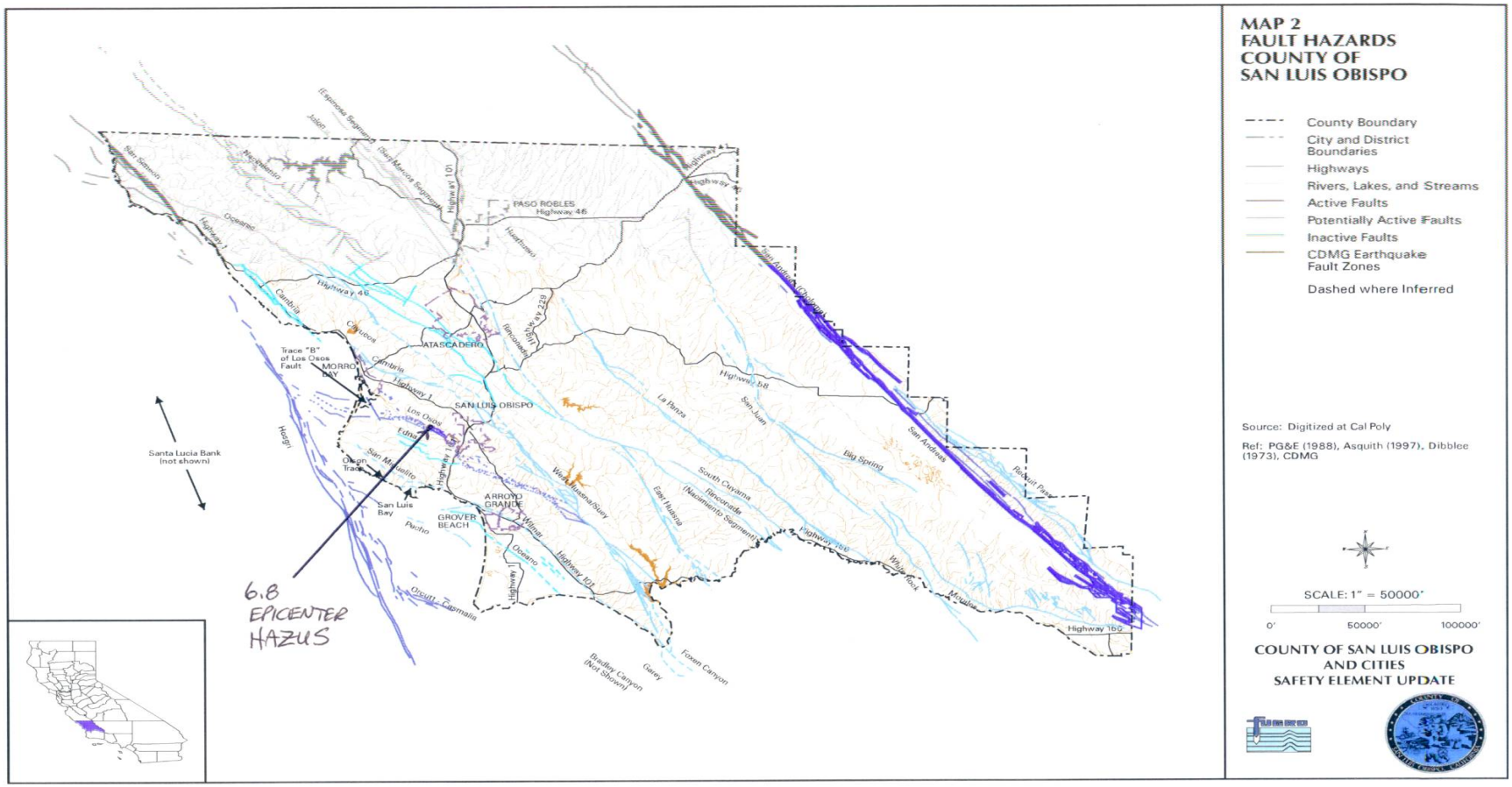
HAZUS Analysis – Number 2

As part of the development of this LHMP, an earthquake scenario was created in HAZUS-MH, the FEMA-approved software program for estimating potential losses from disasters.

For the HAZUS Analysis – Number 2 scenario, a magnitude 6.8 earthquake on the Los Osos Fault was simulated with an epicenter approximately 5 miles west of US Highway 101. The following Map indicates the simulated epicenter.

The results produced by HAZUS are reported by census tract. The summarized results for San Luis Obispo County are presented on the pages immediately following.

HAZUS Analysis – Number 2



SUMMARIZED HAZUS RESULTS

HAZUS Analysis – Number 2

Jurisdiction: San Luis Obispo County

Scenario: Los Osos Fault Earthquake 6.8

Direct Economic Loss Estimates (thous. $)	
Structural Damage	$143,533
Non-Structural Damage	$613,496
Building Damage	$757,028
Contents Damage	$199,614
Inventory Loss	$3,858
Relocation Cost	$3,625
Income Loss	$39,187
Rental Income Loss	$50,729
Wage Loss	$48,619
Total Loss	$1,102,661

Commercial Casualties for Daytime Event	
Medical Aid	369
Hospital Treatment	96
Life-Threatening Severity	15
Death	29

Commuting Casualties for Daytime Event

Medical Aid	1
Hospital Treatment	1
Life-Threatening Severity	1
Death	0

Educational Casualties for Daytime Event	
Medical Aid	69
Hospital Treatment	17
Life-Threatening Severity	3
Death	5

Hotels Casualties for Daytime Event	
Medical Aid	2
Hospital Treatment	1
Life-Threatening Severity	0
Death	0

Industrial Casualties for Daytime Event	
Medical Aid	38
Hospital Treatment	10
Life-Threatening Severity	1
Death	3

Other Residential Casualties for Daytime Event	
Medical Aid	34

Hospital Treatment	7
Life-Threatening Severity	1
Death	1

Single Family Casualties for Daytime Event	
Medical Aid	24
Hospital Treatment	3
Life-Threatening Severity	0
Death	0

Total Casualties for Daytime Event	
Medical Aid	537
Hospital Treatment	135
Life-Threatening Severity	21
Death	38

Hazard: Fault Rupture /Groundshaking / Liquefaction

Severity: High (in the event of an earthquake in specific regions of the County)	Probability: High (in the event of an earthquake in specific regions of the County)

Fault Rupture

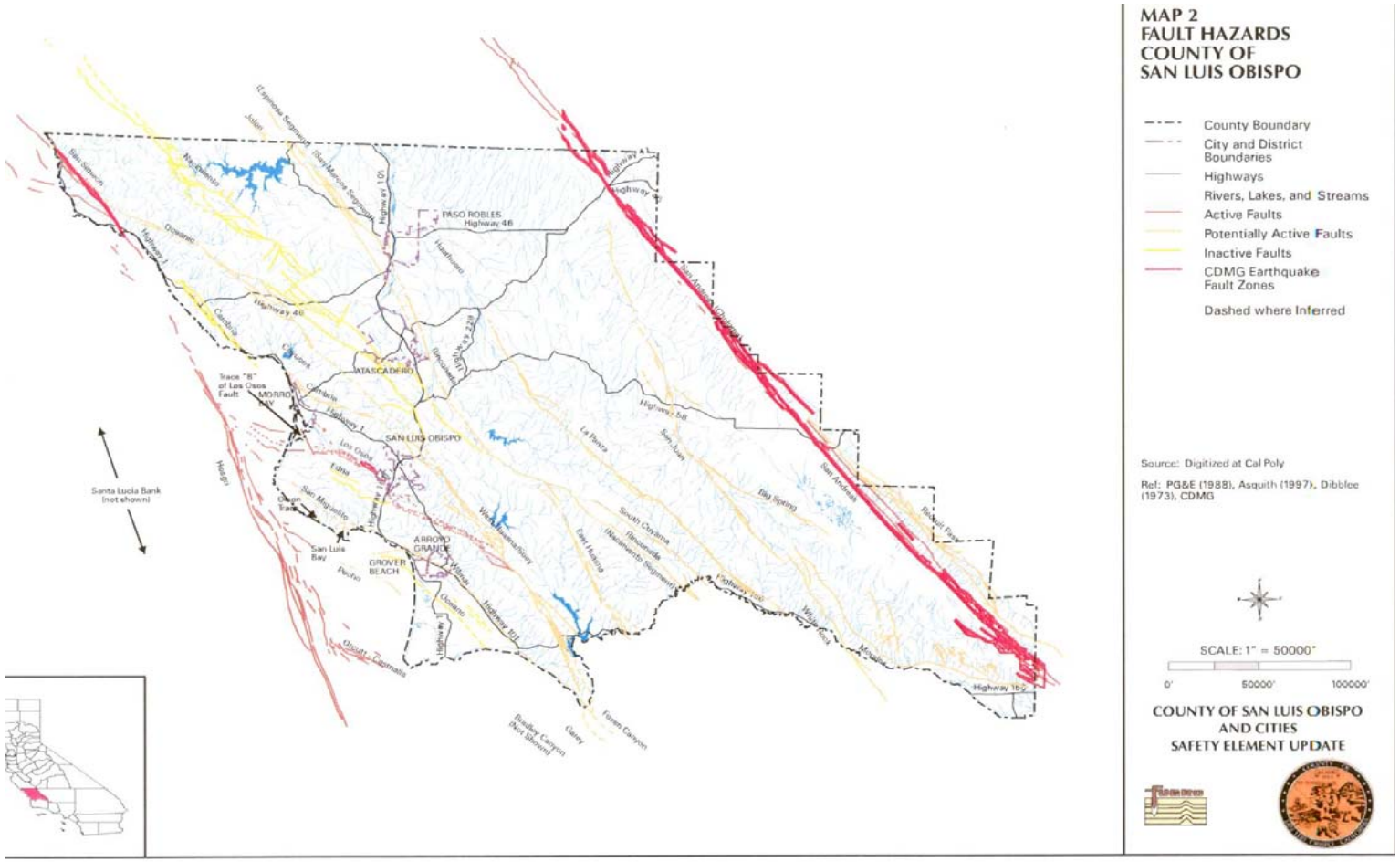
Hazard Description

A fault is a fracture in the earth's crust along which movement has occurred either suddenly during earthquakes or slowly during a process called creep. Cumulative displacement may be tens or even hundreds of miles if movement occurs over geologic time. However, individual episodes are generally small, usually less than several feet, and are commonly separated by tens, hundreds, or thousands of years. Damage associated with fault-related ground rupture is normally confined to a fairly narrow band along the trend of the fault. Structures are often not able to withstand fault rupture and utilities crossing faults are at risk of damage. Fault displacement involves forces so great that it is generally not feasible (structurally or economically) to design and build structures to accommodate this rapid displacement.

Fault displacement can also occur in the form of barely perceptible movement called "fault creep." Damage by fault creep is usually expressed by the rupture or bending of buildings, fences, railroads, streets, pipelines, curbs, and other linear features. Excellent examples of fault creep can be seen in the Carrizo Plain area of eastern San Luis Obispo County where gradual creep on the San Andreas fault has offset stream beds, roadways, and fence lines. In addition, there is also the potential for coseismic creep, where movement on a fault is triggered by an earthquake on another nearby fault.

Historically active faults are generally thought to present the greatest risk for future movement and, therefore, have the greatest potential to result in fault rupture hazards. A common problem in determining where ground displacement may occur is identifying the location of the fault. Many faults are hidden beneath deep accumulations of soil. Additionally, fault displacement may occur in rupture zones (similar to the Landers and Loma Prieta earthquakes) instead of along a single fault trace. Another consideration is that detailed geologic studies have not been performed in large portions of San Luis Obispo County. With the difficulties associated with mitigating the effects of fault rupture and in determining the precise location of faults, the most effective method to minimize fault rupture hazard is to avoid placing structures in proximity to suspected fault locations.
Because of the presence of numerous active and potentially active faults in San Luis

Obispo County, it is appropriate to consider the potential for ground surface rupture due to faulting. Portions of the Los Osos, San Simeon-Hosgri, and San Andreas faults have been designated active by CSG. The approximate limits of the earthquake fault zones recommended by CSG, and active and potentially active faults in San Luis Obispo County are shown on following map (Map 2 from the San Luis Obispo County Safety Element).


MAP 2
FAULT HAZARDS
COUNTY OF
SAN LUIS OBISPO
County Boundary
City and District Boundaries
Highways
Rivers, Lakes, and Streams
Active Faults
Potentially Active Faults
Inactive Faults
CDMG Earthquake Fault Zones
Dashed where Inferred
Source: Digitized at Cal Poly
Ref: PG&E (1988), Asquith (1997), Dibblee (1973), CDMG
SCALE: 1" = 50000'
0'
50000'
100000'
COUNTY OF SAN LUIS OBISPO
AND CITIES
SAFETY ELEMENT UPDATE
PASO ROBLES
Highway 46
ATASCADERO
MORRO BAY
SAN LUIS OBISPO
ARROYO GRANDE
GROVER BEACH
San Luis Bay
Santa Lucia Bank (not shown)
Highway 166

Fault Rupture Hazard Potential

Active faults identified by the Alquist-Priolo Fault Zoning Act include the San Andreas, San Simeon-Hosgri, and Los Osos faults. Fault zoning is continually updated and reviewed by CSG and it is likely that other faults in addition to those currently listed by CSG will be added to the list in the future.

Table 4-9 list major faults that have been mapped by the CSG in San Luis Obispo County. The potential for fault rupture hazards along other faults listed in the Table as inactive faults is generally considered to be low. However, this hazard should be considered when placing a structure near or over any suspected fault location.

Table 4-9: Major faults in San Luis Obispo County mapped by CSG

Fault Name	Maximum Moment Magnitude	Activity	Earthquake Hazard Zone?
Hosgri-San Simeon	7.3	Active	Yes
Casmalia	6.5	Potentially Active	No
Los Osos	6.8	Active	Yes
San Luis Range	7.0	Potentially Active	No
San Juan	7.0	Potentially Active	No
Rinconada	7.3	Potentially Active	No
San Andreas-Carrizo	7.2	Active	Yes
San Andreas-Cholame	6.9	Active	Yes
San Andreas–Parkfield Segment	6.7	Active	Yes
San Andreas (1857 rupture)	7.8	Active	Yes
San Andreas (1906)	7.9	Active	Yes

Arroyo Grande

Mapped faults in the City of Arroyo Grande are the potentially active Wilmar Avenue fault and the inactive Pismo fault. The Wilmar Avenue fault is exposed in the seacliff near Pismo Beach and the buried trace of the fault is inferred to strike northwest-southeast parallel and adjacent to U.S. Highway 101 beneath portions of Arroyo Grande. The potentially active fault presents a moderate potential fault rupture hazard to the City. The inactive Pismo fault presents a very low potential fault rupture hazard. Further

studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

Atascadero

Mapped faults in the vicinity of Atascadero are the potentially active Rinconada fault and the Nacimiento fault zones. The Rinconada fault and its western associated fault, the Jolon, is mapped trending northwest along the eastern City limits. The fault mostly lies east of the Salinas River and outside the City limits. Although there is evidence that indicates movement along the Rinconada fault, the fault lacks any geomorphic features to suggest the fault is active. Because the Rinconada fault is potentially active, it presents a moderate fault rupture hazard to the City of Atascadero. Further studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

The Nacimiento fault zone consists of a nearly 10-kilometer wide northwest trending, complex fault zone located in the Santa Lucia Range of southwest Atascadero. The Nacimiento fault zone is classified as inactive by CSG, but is believed to be coincident with the location of the epicenter for historic earthquakes that suggest the fault is seismically active. Given the uncertainty of the Nacimiento fault's activity, further studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

Grover Beach

The only mapped fault near Grover Beach is the potentially active Wilmar Avenue fault. The Wilmar Avenue fault is exposed in the seacliff near Pismo Beach and the buried trace of the fault is inferred to strike northwest-southeast generally along the alignment of U.S. Highway 101 past Grover Beach. The mapped location of the fault runs along a portion of the northern city limits for Grover Beach. The Wilmar Avenue fault is considered potentially active and presents a moderate fault rupture hazard to the City. Further studies to evaluate the activity of the fault are warranted, prior to placing structures near the mapped fault traces.

Morro Bay

The only known mapped faults in the City of Morro Bay are the potentially active Cambria fault and possible splays of the active Los Osos fault system. The Cambria fault is mapped within the eastern limits of the City. The Cambria fault consists of a complex system of thrust faults located primarily in the hills northeast of Morro Bay. The potentially active fault presents a moderate fault rupture hazard to City developments in that area. The Los Osos fault is active, but presents essentially no fault rupture hazard to the City as it is only mapped in undeveloped areas. Further studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

Paso Robles

The only known mapped fault within the City of Paso Robles is the Rinconada fault. The potentially active Rinconada fault is mapped through southwestern Paso Robles and crosses Highway 101 just south of Spring Street. A trace of the fault is also identified as running up Spring Street, which corresponds to a line of hot springs that once existed in this area but have since been capped and buried. As a potentially active fault, the Rinconada presents a moderate fault rupture hazard to the City. Further studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

The northern end of the potentially active La Panza fault is located about 20 kilometers southeast of Paso Robles, near the town of Creston. The northwest striking La Panza fault is about 75 kilometers long. The Huerhuero fault is a possible extension of the La Panza and is mapped trending northwest along Huerhuero Creek south of Highway 46, but is not within the current City limits.

Pismo Beach

As with surrounding communities, the City of Pismo Beach is located in a seismically active area, and ground shaking could occur in Pismo Beach, as in other areas of the county.

San Luis Obispo

CSG has mapped the active Los Osos fault through a portion of the City, which strikes northwest-southeast along the southwestern margin of the Los Osos Valley. Field evaluations for the main strand of the Los Osos fault, found evidence of movement in the last 11,000 years. This evidence of recent activity resulted in the establishment of an Earthquake Fault Zone by CSG in 1989 under the Alquist-Priolo Fault Zoning Act. It should not be interpreted that the active portion of the main trace of the Los Osos Fault is limited only to the designated Earthquake Fault Zone. Rather, the limits of the established zone correspond to the limits of the available information provided in site specific studies that show evidence of recent fault activity in that area. The Los Osos fault presents a high to very high fault rupture hazard to City developments near and southwest of the Los Osos Valley Road area.

Other faults that are near the borders of San Luis Obispo are the West Huasna, Oceanic, and Edna faults. These faults are considered to be potentially active and present a moderate fault rupture hazard to developments in their vicinity.

Unincorporated Areas in San Luis Obispo County

Fault Rupture Hazard Potential

The following paragraphs briefly discuss the fault rupture hazard potential for the several unincorporated areas of the County including Cambria, Cayucos, Nipomo, Oceano, the South Bay area, San Miguel, Santa Margarita, and Templeton.

Cambria

Mapped faults in the vicinity of Cambria include the Cambria and Oceanic faults, and the offshore Hosgri fault. Although the offshore Hosgri fault is considered to be active and a likely source for future seismic events, it does not itself provide a fault rupture hazard to onshore facilities. The potentially active Cambria fault consists of a complex web of thrust faults that trend northwest along Highway 1 into the town of Cambria. In the vicinity of Cambria, the fault zone extends from the eastern portion of the town eastward for about two kilometers.

The potentially active Oceanic fault zone consists of a zone of northwest trending faults located about 8 kilometers northeast of Cambria. Because the faults are considered to be potentially active, they present a moderate fault rupture hazard to the town of Cambria. Further studies to evaluate the activity of the faults are warranted prior to placing structures near the mapped fault traces.

Cayucos

Faults in the vicinity of Cayucos include the Cayucos, Cambria, and Oceanic fault zones. Geologic mapping mapped the buried trace of the northwest striking Cayucos fault beneath the town of Cayucos. The fault is considered to be inactive and therefore results in a low potential to serve as a fault rupture hazard. Although the CSG considers the Cayucos fault to be inactive, it is often undesirable to site structures over any fault as a result of nonuniform foundation support conditions and the potential for coseismic movement that could result from earthquakes on other nearby faults.

The northwest striking Oceanic fault zone is located about two kilometers northeast of Cayucos. The Cambria fault zone is mapped as going offshore north of Cayucos, and returning to shore as a broad zone of faults passing through Cayucos. These faults are considered to be potentially active and therefore present a moderate fault rupture hazard. Further studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

Nipomo

The faults in the Nipomo area include the Santa Maria River, Wilmar Avenue, Oceano and West Huasna faults. The buried trace of the Santa Maria River/Wilmar Avenue fault is inferred to parallel U.S. Highway 101 in the vicinity of Nipomo. The Oceano fault generally is trending northwest across the Nipomo Mesa and into the town of Oceano.

The West Huasna fault is mapped along the eastern side of the valley. These faults generally have a subdued topographic expression and are considered to be potentially active by CSG. Review of the Oceano fault suggests that the fault is inactive. On the basis of that information, potentially active faults present moderate fault rupture hazard in the Nipomo area. The inactive Oceano fault presents a very low potential as a fault rupture hazard. Although the Oceano fault is inactive, it is often undesirable to site structures over any fault as a result of nonuniform foundation support conditions and the potential for coseismic movement that could result from earthquakes on other nearby faults. Further studies to evaluate the activity of the Wilmar Avenue and West Huasna faults are warranted, prior to placing structures near the mapped fault traces.

Oceano

The only known mapped fault in the vicinity of Oceano is the Oceano fault. The buried trace of the potentially active Oceano fault is interpreted to strike northwest along the southwestern side of the Cienega Valley about 1,000 meters southwest of Oceano, and goes offshore near the mouth of Arroyo Grande Creek. Although the fault is classified as potentially active by CSG, review of the Oceano fault suggests that the fault is inactive. The Oceano fault presents a very low fault rupture hazard to Oceano. Although the Oceano fault is likely inactive, it is often undesirable to site structures over any fault as a result of nonuniform foundation support conditions and the potential for coseismic movement that could result from earthquakes on other nearby faults.

South Bay

The South Bay area includes the communities of Los Osos, Cuesta by-the-Sea, Baywood Park, and the south Morro Bay area. Mapped faults in the South Bay area include the active Los Osos fault. As mapped the Los Osos fault consists of a several hundred meter wide zone of west-northwest striking lineaments and scarps located along the southern side of the Los Osos Valley. Portions of the Los Osos fault have been zoned active by CSG. The activity of this fault segment is unknown, but is inferred to be at least potentially active or possibly active. The Los Osos fault and related branches present a moderate to very high fault rupture hazard to the area. Further studies to evaluate the location and activity of the fault are warranted, prior to placing structures near the mapped fault traces.

San Miguel

As indicated on Map 2, the data reviewed does not indicate that there are mapped active or potentially active faults in San Miguel.

Santa Margarita

The only mapped fault in the Santa Margarita area is the potentially active Rinconada fault. The fault trends northwest through the Santa Margarita area near Pozo Road, Trout Creek, and the Salinas River. Although there is evidence that indicates movement along

the Rinconada fault, the fault lacks any geomorphic features to suggest the fault is active. Because the Rinconada fault is potentially active, it poses a moderate fault rupture hazard to this area. Further studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

Templeton

The only mapped fault in the Templeton area is the western trace of the potentially active Rinconada fault system referred to as the Jolon fault. The fault trends northwest through the community just south of the junction of Highways 46 and 101. Although there is evidence that indicates movement along the Rinconada fault, the fault lacks any geomorphic features to suggest the fault is active. Because the Rinconada fault is potentially active, it poses a moderate fault rupture hazard to this area. Further studies to evaluate the activity of the faults are warranted, prior to placing structures near the mapped fault traces.

Groundshaking

Hazard Description

Sudden slip along all or part of a fault surface releases energy that has accumulated within the earth's crust and radiates that energy in the form of earthquake waves in all directions away from the source. As the waves pass through an area, they produce the shaking effects that are the predominant cause of earthquake damage. In general, groundshaking intensity diminishes as the distance from the earthquake epicenter increases. The loss of earthquake energy that occurs as distance from the fault increases is called "attenuation."

Groundshaking has historically resulted in a significant risk to life and property damage. The extent of loss that can result from groundshaking was demonstrated by the 1989 Loma Prieta, the 1994 Northridge, and the 2003 San Simeon earthquakes which together resulted in the loss of many lives and property and infrastructure damage in the billions of dollars. Groundshaking can also trigger secondary seismic phenomenon such as liquefaction, lateral spreading, seismically induced settlement and slope instability, tsunami and seiche, and other forms of ground rupture and seismic response.

San Luis Obispo County is located in a geologically complex and seismically active region that is subject to earthquakes and potentially strong groundshaking. The intensity of groundshaking at a particular site or structure is a function of many factors including: 1) earthquake magnitude, 2) distance from the epicenter, 3) duration of strong ground motion, 4) local geologic conditions (soil type and topography), and 5) the fundamental period of the structure.

A brief description of those factors is presented below.

Earthquake Magnitude. Earthquake magnitude, as generally measured by either the Richter or Moment Magnitude scale, is a measurement of energy released by the movement of a fault. As the amount of energy released by an earthquake increases, the potential for groundshaking impacts also increases.

Distance From Epicenter. Earthquake energy generally dissipates (or attenuates) with distance from a fault. Over long distances, this loss of energy can be significant, resulting in a significant decrease in groundshaking with increased distance from the epicenter.

Duration of Strong Shaking. The duration of the strong groundshaking constitutes a major role in determining the amount of structural damage and the potential for ground failure that can result from an earthquake. Larger magnitude earthquakes have longer durations than smaller earthquakes.

Local Geologic Conditions. The geologic and soil conditions at a particular site have the potential to substantially increase the effects of groundshaking. The thickness, density, and consistency of the soil, as well as shallow ground water levels, have the potential to amplify the effects of groundshaking depending on the characteristics of the earthquake. In general, the presence of unconsolidated soils above the bedrock surface can amplify the groundshaking caused by an earthquake.

Fundamental Periods. Every structure has its own fundamental period or natural vibration. If the vibration of groundshaking coincides with the natural vibration period of a structure, damage to the structure can be greatly increased. The extent of damage suffered during an earthquake can also depend on non-geologic factors. The type of building and its structural integrity will influence the severity of the damage suffered. Generally, small, well constructed, one- and two-story wood and steel frame buildings have performed well in earthquakes because of their light weight and flexibility. Reinforced concrete structures will also usually perform well. Buildings constructed from non-flexible materials, such as unreinforced brick and concrete, hollow concrete block, clay tile, or adobe, are more vulnerable to earthquake damage.

Effects of Groundshaking

The primary effect of groundshaking is the damage or destruction of buildings, infrastructure, and possible injury or loss of life. Building damage can range from minor cracking of plaster to total collapse. Disruption of infrastructure facilities can include damage to utilities, pipelines, roads, and bridges. Ruptured gas and water lines can result in fire and scour/inundation damage, respectively, to structures. Secondary effects can include geologic impacts such as coseismic fault movement along nearby faults, seismically induced slope instability, liquefaction, lateral spreading, and other forms of

ground failure and seismic response. As demonstrated in Oceano by the San Simeon 2003 earthquake.

Seismic Risk

Seismic risk associated with earthquakes and public safety is being addressed on an ongoing basis by local, state and federal agencies. The most significant elements of this assessment are the building codes and regulations that define acceptable risks and govern seismic design standards for residential, public, and infrastructure buildings and facilities. The California Building Code, which is published periodically by the International Congress of Building Officials (ICBO) provides minimum standards that represent current practices in building safety and the construction of earthquake-resistant structures. Previous editions of the California Building Code have recognized the seismic exposure of San Luis Obispo County to groundshaking hazards by categorizing the entire County within Seismic Zone IV, the most stringent category for seismic design. According to California Business Code standards, structures in Zone IV should be designed to the same seismic criteria regardless of their proximity to faults. Design professionals may recommend that structures also consider faults that are not listed in Table 4-9. Ongoing studies are also being performed by CSG to map seismic hazards for areas founded on soil profiles subject to ground failure during seismic events.

Groundshaking By Fault Movement

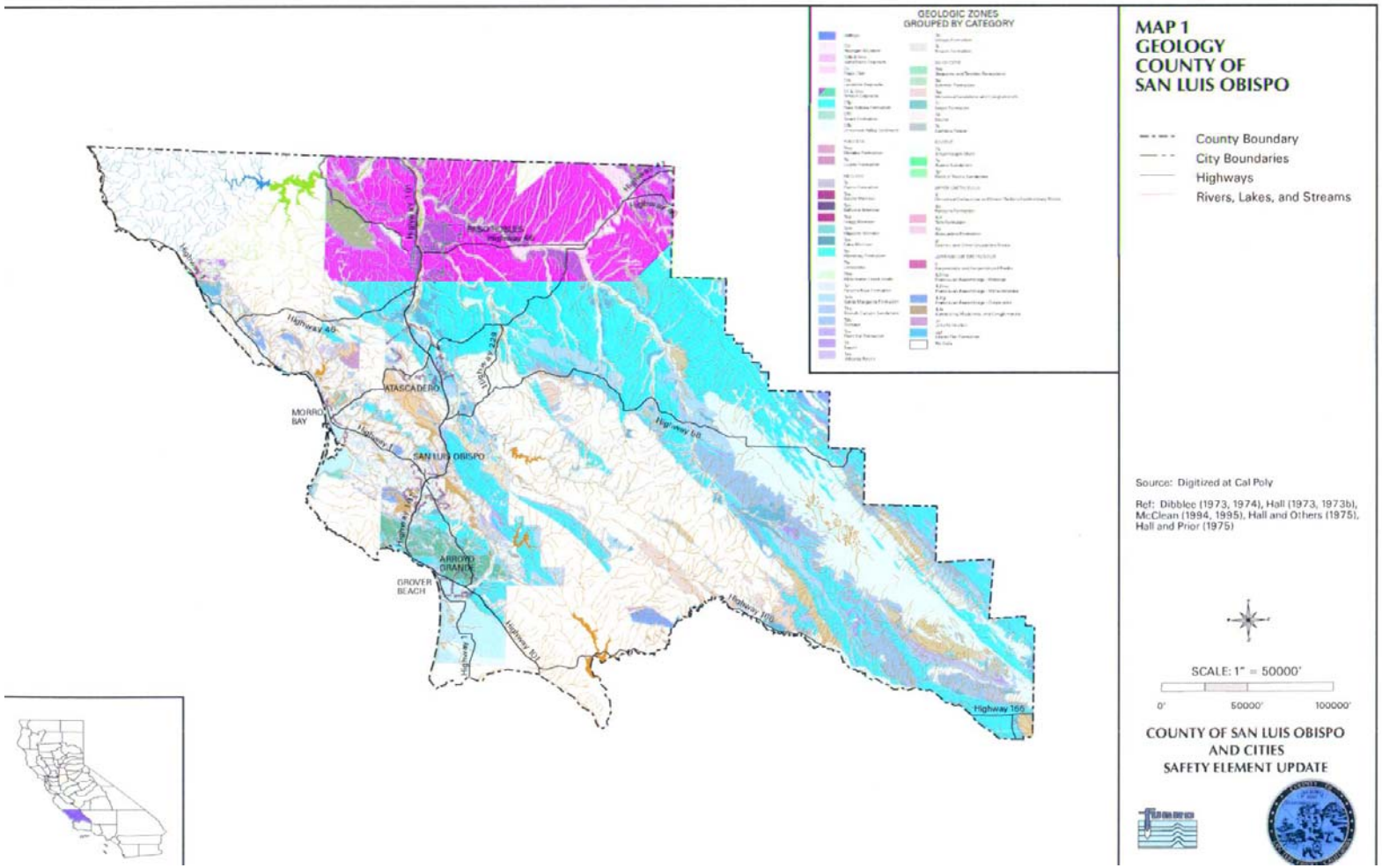
Hazard Description

Groundshaking caused by fault movement during an earthquake has the potential to result in significant life, safety, and property damage impacts throughout San Luis Obispo County. Groundshaking may occur as a result of movement along a fault located within the County or along a more distant fault. Similarly, an earthquake on any one of the faults in the County limits could affect each of the Cities within the County.

Two recent studies by CSG have estimated potential ground acceleration that could be experienced in California. Studies have estimated the maximum credible ground acceleration that could be generated by active and potentially active faults. Deterministic peak horizontal ground accelerations from these studies range from a low of 0.4 g in the central portion of the County to a high of about 0.7 g along the San Andreas, Rinconada, Oceanic-West Huasna, and coastal fault zones.

The western portion of San Luis Obispo County has a 90 percent probability of experiencing ground accelerations in the range of 0.3 g to 0.4 g in the next 50 years. The eastern portion of the County adjacent to the San Andreas Fault has a 90 percent probability of experiencing a peak ground acceleration of 0.5 g to 0.7 g in the next 50

years. The statistical variance in estimated ground acceleration could easily be plus or minus 50 percent of the estimated ground motion. Major areas within San Luis Obispo County that are underlain by recent alluvial sediments are depicted on the following map (Map 1 from the San Luis Obispo County Safety Element).


GEOLOGIC ZONES
GROUPED BY CATEGORY
MAP 1
GEOLOGY
COUNTY OF
SAN LUIS OBISPO
County Boundary
City Boundaries
Highways
Rivers, Lakes, and Streams
Source: Digitized at Cal Poly
Ref: Dibblee (1973, 1974), Hall (1973, 1973b), McClean (1994, 1995), Hall and Others (1975), Hall and Prior (1975)
SCALE: 1" = 50000'
0'
50000'
100000'
COUNTY OF SAN LUIS OBISPO
AND CITIES
SAFETY ELEMENT UPDATE
ATASCADERO
MORRO BAY
SAN LUIS OBISPO
ARROYO GRANDE
GROVER BEACH
Highway 101
Highway 1
Highway 46
Highway 41
Highway 58
Highway 166

Groundshaking Faults in San Luis Obispo County

San Andreas Fault

The San Andreas fault is one of the most seismically active faults in California and presents a significant groundshaking risk to San Luis Obispo County, especially to communities located in the eastern portion of the County. Because of the proximity of the fault and the relatively high probability of a major earthquake in the near future, the San Andreas fault is generally considered the most likely source for strong ground motion in the County.

Coastal Faults

There are numerous active and potentially active faults in the western portion of the County and in the offshore area that have the potential to generate strong ground motion. On the basis of recent studies, the most likely earthquake sources for generating strong ground motion in the coastal region of San Luis Obispo County are considered to be the San Simeon-Hosgri, Los Osos, and Santa Lucia Bank and offshore faults, which are shown as active faults by CSG. Other potentially active faults that are thought to be seismically capable of generating strong ground motion include the Wilmar Avenue/Santa Maria River, Oceano, Pecho, West Huasna-Oceanic, Cambria, Casmalia (Orcutt Frontal-Pezzoni), Nacimiento, and Rinconada faults.

Blind Thrust Faults

A potentially significant source of strong motion in San Luis Obispo County is buried or blind thrust faults and thrust ramps beneath the Santa Maria Basin and coastal areas of San Luis Obispo County. The ramps are the Point San Luis, Santa Lucia, Black Mountain and La Panza faults. Evaluations show that there are several blind thrust faults and a regional detachment fault located between about three to 14 kilometers beneath the San Luis Obispo County area. Based on comparison with the 1983 Coalinga, 1987 Whittier Narrows, and 1994 Northridge earthquakes and a database of worldwide earthquakes, it has been estimated that the thrust faults/ramps beneath the central California coast could produce earthquakes with magnitudes in the range of magnitude 5.0 to 7.5.

Blind thrust faults have the potential to produce strong ground motion and significant structural damage without surface fault rupture. In addition, strong ground motion measurements from the Northridge earthquake demonstrate that: 1) earthquakes on blind thrust faults can produce ground accelerations in excess of those currently estimated by conventional attenuation relationships for areas directly above the thrust fault/ramp, and 2) there can be a significant amplification of the ground motion due to the variation in alluvium depth and properties, referred to as a “basin effect”. There is a potential for both of the above conditions in the coastal and central San Luis Obispo County areas if a large earthquake were to occur on a buried or blind thrust fault.

Groundshaking Hazard Potential

Arroyo Grande

The City of Arroyo Grande is proximal to active and potentially active faults capable of producing strong ground motion in response to seismic events. Table 4-10 lists faults in the vicinity of Arroyo Grande considered to be potential sources of relatively strong ground shaking.

Table 4-10: Sources of Ground Shaking in the Vicinity of Arroyo Grande

Fault	Approximate Distance (kilometers)*	Maximum Earthquake	Maximum Probable Earthquake	Anticipated Acceleration Range (g)
Wilmar Avenue	0	6 ½	4	0.1 - 0.7
Blind Thrust Point San Luis	0	7 ½	6	0.2 - 0.8
Los Osos	6	7	5	0.1 - 0.5
Pecho	9	6 1/4	3	<0.1 - 0.3
Hosgri	25	7 ½	6 ½	0.1 - 0.2
Casmalia	21	7 ½	6	0.1 - 0.3
La Panza	32	7 ½	5	0.05 - 0.2
San Andreas	62	8 ¼	8	0.1 - 0.2

* Measured from the intersection of Branch and Mason Streets

With a high probability for producing a major earthquake in the near future, the San Andreas fault and the offshore Hosgri fault present the most likely groundshaking hazard to Arroyo Grande. Other faults that have the potential to generate strong ground motion in Arroyo Grande include the active Los Osos fault, and the potentially active Wilmar Avenue, Pecho, and Orcutt frontal faults. Although the probability, or return interval, on one of these closer faults is lower, the peak ground acceleration that could result from a near-field event would likely be significantly greater than would be expected from a high probability event on the San Andreas or Hosgri faults.

In addition to the mapped faults, there is also a potential for strong ground motion associated with earthquakes on hypothesized buried thrust faults beneath the coastal area. Portions of Arroyo Grande that are underlain by layers of unconsolidated, recent alluvial soil material have an increased risk of experiencing the damaging effects of groundshaking. These areas are considered to be at an increased risk because of the amplifying effect that can occur when unconsolidated soil materials are subject to groundshaking. Major areas within Arroyo Grande that are underlain by recent alluvial sediments are depicted on Map 1 from the San Luis Obispo County Safety Element.

Atascadero

The City of Atascadero is proximal to active and potentially active faults capable of producing strong ground motion in response to seismic events. Table 4-11 lists faults in the vicinity of Atascadero considered to be potential sources of relatively strong ground shaking. With a high probability for producing a major earthquake in the near future, the San Andreas fault presents the most likely source of groundshaking to Atascadero. The closest mapped fault is the potentially active Rinconada fault which has the potential to generate a magnitude 6.25 to 7.5 earthquake with an estimated ground acceleration in the range of 0.4g to 0.6g., which, if it were to occur, could have a widespread damaging effect on the City.

Other faults that have the potential to generate strong ground motion in Atascadero include the active Los Osos and Hosgri faults but are located at some distance from the City and therefore pose a lesser ground motion hazard. In addition to the mapped faults, there is also a potential for strong ground motion associated with earthquakes on hypothesized buried thrust faults beneath the La Panza and Santa Lucia Ranges.

Portions of Atascadero with an increased risk of experiencing the damaging effects of groundshaking are those areas that are underlain by layers of unconsolidated, recent alluvial soil material. Areas within Atascadero that are underlain by recent alluvial sediments are depicted on Map 1.

Table 4-11: Sources of Ground Shaking in the Vicinity of Atascadero

Fault	Approximate Distance (kilometers)*	Maximum Earthquake	Maximum Probable Earthquake	Anticipated Acceleration Range (g)
Rinconada	3	7 ½	6 ¼	0.4 – 0.6
La Panza	15	7 ½	5	0.1 – 0.4
Los Osos	23	7	5	0.1 - 0.2
Hosgri	35	7 ½	6 ½	0.1 - 0.2
San Andreas	43	8 ¼	8	0.1 - 0.2
Blind Thrust Black Mountain	5	7 ½	5 ¾	0.1 - 0.5

* Measured from El Camino Real and Traffic Way

Grover Beach

The City of Grover Beach is proximal to active and potentially active faults capable of producing strong ground motion in response to seismic events. Table 4-12 lists faults in the vicinity of Grover Beach considered to be potential sources of relatively strong groundshaking. With a high probability for producing a major earthquake in the near future, the San Andreas fault and the offshore Hosgri fault present the most likely sources of groundshaking to Grover Beach.

Other faults that have the potential to generate strong ground motion in Grover Beach include the active Los Osos fault, and the potentially active Wilmar Avenue, Pecho, Orcutt frontal faults. In addition to the mapped faults, there is also a potential for strong ground motion associated with earthquakes on hypothesized buried thrust faults beneath the coastal area. Portions of Grover Beach that are underlain by layers of unconsolidated, recent alluvial soil material have an increased risk of experiencing the damaging effects of groundshaking. Major areas within Grover Beach that are underlain by recent alluvial sediments are depicted on Map 1.

Table 4-12: Sources of Ground Shaking in the Vicinity of Grover Beach

Fault	Approximate Distance (kilometers)*	Maximum Earthquake	Maximum Probable Earthquake	Anticipated Acceleration Range (g)
Wilmar Avenue	1	6 ½	4	0.1 – 0.7
Blind Thrust Point San Luis	3	7 ½	6	0.3 – 0.7
Los Osos	9	7	5	0.1 - 0.4
Pecho	6	6 ¼	3	< 0.1 - 0.3
Casmalia-Orcutt-Little Pine	19	7 ½	6	0.1 - 0.4
Hosgri	21	7 ½	6 ½	0.2 - 0.3
Rinconada	23	7 ½	6 ¼	0.1 - 0.3
Los Alamos-Baseline	27	7	5 ¾	0.1 - 0.2
San Andreas	66	8 ¼	8	0.1 - 0.2

* Measured from Grand Avenue and North 8th Street

Morro Bay

The City of Morro Bay is located in proximity to active and potentially active faults capable of producing strong ground motion in response to seismic events. Table 4-13 lists faults in the vicinity of Morro Bay considered to be potential sources of relatively strong groundshaking. With a high probability for producing a major earthquake in the near future, the San Andreas and the offshore Hosgri fault present the most likely sources of groundshaking to Morro Bay.

Other faults that have the potential to generate strong ground motion in Morro Bay include the active Los Osos fault, and the potentially active Wilmar Avenue, Rinconada, Pecho (offshore) and Santa Lucia Bank (offshore) faults. In addition to the mapped faults, there is also a potential for strong ground motion associated with earthquakes on

hypothesized buried thrust faults beneath the coastal area. Portions of Morro Bay that are underlain by layers of unconsolidated, recent alluvial soil material have an increased risk of experiencing the damaging effects of groundshaking.

Major areas within Morro Bay that are underlain by recent alluvial sediments are depicted on Map 1.

Table 4-13: Sources of Ground Shaking in the Vicinity of Morro Bay

Fault	Approximate Distance (kilometers)*	Maximum Earthquake	Maximum Probable Earthquake	Anticipated Acceleration Range (g)
Blind Thrust Santa Lucia	7	7 ½	5	0.2 – 0.6
Hosgri	14	7 ½	6 ½	0.2 – 0.3
Los Osos	5	7	5	0.1 - 0.5
Pecho	21	6 ¼	3	0.01 - 0.2
Rinconada	24	7 ½	6 ¼	0.1 - 0.2
Wilmar Avenue	21	6 ½	4	0.03 - 0.2
Rinconada	23	7 ½	6 ¼	0.1 - 0.3
San Andreas	64	8 ¼	8	0.1 - 0.2

* Measured from the Embarcadero and Harbor Street

Paso Robles

The City of Paso Robles is proximal to active and potentially active faults capable of producing strong ground motion in response to seismic events. Table 4-14 lists faults in the vicinity of Paso Robles considered to be potential sources of relatively strong groundshaking. With a high probability for producing a major earthquake in the near future, the San Andreas fault presents the most likely source of groundshaking to Paso Robles.

The closest mapped fault to Paso Robles is the potentially active Rinconada fault which has the potential to generate a magnitude 6.25 to 7.5 earthquake, which, if it were to occur, could have a widespread damaging effect on the City. In addition to the mapped faults, there is also a potential for strong ground motion associated with earthquakes on hypothesized buried thrust faults beneath the Paso Robles area. Portions of Paso Robles that would have an increased risk of experiencing the damaging effects of groundshaking are those areas that are underlain by layers of unconsolidated, recent alluvial soil material.

Areas within Paso Robles that are underlain by recent alluvial sediments are depicted on Map 1.

Table 4-14 Sources of Ground Shaking in the Vicinity of Paso Robles

Fault	Approximate Distance (kilometers)*	Maximum Earthquake	Maximum Probable Earthquake	Anticipated Acceleration Range (g)
Rinconada	2	7 ½	6 ¼	0.4 – 0.6
La Panza	32	7 ½	5	< 0.1 – 0.3
Los Osos	37	7	5	< 0.1 - 0.2
San Andreas	38	8 ¼	8	0.2 - 0.3
Hosgri	40	7 ½	6 1/2	0.1 - 0.2
Blind Thrust Black Mountain	23	7 ½	5 ¾	0.2 - 0.4

* Measured from Spring Street and 11th Street

Pismo Beach

As with surrounding communities, the City of Pismo Beach is located in a seismically active area, and ground shaking could occur in Pismo Beach, as in other areas of the county.

City of San Luis Obispo

The City of San Luis Obispo is proximal to active and potentially active faults capable of producing strong ground motion in response to seismic events. Table 4-15 lists faults in the vicinity of San Luis Obispo considered to be potential sources of relatively strong groundshaking. With a high probability for producing a major earthquake in the near future and proximity to the City, the San Andreas fault and the offshore Hosgri faults present the most likely sources of groundshaking to the City of San Luis Obispo. Other faults that have the potential to generate strong ground motion in San Luis Obispo include the active Los Osos faults. In addition to the mapped faults, there is also a potential for strong ground motion associated with earthquakes on hypothesized buried thrust faults beneath the coastal area. Portions of the City of San Luis Obispo that are underlain by layers of unconsolidated, recent alluvial soil material have an increased risk of experiencing the damaging effects of groundshaking.

Areas within San Luis Obispo that are underlain by recent alluvial sediments are depicted on Map 1.

Table 4-15: Sources of Ground Shaking in the Vicinity of San Luis Obispo

Fault	Approximate Distance (kilometers)*	Maximum Earthquake	Maximum Probable Earthquake	Anticipated Acceleration Range (g)
Los Osos	4	7	5	0.2 – 0.6
Blind Thrusts Point San Luis Black Mountain	0	7 ½	5 ¾	0.2 – 0.6
Rinconada	13	7 ½	6 ¼	0.2 - 0.3
Wilmar Avenue	14	6 ½	4	< 0.1 - 0.3
Pecho	19	6 ¼	3	< 0.1 - 0.2
Hosgri	25	7 ½	6 ½	0.1 - 0.2
La Panza	27	7 ½	5	< 0.1 - 0.3
San Andreas	57	8 ¼	8	0.1 - 0.2

* Measured from Monterey Street and Osos Street

Liquefaction

Hazard Description

Liquefaction is defined as the sudden loss of soil strength due to a rapid increase in soil pore water pressures resulting from seismic groundshaking. In order for liquefaction to occur, three general geotechnical characteristics should be present: 1) ground water should be present within the potentially liquefiable zone; 2) the potentially liquefiable zone should be granular and meet a specific range in grain-size distribution; and 3) the potentially liquefiable zone should be of low relative density. If those criteria are present and strong ground motion occurs, then those soils could liquefy, depending upon the intensity and duration of the strong ground motion. Liquefaction that produces surface effects generally occurs in the upper 40 to 50 feet of the soil column, although the phenomenon can occur deeper than 100 feet. The duration of groundshaking is also an important factor in causing liquefaction to occur. The larger the earthquake magnitude, and the longer the duration of strong groundshaking, the greater the potential there is for liquefaction to occur.

Effects of Liquefaction

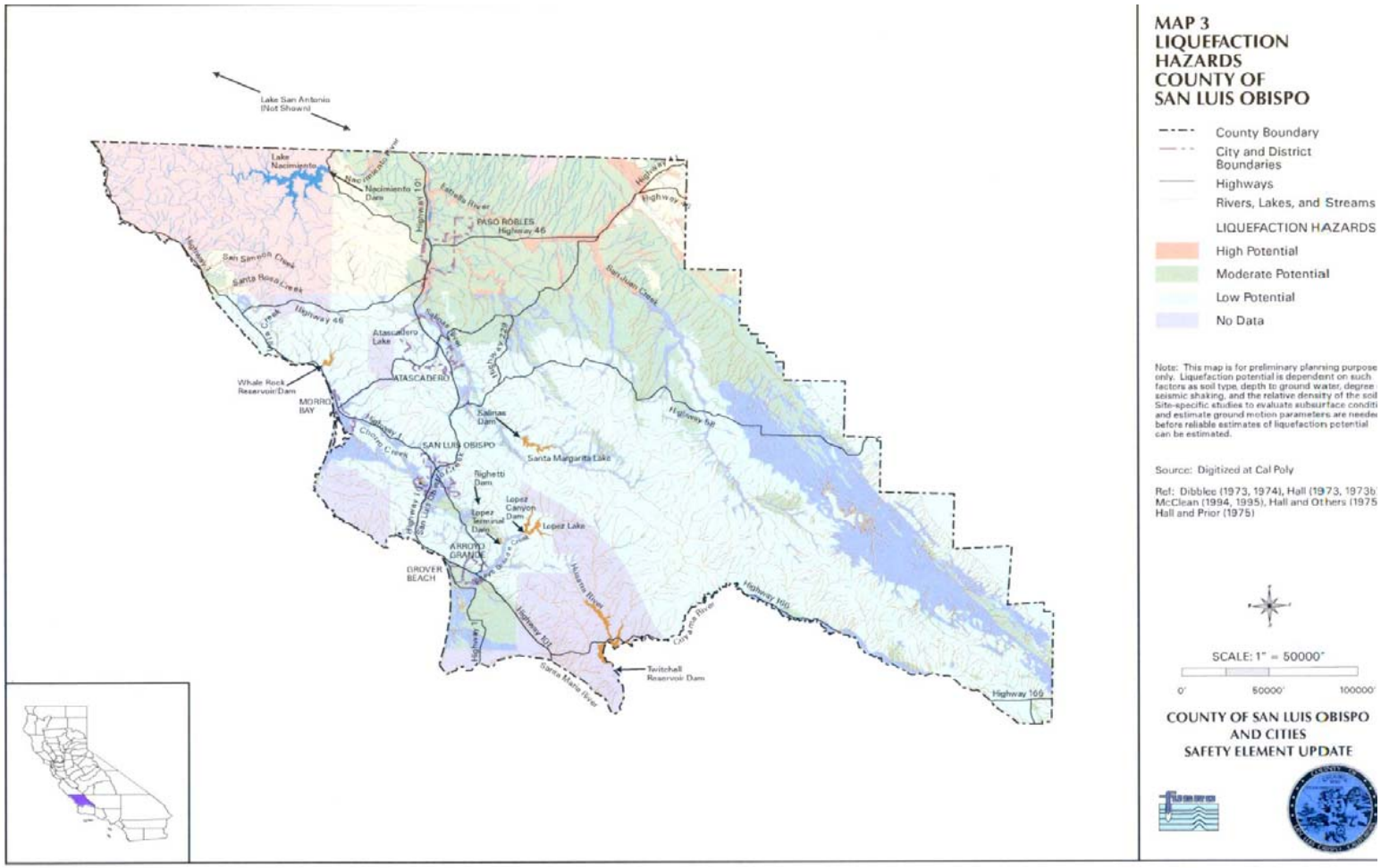
When liquefaction of the soil does occur, buildings and other objects on the ground surface may tilt or sink, and lightweight buried structures (such as pipelines) may float

toward the ground surface. Liquefied soil may be unable to support its own weight or that of structures, which could result in loss of foundation bearing or differential settlement. Liquefaction may also result in the development of cracks in the ground surface followed by the emergence of a sand/water mixture, typically referred to as a sand-boil. In areas underlain by thick deposits of saturated, loose granular sediment (such as alluvial valleys or beaches), subsidence as much as several feet may result.

Because the alluvial sediments are a heterogeneous mixture of soil types with variable thickness, the resulting settlement is often differential. The differential settlement can cause significant damage to rigid structures such as buildings and linear features such as pipelines and highways. Liquefaction may also lead to the lateral spreading of soft saturated soils. Lateral spreading is a form of slope instability that results when the lateral movement of a soil-block toward an unconfined free face can occur when a layer of soil below the ground surface liquefies. An example of where lateral spreading may occur is adjacent to stream banks. Lateral spreading has been reported to occur on slopes of less than five percent, but it is difficult to evaluate the magnitude of the potential lateral spreading.

Liquefaction Hazard Potential

The areas of San Luis Obispo County most susceptible to the effects of liquefaction are those areas underlain by young, poorly consolidated, saturated granular alluvial sediments. These soil conditions are most frequently found in areas underlain by recent river and flood plain deposits. The following map indicates areas of low to high liquefaction potential based on the geologic units (Map 3 from the San Luis Obispo County Safety Element).


Lake San Antonio (Not Shown)
Lake Nacimiento
Nacimiento Dam
Nacimiento River
Estrella River
Highway 101
PASO ROBLES
Highway 46
San Simeon Creek
Santa Rosa Creek
Santa Rosa River
Highway 46
Atascadero Lake
Salinas River
Highway 229
ATASCADERO
Whale Rock Reservoir/Dam
MORRO BAY
Highway 1
Chorro Creek
Salinas Dam
Santa Margarita Lake
SAN LUIS OBISPO
Righetti Dam
Lopez Canyon Dam
Lopez Terminal Dam
Lopez Lake
San Luis Obispo Creek
Arroyo Grande Creek
ARROYO GRANDE
GROVER BEACH
Huasna Road
Highway 166
Cuyama River
Twitchell Reservoir Dam
Santa Maria River
Highway 1
Highway 101
Highway 166
MAP 3
LIQUEFACTION HAZARDS
COUNTY OF SAN LUIS OBISPO
County Boundary
City and District Boundaries
Highways
Rivers, Lakes, and Streams
LIQUEFACTION HAZARDS
High Potential
Moderate Potential
Low Potential
No Data
Note: This map is for preliminary planning purpose only. Liquefaction potential is dependent on such factors as soil type, depth to ground water, degree seismic shaking, and the relative density of the soil Site-specific studies to evaluate subsurface conditi and estimate ground motion parameters are needed before reliable estimates of liquefaction potential can be estimated.
Source: Digitized at Cal Poly
Ref: Dibblee (1973, 1974), Hall (1973, 1973b McClean (1994, 1995), Hall and Others (1975 Hall and Prior (1975)
SCALE: 1" = 50000'
0'
50000'
100000'
COUNTY OF SAN LUIS OBISPO AND CITIES SAFETY ELEMENT UPDATE

Areas Susceptible to Effects of Liquefaction

County of San Luis Obispo
Portions of coastal San Luis Obispo County are underlain by sediments that may be vulnerable to liquefaction. Developed areas that may be underlain by geologic units having a higher potential for liquefaction are the coastal communities of Oceano, Avila, South Bay, Cayucos, and Cambria. Site-specific studies are needed to evaluate if a geologic unit actually contains potentially liquefiable materials and if they require mitigation for development.

Arroyo Grande
The areas of Arroyo Grande that have a high potential to be underlain by potentially liquefiable sediments are those areas underlain by younger alluvium. The younger alluvium underlies most of the low-lying downtown areas south of Branch Street and along Grand Avenue. Site-specific studies are needed to evaluate if a geologic unit actually contains potentially liquefiable materials, and if they require mitigation for development.

Atascadero
The areas of Atascadero that have a high potential to be underlain by potentially liquefiable sediments are those areas underlain by younger alluvium. Portions of the City in the low lying areas adjacent to Atascadero Creek, Graves Creek, and the Salinas River are mapped as being underlain by younger alluvium. Site-specific studies are needed to evaluate if a geologic unit actually contains potentially liquefiable materials, and if they require mitigation for development.

Grover Beach
The areas of Grover Beach that have a high potential to be underlain by potentially liquefiable sediments are those areas underlain by beach sand and young alluvium. High ground water levels can be expected near the Pacific Ocean and adjacent to Meadow Creek. Site specific studies are needed to evaluate if a geologic unit actually contains potentially liquefiable materials, and if they require mitigation for development.

Morro Bay
The areas of Morro Bay that have a high potential to be underlain by potentially liquefiable sediments are those areas underlain by beach and sand dune deposits and younger alluvium. A majority of the City is underlain by these alluvial, estuarine, beach and sand dune deposits. High ground water levels can be expected in the Embarcadero area and other beach front areas. Flood plain areas along Chorro, Little Morro and Morro Creeks are also underlain by younger alluvium. Site-specific studies are needed to evaluate if a geologic unit actually contains potentially liquefiable materials, and if they require mitigation for development.

Paso Robles
The areas of Paso Robles that have a high potential to be underlain by potentially liquefiable sediments are those areas underlain by younger alluvium. Portions of the City that are located on recent alluvium in the low lying areas adjacent to the Salinas River (or its tributaries) appear to have the highest potential for liquefaction. Site specific studies are needed to evaluate if a geologic unit actually contains potentially liquefiable materials, and if they require mitigation for development.

Pismo Beach
The potential for liquefaction is present within and surrounding the city.

City of San Luis Obispo
The areas of the City of San Luis Obispo that have a high potential to be underlain by potentially liquefiable sediments are those areas underlain by younger alluvium. Most of the City of San Luis Obispo is underlain by alluvium. Site specific studies are needed to evaluate if a geologic unit actually contains potentially liquefiable materials, and if they require mitigation for development.

Risk Assessment

- **Effects on people and housing.** In any event, the primary consideration is saving lives. Time and effort must also be dedicated to providing for mental health by reuniting families, providing shelter to displaced persons, and restoring basic needs and services. Major efforts will be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and temporary housing for affected citizens.

- **Effects on commercial and industrial structures.** After any event, individuals are likely to lose wages due to the inability of businesses to function because of damaged goods and/or facilities. With business losses, the County of San Luis Obispo will lose revenue. Economic recovery from even a minor event will be critical to the communities involved.

- **Effects on infrastructure.** The damage caused by fault rupture, groundshaking, or liquefaction can lead to the paralysis of the local infrastructure: police, fire, medical and governmental services.

- **Effects on agriculture.** Damages caused by fault rupture, groundshaking, or liquefaction can cause loss of human life, loss of animal life, and property damage to structures and land dedicated to agricultural uses. The most significant long-term impacts on agriculture from earthquakes are those that arise from the cascading effects of fire and flood.

Relationship to Other Hazards – Cascading Effects

Fault rupture, groundshaking or liquefaction can cause many cascading effects such as fires, flooding, hazardous material spills, utility disruptions, landslides, transportation emergencies, liquefaction, seismic settlement, structural hazards and the possible failure of dams. They may cause landslides and rupture dams. Groundshaking may cause tsunamis and seiche, the rhythmic sloshing of water in reservoirs and other bodies of water.

Risk assessment conclusion. Because of the presence of numerous active and potentially active throughout San Luis Obispo County, it is appropriate to consider the potential for ground surface rupture due to faulting. Portions of the Los Osos, San Simeon-Hosgri, and San Andreas faults have been designated active by CSG. Since portions of the County are located on sand in-fill areas, the threat of fault rupture, ground shaking and liquefaction events is rated as High.

Plans and Programs

The County will enforce the General Plan and applicable building codes that require developments, structures, and public facilities to address geologic and seismic hazards through the preparation and approval of geotechnical and geologic reports. Appointment of a County Geologist will improve implementation of the goals, policies, programs plans, and standards for conformance with applicable codes and regulations pertaining to mitigation of potential geologic and seismic hazards and to disseminate information to the public to improve awareness of geologic hazards and seismic safety.

Ordinances and Regulations

The City of Arroyo Grande has adopted the California Building Code. This code belongs to a family of codes, published by ICBO, to provide jurisdictions with a complete set of building-related regulations for adoption.

In Atascadero, the California Building Code was adopted by Ordinance No. 248, which amended Title 8 (Building Regulations) of the Atascadero Municipal Code.

In Grover Beach, the California Building Code was adopted by Ordinance No 95-5, which amended Municipal Code section 8101-8110.

In Morro Bay, the California Building Code was adopted in Chapter 14.18 (Ordinance No. 450) of the Municipal Code. In 1996 the City Council amended Chapter 14.18 to provide for voluntary compliance with California and Safety Codes sections 19160-19169.

In Paso Robles, the California Building Code is adopted in Chapter 17.04 of the Municipal Code.

In the City of San Luis Obispo, the California Building Code is adopted in Chapter 15.04 of the Municipal Code.

In San Luis Obispo County, the California Building Code was adopted with amendments into the CountyBuilding and Construction Ordinance, Section 19.01.012, Title 19 of the County Code.

Coastal Storm / Coastal Erosion

Severity: Low	Probability: Medium

Hazard Definition

Coastal Storm

Coastal storms may have hurricane-force winds and may cause similar kinds and amounts of damage; however, they are not classified as hurricanes because they do not originate in the tropics. Coastal storms usually do most of their damage at the coast, in the form of beach erosion and flooding. The winds come from a low-pressure system offshore. Winds circulate counterclockwise around a low. When the low stops moving, its winds combine with those of the high to blow in one direction over a long period of time, which creates huge waves. The duration of such a storm — the number of high tides through which it persists — can be the most significant measure of its destructiveness.

Coastal Erosion

Coastal erosion is a natural geological process caused by currents, storms, earthquakes, winds, waves, tides, and the gradual movement of tectonic plates. It may take place slowly over thousands of years, or it may occur dramatically, as with landslides or severe storms. Coastal erosion rates can be accelerated by sea level rise.

Coastal bluffs on the marine terraces are the most likely to result in hazards. Homes and other structures built near the edge are threatened by the retreat of the bluff.

Driven by a rising sea level, large storms, flooding, and powerful ocean waves, erosion wears away the beaches and bluffs along shorelines. Erosion undermines waterfront houses, businesses, and public facilities, eventually rendering them uninhabitable or unusable. By moving the shoreline inland, erosion also brings nearby structures ever closer to the water, often putting them at greater risk than either their owners or insurers recognize.
An April 2000 study sponsored by FEMA predicts that over the next 60 years, erosion may claim one out of four houses within 500 feet of the U.S. shoreline. To the homeowners living within this narrow strip, the risk posed by erosion is comparable to the risk from flooding, especially in beach areas.

History

The process of coastal erosion is highly complex and depends on a number of factors such as geologic formation, groundwater seepage, and exposure to wave energy. The coastline along the County of San Luis Obispo is variable in terms of geologic

composition and exposure to wave energy. Sections of the coast range from rocky coastline to sandy beaches backed by cliffs, to sandy beaches backed by sand dunes. Due to these variances along the shoreline, erosion characteristics also vary significantly. It is important to note that coastal erosion occurs episodically, mainly during periods of intense wave action that coincides with high tides. Although erosion occurs episodically, it is typical to report rates of coastal erosion as a yearly average. This is the method employed to quantify the rate of seacliff erosion. Typically, annual rates of coastal erosion range from about three inches a year to more than one foot a year. However, it does not necessarily mean that erosion will behave this way each year.

The reported rates of erosion presented in the following sections must only be considered as approximations in characterizing coastal erosion rates and vulnerability due to difficulties in obtaining accurate erosion data.

Historical coastal storms / coastal erosion events in San Luis Obispo County are depicted on the following Table 4-16.

Table 4-16: Historical Coastal Storm / Coastal Erosion Events

Location	Date of Incident	Declaration	Intensity	Reported Damage	Number Injured	Structures Affected	Incident Description	Source
San Luis Obispo County	11/14/1997 to 11/16/1997		10 to 15 foot surf				Heavy Surf. Heavy surf pounded the Southern California coast. The largest surf - breakers 10 to 15 feet - affected the coast of San Luis Obispo County.	NCDC
San Luis Obispo County	12/4/1997 to 12/7/1997		6 to 8 foot surf, local sets up to 12 feet				Heavy Surf. A strong Pacific storm generated heavy surf along the Central and Southern California coasts. Widespread 6 to 8 foot surf was reported with local sets up to 12 feet.	NCDC
San Luis Obispo County	1/10/1998 to 1/14/1998		10 to 15 foot surf, local sets to 18 feet				Heavy Surf. A series of Pacific storms generated heavy surf along the Central and Southern California coasts. At its peak - 10 to 15 foot surf with local sets to 18 feet battered the coast of San Luis Obispo. Minor coastal flooding was reported.	NCDC
San Luis Obispo County	1/17/1998 to 1/20/1998		10 to 15 foot surf				Heavy Surf. Pacific storms produced a second heavy surf event across the coasts of Central and Southern California. Along the coast of San Luis Obispo - 10 to 15 foot surf was reported. Only minor coastal flooding occurred.	NCDC
San Luis Obispo County	1/28/1998 to 1/31/1998		10 to 15 foot surf, local sets to 20 feet				Heavy Surf. The third and most significant surf event of the month occurred. Along the coasts of San Luis Obispo -10 to 15 foot surf with local sets to 20 feet was reported.	NCDC
San Luis Obispo County	2/1/1998 to 2/9/1998		12 to 25 foot waves,				Heavy Surf. An extended heavy surf event, produced by a series of Pacific storms, battered coastal areas of Central and Southern California. Along the coasts of San Luis Obispo waves as high as 25 feet were reported. Elsewhere, coastal areas reported 12 to 15 foot waves. The heavy surf produced some damage across coastal areas. In Port San Luis, widespread shoreline erosion was reported.	NCDC
San Luis Obispo County	5/2/1998 to 5/3/1998		7 to 9 foot surf, local sets to 12 feet				Heavy Surf. Large swells, from storms in the South Pacific, produced heavy surf along the Central and Southern California coast. Average surf heights of 7 to 9 feet with local sets to 12 feet was reported.	NCDC
San Luis Obispo County	11/22/1998 to 11/28/1998		8 to 10 foot surf, local sets to 14 feet				Heavy Surf. Large northwest swell, generated by a series of Northern Pacific storms, produced han extended period of heavy surf along the Central California coast. Widespread surf of 8 to 10 feet with local sets to 14 feet was reported.	NCDC
San Luis Obispo County	12/1/1998 to 2/9/1998		7 to 10 foot surf, local sets to 12 feet				Heavy Surf. Large northwest swell, generated by storms in the Northern Pacific, produced heavy surf along the Central California coasts. Widespread surf of 7 to 10 feet with local sets to 12 feet was reported.	NCDC
San Luis Obispo County	12/11/1998 to 12/12/1998		8 to 10 foot surf				Heavy Surf. Large northwest swell produced heavy surf along the Central California coast. Widespread surf of 8 to 10 feet with local sets to 12 feet was reported.	NCDC
San Luis Obispo County	1/18/1999 to 1/19/1999		8 to 10 foot surf				Heavy Surf. Large northwest swell produced heavy surf along the Central California coast. Widespread surf of 8 to 10 feet were reported.	NCDC
San Luis Obispo County	2/7/1999		8 to 10 foot surf, local sets to 12 feet				Heavy Surf. Large northwest swell produced heavy surf along the Central California coast. Widespread surf of 8 to 10 feet with local sets to 12 feet was reported.	NCDC
San Luis Obispo County	2/25/1999 to 2/26/1999		8 to 10 foot surf				Heavy Surf. Large northwest swell produced heavy surf along the Central California coast. Widespread surf of 8 to 10 feet was reported.	NCDC
San Luis Obispo County	3/1/1999 to 3/2/1999		10 to 14 foot surf				Heavy Surf. Large northwest swell produced heavy surf along the Central California coast. Widespread surf of 10 to 14 feet was reported.	NCDC
San Luis Obispo County	3/20/1999 to 3/24/1999		10 to 15 foot surf				Heavy Surf. Persistent northwest swell produced an extended period of heavy surf along the Central California coast. Widespread surf of 10 to 15 feet was reported.	NCDC
San Luis Obispo County	5/8/1999 to 5/9/1999		8 to 12 foot surf				Heavy Surf. Large northwest swell generated heavy surf along the coast of San Luis Obispo. Widespread surf of 8 to 12 feet was reported.	NCDC
San Luis Obispo County	10/28/1999 to 10/29/1999		15 to 20 foot surf				Heavy Surf. Large northwest swell generated heavy surf along west facing beaches of Central and Southern California. Along the coast of San Luis Obispo, widespread surf of 15 to 20 feet was reported.	NCDC
San Luis Obispo County	11/19/1999 to 11/20/1999		10 to 12 foot surf				Heavy Surf. Large northwest swell generated heavy surf along the Central Coast of California. Surf of 10 to 12 feet was reported.	NCDC

Coastal Erosion Hazard Potential

Cambria

Cambria is primarily characterized by narrow beaches backed by low cliffs approximately 20 feet-high. This section of coastline is subject to moderate to heavy wave action mostly from northerly swells. The coast in the area is comprised of a rock unit called the Cambrian slab which is a local, colloquial name for the Cretaceous-age sandstones that form the resistant rock headlands in the area. Since sandstone is fairly resistant to erosion, cliff retreat rates in Cambia are relatively low when considering the wave energy imposed on this area. However, present developments along Windsor Avenue are considered to be in danger from wave action and are currently experiencing rates that average seacliff retreat of two to three inches per year.

Cayucos

Shorelines in Cayucos are similar to those found in Cambria; however, there are several important differences that affect the erosion potential. Cayucos is also backed by low cliffs (about 20 feet-high) but has wider beaches than those found in Cambria. In the winter months, however, the sandy beaches virtually disappear and waves strike directly against the bluffs. The Cayucos shoreline faces south; therefore, its beaches are partially protected from northerly swells. However, wave action in this area is significant. The seacliffs are comprised of Franciscan melanges, characterized by blocks of rocks often surrounded by small zones of sheared or crushed rock that tend to erode easily. Some zones contain more erosion resistant rock blocks that have been exposed as the weaker blocks have eroded away. However, during the intense storm waves of 1983, even these seemingly resistant blocks were breached at some spots. As a result, the bluff receded as much as 20 feet.

Rates of erosion are highly variable along this coastline, and range from 6 to 10 inches per year. In response to the storm waves of 1983, emergency rip-rap and numerous seawalls were constructed. Even with this protection, rapid erosion rates can be expected to continue in the future.

Downtown Cayucos is another area of concern. Built upon the unconsolidated sediment deposited from the Cayucos creek, this area is susceptible to shoreline erosion. Upcoast from the downtown area along Lucerne Avenue and extending north to the undeveloped bluffs, the shoreline is comprised of Franciscan melange containing erodable rocks with high silt contents. Also, unconsolidated clays form approximately the upper 10 feet of these bluffs and contribute to rates of cliff retreat through a landslide-type mechanism. During rainy months when the ground becomes wet, the low permeability of the clays tends to perch or elevate the ground water table. Consequently, these saturated soils cause increased soil loss due to slope instability and slumping of the sea cliff face.

Morro Bay

From Atascadero State Beach and continuing south through much of Montana de Oro

State Park, the Morro Bay coast is fronted by large sand dunes that provide protection for developments located on terrace materials behind the sand dunes. Due to the construction of the Morro Bay Harbor Breakwater and the presence of Morro Rock, the littoral drift north of Morro Bay has been interrupted and the coast has extended, seaward. In about 50 years, the beach has widened about 250 feet near San Jacinto Avenue and almost 500 feet in front of Morro Bay High School. This sandbar, provides protection for developments in this region. South of Morro Rock, the bay is protected by the sandspit which provides a barrier to wave attack that would otherwise impact the developed areas along the Embarcadero.

Los Osos

From the Morro Rock extending into Montana de Oro State Park, large sand dunes protect the community of Los Osos from potential wave hazards. Coastal development in the area from Montana de Oro State Park through Port San Luis is unlikely due to the current land uses. Erosion rates for shorelines of geology similar to this area range from approximately four to six inches per year.

Port San Luis

Port San Luis and the coastline surrounding San Luis Bay is well protected from the predominant northwesterly swells by the 2,300 foot long Port San Luis breakwater. However, little protection is offered from southerly swells. The Port San Luis area is backed by 100 foot-high cliffs which descend eastward into approximately 30 foot-high cliffs. Proceeding eastward from Port San Luis toward Avila Beach, protective rip-rap has been placed adjacent to Avila Beach Drive in to protect the roadway from storm waves. Just east of the mouth of the San Luis Obispo Creek, and extending eastward to Fossil Point, the community of Avila Beach is fronted by a 300 foot-wide beach which provides little protection from storm waves.

Winter storm waves of 1983 damaged the concrete seawall which runs parallel to Front Street. Housing developments in this area experienced landslide activity as well as cracking of foundations and roads. The recreational pier at Avila Beach was also severely damaged.

Historic storms have shown that both Port San Luis and Avila Beach are susceptible to coastal damage resulting from storm waves, especially those generated from southerly swells. This region is classified with a “moderate risk” with respect to possible coastal damage incurred by storm waves.

Pirates Cove

From Fossil Point proceeding eastward to Shell Beach, the coastline is characterized by offshore rocks and sea stacks backed by high (30-100 feet) eroding cliffs. Rates of seacliff retreat range from four to seven inches per year for the Shell Beach coastline and catastrophic rockfall is an important agent of erosion in this area. Although many homes located very near the coastline of Shell Beach are protected by seawalls, bulkheads,

sandbags, and rip rap, this stretch of coastline as a "high risk" with respect to possible coastal damage incurred by storm waves.

Grover Beach

Grover Beach is fronted by sandy beaches backed by low active dunes covered with dense vegetation, a golf course, and a mobile home park. The sandy beaches provide structures with moderate protection from storm waves. However, during the winter storms of 1983, timber beach access ramps were damaged. The Grover Beach shoreline is classified as a "moderate risk" with respect to possible coastal damage incurred by storm waves.

Oceano

Oceano is generally fronted by wide sandy beaches backed by low active dunes. These dunes provide protection for structures located near them, however they are subject to erosion during storm surges at extreme high tides. Continuous vehicle traffic on the beach and dunes is hindering dune protection with respect to erosion. Although these sand dunes offer dwellings protection from storm waves, the winter storms of 1983 damaged structures and destroyed timber ramps which provided vehicular beach access. Therefore, this region is characterized with a "moderate risk" and a "high risk" region adjacent to the Arroyo Grande Creek mouth with respect to coastal erosion.

Pismo Beach

Approximately five miles of the northwest portion of the city shoreline consists of cliffs and bluffs ranging in height from ten to one hundred feet. The rapidly receding nature of this long cliff line has claimed and continues to threaten a broad range of public and private investments located near the edge. This bluff erosion has been caused by both natural events and human activities including development and intrusion up and down unprotected banks.

South County

From Oceano southward to the San Luis Obispo/Santa Barbara County line, the coastline is described as "sandy beaches backed by active dunes with sparse vegetative cover, high intermediate old dunes with vegetative cover, marshes, and lakes." Although the dune face is wave cut and experiences frequent slides, this region is classified with a "moderate risk" with respect to coastal erosion.

Risk Assessment

Coastal storms are a recurring hazard for the San Luis Obispo County. Waves erode the coastline at varying rates depending upon the geology. Coastal bluffs on the marine terraces are the most likely to result in hazards. Homes and other structures built near the edge are threatened by the retreat of the bluff.

- **Effects on people and housing.** Historically, there has been little or no loss of life or injury in San Luis Obispo County due to coastal storms. The primary impacts have been economic in nature.
- **Effects on commercial and industrial structures.** As beaches are eroded away, the amount of recreational beach available to the public is greatly reduced. Also, changes in beach geometry can alter the wave characteristics of a particular site. Beach erosion results in the loss of sand from coastal areas. This hazard can accelerate the rate of erosion of coastal bluffs, and can also contribute to increased wave-related damage to coastal structures.
- **Effects on infrastructure.** Erosion of beach sand removes the natural barrier which protects landforms and structures from the potentially destructive wave action. The end result can be the direct destruction of roads, homes, and other structures by waves whose force is no longer dissipated by wide beaches.

Relationship to Other Hazards – Cascading Effects

Humans have the ability to alter the configuration of the shoreline by influencing long and short-term erosion rates. One of the major causes of beach erosion is the construction of dams and other structures along creeks and rivers that trap sediment and prevent it from reaching the ocean. This deprives the shoreline of the material that would replenish beach sand supplies. Coastal structures such as groins, jetties, seawalls, and breakwaters can also alter littoral drift. Beach groins and breakwaters, for example, can trap littoral sand and build beaches over a limited area but by doing so they reduce the amount of sand that flows to down-current beaches. This can result in a rapid loss of beach sand in down-current beaches. Seawalls are often used to protect seacliffs from erosional effects of wave action. However, these structures can reflect wave energy to strip protective beach sand at an accelerated rate. This may ultimately result in increased seacliff erosion rates, particularly at sections of coastline adjacent to the seawall.

Risk assessment conclusion. The coastline along the County of San Luis Obispo is variable in terms of geologic composition and exposure to wave energy. Sections of the coast range from rocky coastline to sandy beaches backed by cliffs, to sandy beaches backed by sand dunes. Due to these variances along the shoreline, erosion characteristics also vary significantly. It is important to note that coastal erosion occurs episodically, mainly during periods of intense wave action that coincides with high tides. Typically, annual rates of coastal erosion range from about three inches a year to more than one foot a year.

Plans and Programs

Development shall not be permitted near the top of eroding coastal bluffs. San Luis Obispo County will require coastal bluff erosion studies to determine the rate or erosion and the resulting safe distance from the top of the bluff for development.

Hazard: Landslides / Rockslides

Severity: Low	Probability: Low

Hazard Definition

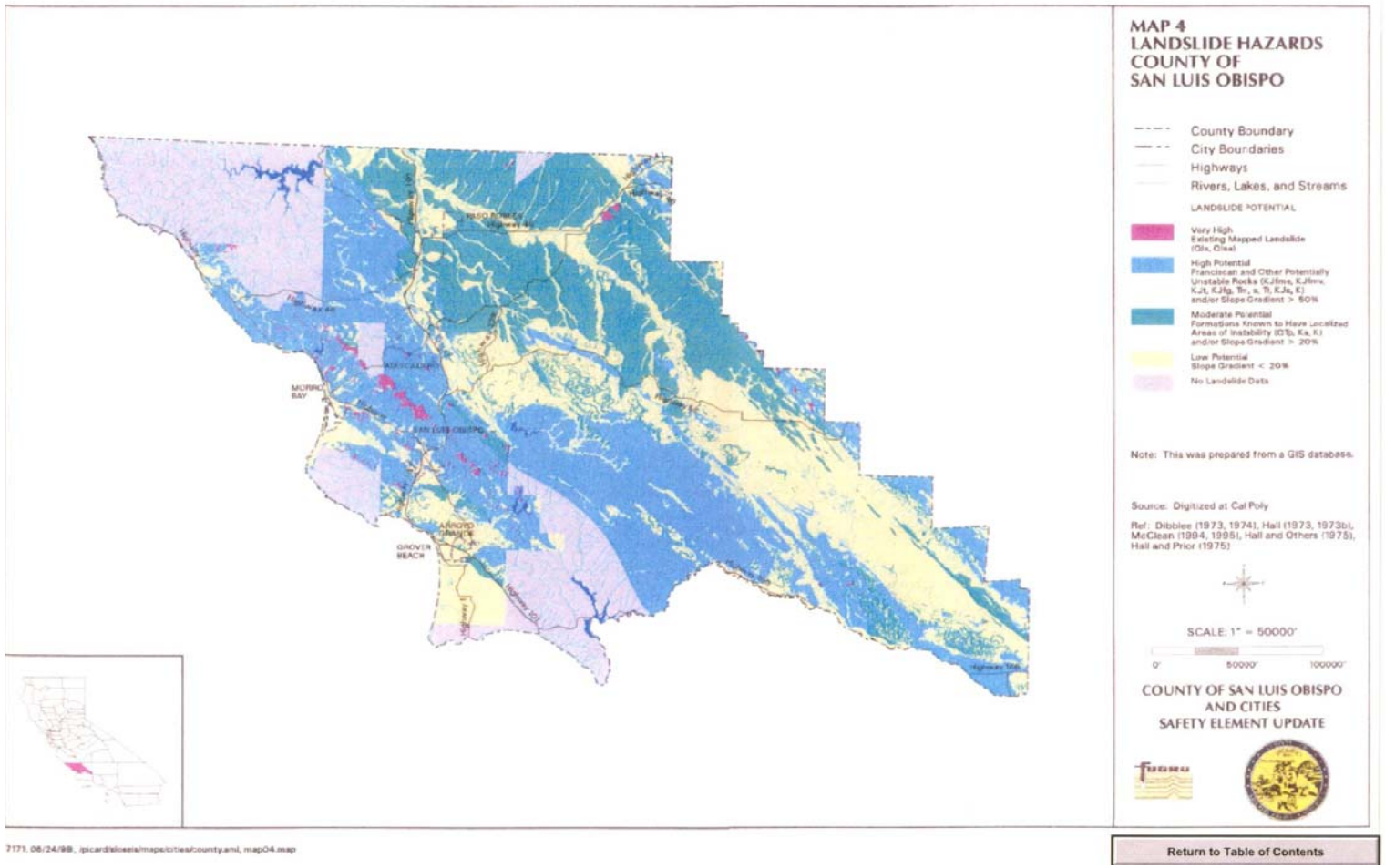
A landslide is a geologic hazard where the force of gravity combines with other factors to cause earth material to move or slide down an incline. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Slopes with the greatest potential for sliding are between 34 degrees and 37 degrees. Although steep slopes are commonly present where landslides occur, it is not necessary for the slopes to be long.

Landslides, rockslides, and debris flows occur continuously on all slopes; some processes act very slowly, while others occur very suddenly, often with disastrous results. As human populations expand over more of the land surface, these processes become an increasing concern.

There are predictable relationships between local geology and landslides, rockslides, and debris flows. The down-slope movement of earth material, either as a landslide, debris flow, mudslide, or rockslide, are part of the continuous, natural process of erosion. This process, however, can be influenced by a variety of causes that change the stability of the slope. Slope instability may result from natural processes, such as the erosion of the toe of a slope by a stream, or by groundshaking caused by an earthquake. Slopes can also be modified artificially by grading, or by the addition of water or structures to a slope. Development that occurs on a slope can substantially increase the frequency and extent of potential slope stability hazards. Knowledge of these relationships can improve planning and reduce vulnerability. Slope stability is dependent on many factors and their interrelationships, including rock type, pore water pressure, slope steepness, and natural or man-made undercutting.

History

In San Luis Obispo County, there are several geologic formations commonly associated with slope stability problems. The data presented on the following map (Map 4 from the San Luis Obispo County Safety Element) presents a limited summary of landslides hazards related to slope gradient and topography that were identified.



Return to Table of Contents

The geologic formations commonly associated with slope stability problems in San Luis Obispo County, include the Franciscan, Rincon, Toro, and Monterey formations. Of these, the Franciscan is the most well known formation known for slope instability. Numerous landslides within the Franciscan complex are observable along the Highway 1 corridor from San Luis Obispo to San Simeon. Numerous landslides have also been mapped in the Franciscan and Toro formations along Highway 101 on the Cuesta Grade. Landslides in the Franciscan formation have impacted residences, roadway facilities, pipelines, and other infrastructure in the County. The Rincon and Toro formations have a similar geologic history of landsliding, but are generally not as widespread as the Franciscan. An active landslide has also been identified in the vicinity of Harbor Terrace near Port San Luis Harbor west of Avila Beach.

Geologic formations located in San Luis Obispo County that present a moderate slope stability hazard potential include the Quaternary bedrock units such as the Paso Robles Formation and formations of equivalent age and composition. The susceptibility of areas underlain by these formations to slope stability impacts will vary based on a variety of site specific factors, such as slope, the orientation of bedding planes, rainfall, characteristics of the overlying soil, and the type and extent of proposed slope modifications. In some areas, slopes may be stable in a natural condition, but alterations to the hillsides to accommodate urban development may cause unstable conditions that could adversely affect future development. Prior to the initiation of new development that could be adversely affected by slope movement, site specific evaluations are necessary to determine the hazard potential and to identify engineering design methods to minimize the risk of landslide-related damage.

Numerous large landslides are also mapped in the steep mountainous terrain of the Santa Lucia, La Panza and Caliente Mountain ranges and many canyons. Landslides of this type have been mapped in nearly all of the formations and are generally related to steep slopes, adverse geologic structure, weak or weathered formations, faulting, and wet slopes. To date, only limited geologic mapping has been performed to evaluate the presence of landslides in the hillside areas of the County. Most of the geologic studies to date have focused on large scale geologic structure, faulting, or other geologic issues and did not specifically evaluate landsliding. A significant amount of additional studies need to be performed to identify and evaluate landslides to help reduce the potential for long term damage related to slope instability.

Landslide Hazard Potential

Arroyo Grande

A majority of the existing development in Arroyo Grande is located on gently inclined alluvial valley sediments and the hilly terrain north of Branch Street. The potential for slope stability hazards in valley areas is low to very low. The potential slope instability is greatest in the hilly areas of the City. The potential for slope instability in the sloping terrain can mostly be mitigated by applying building code requirements that provide

minimum requirements for building construction and grading on sloping ground as those areas are not known to be underlain by large landslide features or unstable formations. However, there are relatively steep hillsides and canyons near the City, and as development moves into those areas, there could be greater potential for slope stability related concerns. A thorough geologic/geotechnical study should be prepared prior to development for projects planned in those areas.

Ordinances and Regulations

The California Building Code, which has been adopted by the City of Arroyo Grande with certain amendments, requires that site specific investigations be performed for development that is located in hillside areas. Investigations and practices that are typically required for hillside development include the following:

- Conduct thorough geologic/geotechnical studies by qualified geotechnical engineers and engineering geologists.
- Require both engineering geologists and geotechnical engineers during construction to confirm preliminary findings reported during initial studies.
- Require certification of the proposed building site stability in relation to the adverse effects of rain and earthquakes prior to the issuance of building permits.
- Mandate coordination between the civil engineer and the project engineering geologist and geotechnical engineer during construction grading.
- Require mitigation of onsite hazards caused by grading that may affect adjoining properties, including erosion and slope instability.

Title 7, Chapter 1, of the Arroyo Grande Municipal Code provides development standards adopted by the City pertaining to excavation, grading, erosion, and sediment control. This chapter specifies performance standards and other requirements intended to protect public health and safety and minimize hazards from excavation and filling activities.

Atascadero

Development in Atascadero generally has occurred in two areas: along the alluvial valley of the Salinas River and Highway 101, and in the relatively steeply sloping terrain of the Santa Lucia Mountains west of Highway 101. The primary bedrock geologic units exposed in the area include the Tertiary-age Santa Margarita, Vaqueros, and Monterey formations, and Cretaceous-age unnamed, Franciscan, Toro, and Atascadero formations. The potential for slope instability in the alluvial valleys is low to moderate because of fairly gentle slopes. Development in steeper hillside areas have a known history of slope instability, and a moderate to very high hazard potential for slope instability problems. Localized undercutting by streams or development could cause instability. Appropriate geologic studies should be performed prior to development to evaluate this increased level of risk.

The Franciscan and upper Cretaceous formations are exposed along the eastern flank of the Santa Lucia Mountains. These formations are the predominate geologic unit in the hilly southwestern portion of the City. In this area, 50 separate landslides have been mapped, encompassing 268 acres. The City has recently made repairs in this area to roadways damaged from landsliding. Although some of the mapped landslides may now be relatively stable, the concentration of old and recent landslides are indicative of relatively unstable slope conditions. This area is considered to have a high to very high potential for slope instability. Thorough geologic/geotechnical study should be prepared prior to development for projects planned in those areas.

Ordinances and Regulations

The California Building Code, which has been adopted by the City of Atascadero with certain amendments, requires that site specific investigations be performed for development that is located in hillside areas. Investigations and practices that are typically required for hillside development include the following:

- Conduct thorough geologic/geotechnical studies by qualified geotechnical engineers and engineering geologists.
- Require both engineering geologists and geotechnical engineers during construction to confirm preliminary findings reported during initial studies.
- Require certification of the proposed building site in relation to stability to the adverse effects of rain and earthquakes prior to the issuance of building permits.
- Mandate coordination between the civil engineer and the project engineering geologist and geotechnical engineer during construction grading.
- Require mitigation of on-site hazards caused by grading that may affect adjoining properties, including erosion and slope instability.

Sections 9-4.138 through 9-4.146 of the Atascadero Zoning Ordinance provide development standards adopted by the City pertaining to excavation, grading, erosion, and sediment control. These sections specify performance standards and other requirements intended to protect public health and safety and minimize hazards from excavation and filling activities. In Atascadero, any grading on slopes at or exceeding ten percent must undergo environmental review pursuant to the California Environmental Quality Act (CEQA).

Grover Beach

Grover Beach is characterized by fairly gently inclined slopes with gradients of less than 50 percent on slopes consisting of older alluvium and late Pleistocene dune sands. The potential for slope stability concerns is low. Locally, there may be a potential for shallow slope failures in loose dune sands on areas of steep terrain. The potential for slope instability in the sloping terrain can mostly be mitigated by applying building code requirements that provide minimum requirements for building construction and grading on sloping ground as these areas are not known to be underlain by large landslide features or notoriously unstable formations.

Ordinances and Regulations

The California Building Code, which has been adopted by the City of Grover Beach with certain amendments, requires that site specific investigations be performed for development that is located in hillside areas. Investigations and practices that are typically required for hillside development include the following:

- Conduct thorough geologic/geotechnical studies by qualified geotechnical engineers and engineering geologists.
- Require both engineering geologists and geotechnical engineers during construction to confirm preliminary findings reported during initial studies.
- Require certification of the proposed building site stability in relation to the adverse effects of rain and earthquakes prior to the issuance of building permits.
- Mandate coordination between the civil engineer and the project engineering geologist and geotechnical engineer during construction grading.
- Require mitigation of on-site hazards caused by grading that may affect adjoining properties, including erosion and slope instability.

Sections 8400 through 8423 of the Grover Beach Municipal Code provides development standards adopted by the City pertaining to excavation, grading, erosion, and sediment control. These sections specify performance standards and other requirements intended to protect public health and safety and minimize hazards from excavation and filling activities.

Morro Bay

Numerous studies have documented unstable, landslide prone slopes in the Morro Bay area east of Highway 1 and north of Highway 41. Many of the landslides mapped in the area are associated with the Franciscan melange. These landslide hazards that have impacted residential development and lifeline facilities and are most prevalent on west-facing slopes. Although some of the mapped landslides may now be relatively stable, the concentration of old and recent landslides are indicative of relatively unstable slope conditions. This area is considered to have a high to very high potential for slope instability. Thorough geologic/geotechnical study should be prepared prior to development for projects planned in those areas.

The potential slope instability is greatest in the hilly areas of the City. The potential for slope instability in the sloping terrain can mostly be mitigated by applying building code requirements that provide minimum requirements for building construction and grading on sloping ground, as these areas are not known to be underlain by large landslide features or notoriously unstable formations.

Ordinances and Regulations

The California Building Code, which has been adopted by the City of Morro Bay with certain amendments, requires that site specific investigations be performed for development that is located in hillside areas. Investigations and practices that are typically required for hillside development include the following:

- Conduct thorough geologic/geotechnical studies by qualified geotechnical engineers and engineering geologists.
- Require both engineering geologists and geotechnical engineers during construction to confirm preliminary findings reported during initial studies.
- Require certification of the proposed building site stability in relation to the adverse effects of rain and earthquakes prior to the issuance of building permits.
- Mandate coordination between the civil engineer and the project engineering geologist and geotechnical engineer during construction grading.
- Require mitigation of on-site hazards caused by grading that may affect adjoining properties, including erosion and slope instability.

General Plan Policies S-6.1 and S-7.1 and Coastal Plan Policies 9.04 and 9.07 require that geology and soils reports be prepared to identify and evaluate potential adverse conditions from grading activities in specific areas of the City.

Paso Robles

A majority of the existing development in Paso Robles is located in areas of gently rolling hills with slope inclinations between 50 percent to 20 percent or less. The primary bedrock geologic unit in the area is the Paso Robles Formation. However, the Paso Robles Formation contains localized areas of relatively weak clay units, which are susceptible to small- to large-sized landslides. These landslides are not well mapped regionally, but are often identified by site specific studies.

The Salinas River flood plain is also an area of extensive development in the Paso Robles area. Because of the fairly gentle slopes, the potential for slope stability concerns in this area is generally low. The bedrock strata is locally folded and faulted and is subject to localized undercutting by streams or development. If the bedding becomes laterally unsupported, there is an increased potential for instability. Appropriate geologic studies should be performed prior to development to evaluate this increased level of risk.

Ordinances and Regulations
The California Building Code, which has been adopted by the City of Paso Robles with certain amendments, requires that site specific investigations be performed for developments located in hillside areas. Investigations and practices typically required for hillside development include the following:

- Conduct thorough geologic/geotechnical studies by qualified geotechnical engineers and engineering geologists.
- Require both engineering geologists and geotechnical engineers during construction to confirm preliminary findings reported during initial studies.
- Require certification of the proposed building site stability in relation to the adverse effects of rain and earthquakes prior to the issuance of building permits.
- Mandate coordination between the civil engineer and the project engineering geologist and geotechnical engineer during construction grading.
- Require mitigation of on-site hazards caused by grading that may affect adjoining properties, including erosion and slope instability.

Title 20 of the Paso Robles Municipal Code provides development standards that have been adopted by the City pertaining to excavation, grading, erosion, and sediment control. These sections specify performance standards and other requirements intended to protect public health and safety and minimize hazards from excavation and filling activities.

Pismo Beach
The potential for landslides is present within and surrounding the city. The City of Pismo Beach's Safety Element provides information on their policies related to land areas subject to hazards associated with steep slopes.

City of San Luis Obispo
A majority of the development in San Luis Obispo is in the valley area with a low to very low potential for slope instability. However, the hillside areas to the east, north and west of the City, as well as along the flanks of the Morros, are underlain by the Franciscan melange, which is the source of significant slope instability. Areas of the City with steep topography and geologic formations prone to slope stability problems are depicted on Map 4. Because of the past slope stability related problems, a thorough geologic/ geotechnical study should be prepared prior to development for projects planned in those areas.

Ordinances and Regulations
The California Building Code, which has been adopted by the City of San Luis Obispo with certain amendments, requires that site-specific investigations be performed for development that is proposed in hillside areas. Investigations and practices that are typically required for hillside development include the following:

- Conduct thorough geologic/geotechnical studies by qualified geotechnical engineers and engineering geologists.
- Require both engineering geologists and geotechnical engineers during construction to confirm preliminary findings reported during initial studies.
- Require certification of the proposed building site stability in relation to the adverse effects of rain and earthquakes prior to the issuance of building permits.
- Mandate coordination between the civil engineer and the project engineering geologist and geotechnical engineer during construction grading.
- Require mitigation of on-site hazards caused by grading that may affect adjoining properties, including erosion and slope instability.

County of San Luis Obispo

Ordinances and Regulations

The California Building Code which has been adopted by the County of San Luis Obispo with certain amendments, requires that site specific investigations be performed for development located in hillside areas. Investigations and practices typically required for hillside development include the following:

- Conduct thorough geologic/geotechnical studies by qualified geotechnical engineers and engineering geologists.
- Require both engineering geologists and geotechnical engineers during construction to confirm preliminary findings reported during initial studies.
- Require certification of the proposed building site stability in relation to the adverse effects of rain and earthquakes prior to the issuance of building permits.
- Mandate coordination between the civil engineer and the project engineering geologist and geotechnical engineer during construction grading.
- Require mitigation of on-site hazards caused by grading that may affect adjoining properties, including erosion and slope instability.

Sections 22/23.05.020 et. seq. of the San Luis Obispo County Land Use Ordinance and Coastal Zone Land Use Ordinance, Titles 22 and 23 of the County Code, contain the County's grading ordinance. This ordinance outlines specific requirements for grading permits, procedures for reviewing and approving grading permits, inspection requirements for completed grading projects, and erosion and drainage requirements. Section 22/ 23.07.080 defines general requirements for identifying Geologic Study Areas (GSA) that would require a geology report to address landslide hazards.

Risk Assessment

The risk of landslides and rockslides in San Luis Obispo County is Low, however, these events are recurring in nature and could disrupt access to critical elements of the County's infrastructure.

- **Effects on people and housing.** People and housing are at risk from landslides and rockslides in San Luis Obispo County. For the most part, past incidents have not resulted in significant injuries, but have disrupted transportation routes and caused considerable inconvenience.

- **Effects on commercial and industrial structures.** Landslides can result in damage to property and cause buildings to become unsafe either due to distress or collapse during sudden or gradual slope movement. Structures constructed in steep terrain, possibly on stable ground, may also experience landslide hazards if they are sited in the path of potential mud flows or rockslide hazards.

- **Effects on infrastructure.** Landslides and rockslides can result in the destruction of infrastructure such as roadways, water and sewer lines, electrical and telecommunications utilities and drainage.

Relationship to Other Hazards – Cascading Effects

Landslides are usually a cascading effect of severe weather.

Risk assessment conclusion. In San Luis Obispo County, there are several geologic formations commonly associated with slope stability problems. The geologic formations commonly associated with slope stability problems in San Luis Obispo County, include the Franciscan, Rincon, Toro, and Monterey formations. Of these, the Franciscan is the most well known formation known for slope instability. Numerous landslides within the Franciscan complex are observable along the Highway 1 corridor from San Luis Obispo to San Simeon. An active landslide has also been identified in the vicinity of Harbor Terrace near Port San Luis Harbor west of Avila Beach. The probability for future damaging landslides in San Luis Obispo County is rated as Low.

Plans and Programs

The County acknowledges that areas of known landslide activity are generally not suitable for residential development. The County will avoid development in areas of known slope instability or high landslide risk when possible, and continue to encourage that development on sloping ground use design and construction techniques appropriate for those areas. More stringent slope stability criteria, or dynamic stability analyses, may apply to improvements designed under the jurisdiction of some agencies.

Hazard: Naturally-Occurring Biological Threats

Severity: Low	Probability: Medium

Hazard Definition

Public health-related hazards may be the result of a naturally occurring event or terrorism. Key hazards of concern to San Luis Obispo County today are described below.

Lyme Disease (Borrelia burgdorferi) is a systemic, tick borne disease with protean manifestations, including dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The best clinical marker for the disease is an initial skin lesion that occurs in 60%-80% of patients.

West Nile Virus (WNV) is a mosquito-borne virus that has been found in parts of Asia, Eastern Europe, Africa, and the Middle East. The virus arrived in the Western Hemisphere in 1999 in New York City. The more severe forms of West Nile virus are West Nile encephalitis, West Nile meningitis, and West Nile meningoencephalitis. Encephalitis refers to an inflammation of the brain, meningitis is an inflammation of the membrane around the brain and the spinal cord, and meningoencephalitis refers to inflammation of the brain and the membrane surrounding it.

Bovine Spongiform Encephalopathy (BSE) is widely referred to as "mad cow disease." It is a chronic degenerative disease that affects the central nervous system of cattle. BSE is named because of the spongy appearance of the brain tissue of infected cattle examined under a microscope. BSE belongs to a family of diseases known as the transmissible spongiform encephalopathies (TSEs). TSE animal diseases found in the United States include scrapie in sheep and goats, chronic wasting disease in deer and elk, transmissible spongiform encephalopathy in mink, feline spongiform encephalopathy in cats, and in humans: kuru, both classic and variant Creutzfeldt-Jakob disease, Gerstmann-Straussler-Scheinker syndrome, and fatal familial insomnia.

The agent that is responsible for BSE and other TSEs has not been fully characterized. Although other types of agents have been implicated, the theory that is most accepted in the scientific community is that the agent is a prion, which is an abnormal form of a normal protein known as a cellular prion protein. The TSE agents are extremely resistant to heat, ultraviolet light, ionizing radiation, normal sterilization processes, and common disinfectants that normally inactivate viruses and bacteria.

There is no evidence to date that BSE emanated from TSEs in other animals. Regarding feeding practices, it is known that cattle can become infected with BSE by eating feed contaminated with the infectious BSE agent. This is why in 1997 the U.S. Food and Drug

Administration (FDA) prohibited the use of most mammalian protein in the manufacture of animal feed intended for cattle and other ruminants.

Current scientific research confirms that BSE infectivity occurs in the brain, trigeminal ganglia, tonsils, spinal cord, dorsal root ganglion, and distal ileum of the small intestine of cattle experimentally infected with the BSE agent. Research also confirms that BSE infectivity is in the brain, spinal cord, and retina of the eyes of cattle infected with the agent under field conditions. Although bone marrow has demonstrated infectivity in experimentally infected cattle, these findings are not conclusive.

BSE is not a contagious disease. There is no evidence that the disease is transmitted through direct contact or animal-to-animal spread. The primary means by which animals become infected is through consumption of feed contaminated with the infectious BSE agent.

Botulism is a serious paralytic illness caused by a nerve toxin that is produced by the bacterium Clostridium botulinum. There are three main kinds of botulism. Food borne botulism is caused by eating foods that contain the botulism toxin. Wound botulism is caused by toxin produced from a wound infected with Clostridium botulinum. Infant botulism is caused by consuming the spores of the botulinum bacteria, which then grow in the intestines and release toxin. All forms of botulism can be fatal and are considered medical emergencies. Food borne botulism can be especially dangerous because many people can be poisoned by eating a contaminated food.

Campylobacter jejuni (Pronounced "camp-e-low-back-ter j-june-eye") was not recognized as a cause of human food borne illness prior to 1975. Now, the bacterial organism is known to be the most common cause of food borne illness in the U.S. (Salmonella is the second most common cause). Food is the most common vehicle for the spread of Campylobacter and poultry is the most common food implicated. Some case-control studies indicate that up to 70% of sporadic cases of campylobacteriosis are associated with eating chicken. Surveys by the USDA demonstrated that up to 88% of the broiler chicken carcasses in the U.S. are contaminated with Campylobacter while a recent Consumer Reports study identified Campylobacter in 63% of more then 1000 chickens obtained in grocery stores. Other identified food vehicles include unpasteurized milk, undercooked meats, mushrooms, hamburger, cheese, pork, shellfish, and eggs.

E. coli is found in the family of bacteria named Enterobacteriaceae, which is informally referred to as the enteric bacteria. Most forms of E. coli are harmless; however, there are strains that cause serious illness. Other enteric bacteria are the Salmonella bacteria (also a very large family, with many different members), Klebsiella pneumoniae, and Shigella, which many people consider to be part of the E. coli family.

Hantavirus infection is caused by a group of viruses that can infect humans with two serious illnesses: hemorrhagic fever with renal syndrome (HFRS) and Hantavirus

pulmonary syndrome (HPS). Hantaviruses are found without causing symptoms within various species of rodents and are passed to humans by exposure to the urine, feces, or saliva of those infected rodents. Ten different hantaviruses have been identified as important in humans.

Hepatitis A is one of five human hepatitis viruses that primarily infect the human liver and cause human illness. The other known human hepatitis viruses are hepatitis B, C, D, and E. Hepatitis A is relatively unusual in nations with developed sanitation systems such as the U.S. Nevertheless, it continues to occur here. Each year, an estimated 100 persons die as a result of acute liver failure in the U.S. due to hepatitis A. Approximately 30 - 50,000 cases occur yearly in the U.S. and the direct and indirect costs of these cases exceed $300 million. Hepatitis A is totally preventable, and need not occur.

Listeria monocytogenes is a pathogenic (disease-causing) bacterium that is food-borne and causes an illness called listeriosis. It is frequently overlooked as a possible cause of illness due to its unique growth capabilities. First, it is somewhat difficult for laboratories to grow, and when they do so, Listeria can be confused with common harmless contaminants and disregarded. Second, most bacteria grow poorly when temperatures fall below 40°F, while Listeria survives at in temperatures from below freezing (20°F) to body temperature and it grows best at O°F to 50°F, including the temperature range that we use for refrigeration. As a result, Listeria may be transmitted in ready-to-eat foods that have been kept properly refrigerated.

Monkeypox is a rare viral disease that occurs mostly in central and western Africa. It is called “monkeypox” because it was first found in 1958 in laboratory monkeys. Monkeypox was reported in humans for the first time in 1970. In early June 2003, monkeypox was reported among several people in the U.S. Most of these people got sick after having contact with pet prairie dogs that were sick with monkeypox. This was the first time that there had been an outbreak of monkeypox in the U.S. The disease is caused by Monkeypox virus. It belongs to a group of viruses that includes the smallpox virus (variola), the virus used in the smallpox vaccine (vaccinia), and the cowpox virus. In humans, the signs and symptoms of monkeypox are like those of smallpox, but usually they are milder. Another difference is that monkeypox causes the lymph nodes to swell.

Norwalk virus is a virus that attaches to the outside of cells lining the intestine. Once attached, it transfers its genetic material into that cell. There it reproduces, finally killing the human cell to release new copies of it that attach to more cells of the intestine's lining. Common names of the illness caused by the Norwalk and other small round structured or caliciviruses are viral gastroenteritis, acute nonbacterial gastroenteritis, food poisoning, and food borne infection. This illness occurs worldwide. Humans are the only known hosts. The viruses are passed in the stool of infected persons. Of viruses, only the common cold is reported more often than viral gastroenteritis. Norwalk and Norwalk-like viruses are increasingly being recognized as leading causes of food-borne disease in the United States. People most often get Norwalk virus infection by swallowing infected

food or water. Outbreaks in the U.S. are often linked to eating raw shellfish, especially oysters and clams. Steaming does not kill the virus or prevent its transmission.

Plague is a disease caused by Yersinia pestis (Y. pestis), a bacterium found in rodents and their fleas in many areas around the world. Pneumonic plague is different from the bubonic plague. Both are caused by Yersinia pestis, but they are transmitted differently and their symptoms differ. Pneumonic plague can be transmitted from person to person; bubonic plague cannot. Pneumonic plague affects the lungs and is transmitted when a person breathes in Y. pestis particles in the air. Bubonic plague is transmitted through the bite of an infected flea or exposure to infected material through a break in the skin. Symptoms include swollen, tender lymph glands called buboes. Buboes are not present in pneumonic plague. If bubonic plague is not treated, however, the bacteria can spread through the bloodstream and infect the lungs, causing a secondary case of pneumonic plague. Patients usually have fever, weakness, and rapidly developing pneumonia with shortness of breath, chest pain, cough, and sometimes bloody or watery sputum. Nausea, vomiting, and abdominal pain may also occur. Without early treatment, pneumonic plague usually leads to respiratory failure, shock, and rapid death.

Salmonella is a type of bacteria that causes typhoid fever and many other infections of intestinal origin. Typhoid fever, rare in the U.S., is caused by a particular strain designated Salmonella typhi. But illness due to due to other Salmonella strains, just called "salmonellosis," is common in the U.S. Today, the number of known strains of this bacteria total over 2300.

SARS is a respiratory illness of unknown cause that has recently been reported in a number of countries. According to the World Health Organization (WHO), the main symptoms and signs of SARS include a fever greater than 100.5° F (38° C), and cough, shortness of breath, or difficulty breathing. The cause of SARS is not known at this time. Researchers at CDC and around the world are working to find the cause of SARS. At this early stage of the investigation, it seems more likely that SARS is caused by an organism that we have less experience with rather than a commonly occurring, known organism.

The **Shigella** germ is a bacteria that can cause sudden and severe diarrhea (gastroenteritis) in humans. Shigella lives in the human intestine and is commonly spread both through food and by person-to-person contact. The illness is also known as "bacillary dysentery." About 25,000 or so laboratory confirmed cases of shigellosis are reported each year in the U.S. However, many cases go undiagnosed and/or unreported, and the best estimates are that 450,000 cases of Shigella infection actually occur annually in the U.S.

Tularemia is a potentially serious illness that occurs naturally in the U.S. It is caused by the bacterium Francisella tularensis found in animals (especially rodents, rabbits, and hares). Tularemia, also known as “rabbit fever.” Tularemia is usually a rural disease and has been reported in all U.S. states except Hawaii. Tularemia is a widespread disease in

animals. About 200 human cases of tularemia are reported each year in the U.S. Most cases occur in the south-central and western states.

Canine Distemper is a viral disease of young dogs characterized by high fever and respiratory inflammation. It can affect wild animals and County pets. Other animal diseases which can affect humans include rabies and toxoplasmosis (an opportunistic infection caused by the microscopic parasite Toxoplasma gondii, found in raw or undercooked meat and cat feces), as well as parasites such as roundworms, whipworms, hookworms, ringworms, and mange.

Exotic Newcastle Disease (END) is a contagious viral disease affecting many species of birds including poultry and wild birds. This is probably one of the most infectious diseases of poultry in the world with a death rate of almost 100 percent in unvaccinated poultry flocks and so virulent that many birds die without showing any clinical signs. The disease can even infect and cause death in vaccinated poultry.

END is extremely contagious. The spread is primarily through direct contact between healthy birds and the bodily fluids of infected birds. It can be transmitted through infected bird droppings as well as secretions from the nose, mouth and eyes. It spreads rapidly among confined birds…. like commercially raised chickens. The disease is also easily spread by virus-bearing material picked up on shoes and clothing and carried from an infected flock to a healthy one. END can also spread from poultry flocks to wildlife as wild birds come into contact with infected poultry, possibly when wild birds enter a pen to feed on spilled grain. Although experiments have documented that several wild species including ducks and pheasants can develop the disease, widespread illness and death has only been documented in double-crested cormorants in the United States and Canada. This disease affects the respiratory, nervous and digestive systems, with an incubation period ranging from two to 15 days.

The available information suggests that Newcastle disease can affect people, however, it does not pose a significant health risk. In humans, the disease is usually limited to conjunctivitis, which is a mild inflammation of the tissues around the eyes and is seen in persons associated with infected birds or facilities where infected birds are housed. It should be noted that poultry products in the Arizona marketplace, including eggs and meat, continue to be safe to consume.

History

There is the presence in San Luis Obispo County of West Nile Virus, Plague and Lyme Disease. Outbreaks to date have been localized and controlled.

Risk Assessment

Given the existence of naturally occurring biological agents in San Luis Obispo County, without enhanced public outreach and monitoring and control the potential exists for one or more of these virulent diseases to dramatically affect the life, health and safety of County citizens.

- **Effects on people and housing.** Humans are susceptible to the effects of Naturally-Occurring Biological Threats.

Risk assessment conclusion. Because the risk for a pandemic outbreak of a lethal disease does exist, preparedness should be maintained at a high level. The probability for an outbreak is rated as Medium.

Plans and Programs

Department of Agriculture and Weights and Measures

The San Luis Obispo County Department of Agriculture and Weights and Measures operates a Pest Prevention program that is mandated by the California Food and Agricultural Code to prevent the introduction and spread of agriculture pests in San Luis Obispo County. They operate the pest exclusion, pest detection, and pest eradication programs to protect agriculture, cities, suburbs and native habitat from pests foreign to California and infectious diseases they may transmit.

Pest Exclusion

- Stops the introduction of exotic pests
- Inspects and monitors shipments for pest and diseases
- Assists exporters of agricultural products
- Glassy-winged Sharpshooter

Pest Detection

- Educates the public about the risk of new pest infestations
- Trapping program
- Vine Mealy Bug
- Sudden Oak Death

Pest Eradication

- Eliminates newly introduced pests from a limited area

Apiary

- Registers, educates and assists County beekeepers
- Regulates beekeepers
- Protects the public health and safety through an apiary ordinance

Public Health

According to the California Code of Regulations, the County Health Officer (CHO) will take whatever measures are necessary to investigate and control reported or suspected diseases and conditions. Such measures include, but are not limited to, confirmation of a clinical or laboratory diagnosis, determination that an unusual disease or disease outbreak exists, determination and investigation of the source, and the prevention and control of the disease. Various functions within County Public Health assist the CHO, depending on the issues being addressed. This may include the Division of Environmental Health, lab personnel or epidemiology specialist.

Immediate Disease Control Measures

Among other responsibilities, the CHO is authorized under the California Health and Safety Code to take measures as may be necessary to prevent the spread of communicable disease. Generally, actions may include obtaining information pertaining to the incident, assess the health risk to the community, notify appropriate agencies, and coordinate disease prevention and control with community, local, regional, state and federal agencies. Should it be necessary, the CHO will also initiate Quarantine measures within the County.

Notification of First Responders, Medical Community & Public Sector

If, after consultation with appropriate local, regional, state or federal agencies, the CHO determines that an imminent or actual health threat exists, local response will be initiated in accordance with emergency response and notification protocols. Depending on the nature of the event, potential responders may include local, state and/or federal emergency/disaster, law enforcement and health agencies.

Epidemiology Unit

Enhanced disease surveillance, including accurate, reliable and timely disease reporting and investigation are crucial to early detection of a bioterrorism event. This is particularly true as the initial distinction between a naturally occurring disease event and a bioterrorist's attack may be difficult to establish. The Epidemiology Unit is the communicable disease investigation branch of the County of San Luis Obispo Public

Health Department. Under the direction of the County Health Officer, the group strives to provide leadership in the identification and prevention of acute, enduring and emerging public health challenges.

Use of the existing centralized reporting system will help ensure coordinated and timely epidemiological investigation of disease occurrence. The Epidemiology Unit will coordinate and facilitate diagnostic testing of human, animal and environmental specimens at the San Luis Obispo County Public Health Laboratory (SLOPHL) or the Division of Animal Service's office.

Hazard: Insect Infestation/Non Vectors of Human Diseases

Severity: Low - Medium	Probability: Low - Medium

Hazard Definition

Insect infestation occurs when an undesirable type of insect inhabits an area in a manner that causes serious harm to: agriculture crops, livestock, or poultry; wild land trees, plants, or animals; or humans. Countless insects live on, in, and around plants, animals, and humans in all environments. Many are harmless, while others can cause fatal damage. Under some conditions, insects that have been present and relatively harmless can become hazardous. For example, severe drought conditions can weaken trees and make them more susceptible to destruction from insect attacks.

The major forms of insects are:

Chewing insects are defoliating insects. They generally strip plants of green matter such as leaves. Caterpillars and beetles make up the largest proportion of chewing insects. Under normal conditions, trees can usually bounce back from an attack of these defoliators, though repeat infestation will weaken a tree and can eventually kill it by starving it of energy.

Boring, or tunneling, insects cause damage by boring into the stem, roots, or twigs of a tree. Some lay eggs which then hatch and the larvae burrow more deeply into the wood, blocking off the water-conducting tissues of the tree. Boring insects generally feed on the vascular tissues of the tree. If the infestation is serious, the upper leaves are starved of nutrients and moisture, and the tree can die. Signs of borer infestation include entry/exit holes in the bark, small mounds of sawdust at the base, and sections of the crown wilting and dying.

Sucking insects do their damage by sucking out the liquid from leaves and twigs. Many sucking insects are relatively immobile, living on the outside of a plant and forming a hard protective outer coating while they feed on the plant's juices. Quite often they will excrete a sweet, sticky substance known as honeydew which contains unprocessed plant material. Honeydew can cause sooty mold to form on leaves and can become a nuisance. Signs of infestation include scaly formations on branches, dieback of leaves, and honeydew production.

Also, while not technically an "insect," it is worth noting that pathogens such as **fungi** can kill large stands of trees. For example, *Phytopthora ramorum*, the cause of Sudden Oak Death, which is devastating not only for oaks, but for many other species of trees as well, is spreading rapidly.

In conjunction with the above outlined problems, insects can carry and spread disease to plants, animals, and people.

History

San Luis Obispo County crop values for 2004 are estimated at a record $539,436,100, exceeding the previous year by approximately $26,051,000. Record agriculture receipts were due to increased value of nursery stock, vegetables, fruit and nuts, and cattle. Wine grapes continued to rank number one with crops valued at approximately $127,435,000 in annual sales.

San Luis Obispo County has a demonstrated vulnerability to insect infestation. The Vine Mealybug was found in San Luis Obispo County in 2001. The Vine Mealybug is a serious exotic pest in California that was first found in the Coachella Valley in 1994. Although it has only been found on grapes so far in California, alternate hosts include avocados, citrus and other crops. Within three years of its introduction, Vine Mealybug has been found in most grape growing counties of California. The pest causes an enormous amount of damage is very difficult and costly to treat and in established areas, total crop loss is possible without the use of insecticide treatments.

A condition that is threatening the health of the Monterey pine trees in the Cambria area is the Pine Pitch Canker. This disease, native to Mexico and the southeastern United States, was first found in California in 1986. Since then, it has been found in 16 counties, and is spread by insects, the use of contaminated tools, and the transport of infected wood. The Pine Pitch Canker is considered to be a significant threat to the continued survival of the Monterey Pine ecosystem. Large native stands of the trees are now only found in the Ano Nuevo, Monterey, and Cambria areas. If a tree becomes infected with the Pine Pitch Canker, the disease can spread quickly, and can result in the rapid death of the tree. If an infected or dead tree is not properly removed, it not only becomes a threat to spread the disease, but can also result in a safety threat, as a large dead tree is a fire hazard as well as presenting the potential to become uprooted and to fall during a storm.

Risk Assessment

The climate in San Luis Obispo County makes it possible for insects to reproduce with little natural hindrance to their proliferation.

- **Effects on people and housing.** In the case of Sudden Oak Death, and Pine Pitch Canker, the fire hazard it creates can cost loss of homes and life.

- **Effects of agriculture and commercial and industrial structures.** If a given insect is particularly hazardous to crops, livestock, forest, or property, it can cost the County millions of dollars in lost revenue in eradication and replacement.

Relationship to Other Hazards – Cascading Effects

Sudden Oak Death and Pine Pitch Canker disease, not only leaves dead stands of trees but, as a result, also increases the fuel available to wildfires, thereby exacerbating the negative effect on ecotourism.

Risk assessment conclusion. Insect infestation is an ongoing threat to agriculture and public health in San Luis Obispo County. The effects on people and property can be disastrous and costly.

Plans and Programs

The San Luis Obispo County Department of Agriculture and Weights and Measures operate a Pest Prevention program that is mandated by the California Food and Agricultural Code to prevent the introduction and spread of agriculture pests in San Luis Obispo County. They operate the pest exclusion, pest detection, and pest eradication programs to protect agriculture, cities, suburbs and native habitat from pests foreign to California. They also regulate County beekeepers to provide a safe distance between apiaries and the public.

Pest Exclusion

- Stops the introduction of exotic pests
- Inspects and monitors shipments for agriculture pests and diseases
- Assists exporters of agricultural products
- Glassy-winged Sharpshooter

Pest Detection

- Educates the public about the risk of new pest infestations
- Trapping program
- Vine Mealy Bug
- Sudden Oak Death

Pest Eradication

- Eliminates newly introduced pests from a limited area

Apiary

- Registers, educates and assists County beekeepers
- Regulates beekeepers
- Protects the public health and safety through an apiary ordinance

The San Luis Obispo County Fire Safe Council has issued articles and brochures on Sudden Oak Death and Pine Pitch Canker, both diseases that increase the potential for catastrophic fires.

5. Goals, Objectives, and Mitigation Strategies

Mitigation Strategy Requirements Cross-Reference Table

Element	Requirement	San Luis Obispo County LHMP Response
Local Hazard Mitigation Goals - A	Description of Mitigation Goals to Reduce or Avoid Long-Term Vulnerabilities to the Identified Hazards	Wildfire – Pages 146, 153 Flooding - Pages 146, 153 Extreme Weather - Pages 146, 153 Tsunami - Pages 147, 153 Earthquakes – Pages 147, 154 Fault Rupture/ Groundshaking/ Liquefaction - Pages 147, 154 Coastal Storm/Coastal Erosion - Pages 148, 154 Landslides/Rockslides Pages 148, 155 Naturally-Occurring Biological Threats – Pages 149, 155 Insect Infestation - Pages 149, 155
Identification and Analysis of Mitigation Actions - A	Identification and Analysis of a Comprehensive Range of Specific Mitigation Actions and Projects for Each Hazard	
Identification and Analysis of Mitigation Actions - B	Explain How Identified Actions and Projects Address Reducing the Effects of Hazards on New Buildings and Infrastructure	
Identification and Analysis of Mitigation Actions - C	Explain How Identified Actions and Projects Address Reducing the Effects of Hazards on Existing Buildings and Infrastructure	

The San Luis Obispo County LHMP Planning Team held a workshop to review and analyze the risk assessment. The Planning Team developed goals and objectives based on the risk assessment studies and selected those that were determined to be of greatest benefit in hazard reduction to the County. The goals, objectives and strategies are as follows:

Hazard: Wildfire

Wildfire Goal 1: Reduce risks of wildfires

Objectives
- Minimize the amount of fuel in areas prone to wildfires

Strategies:
- Expand vegetation management program
- Vegetation mapping - acquire detailed vegetation mapping to identify level of fire hazard severity by fuel conditions.
- Expansion of the chipping program
- Develop a Countywide pre-plan handbook, including firefighter risks assessment matrix
- Topographic mapping – acquire high resolution DEM data for creation of well defined topographic/terrain maps (slope, aspect, and contour elevations)

Hazard: Flooding

Flooding Goal 1: Reduce risks of flooding

Objectives
- Improve drainage

Strategies:
- Acquire funding for the "6 Communities Drainage Study"
- Topographic Mapping – acquire high resolution DEM data for creation of well defined topographic/terrain maps (slope, aspect, and contour elevations)

Hazard: Extreme Weather

Extreme Weather Goal 1: Increase public awareness

Objectives
- Better prepare communications for the effects of Extreme Weather

Strategies:
- Public education – notifications enhancements

Hazard: Tsunami

Tsunami Goal 1: Increase public awareness

Objectives
- Better prepare communities for the effects of and reaction to Tsunamis

Strategies:
- Increase public education
- Evacuation route determination
- Topographic Mapping – acquire high resolution DEM data for creation of well defined topographic/terrain maps (slopes, aspect, and contour elevations)

Hazard: Earthquakes

Earthquakes Goal 1: Increase public awareness

Objectives
- Better prepare communities for the effects of and reaction to Earthquakes

Strategies:
- Increase public education
- Develop scenarios – pre-planning program
- Geology Mapping – create comprehensive geological mapping of the County to identify earthquake faults, liquefaction and landslides; acquire high resolution DEM data for creation of well defined topographic/terrain maps (slopes, aspect, and contour elevations)

Hazard: Fault Rupture / Groundshaking / Liquefaction

Fault Rupture / Groundshaking / Liquefaction Goal 1: Increase public awareness

Objectives
- Better prepare communities for the effects of and reaction to Fault Rupture, Groundshaking and Liquefaction

Strategies:
- Increase public education
- Develop scenarios – pre-planning program
- Geology Mapping – create comprehensive geological mapping of the County to identify earthquake faults, liquefaction and landslides; acquire high resolution DEM data for creation of well defined topographic/terrain maps (slopes, aspect, and contour elevations)

Hazards: Coastal Storm / Coastal Erosion

Coastal Storm / Coastal Erosion Goal 1: Limit development on or near bluffs

Objectives
- Avoid the effects of and better prepare for Costal Storms and Coastal Erosion

Strategies:
- Acquire updated digital aerial photography every three years
- Develop scenarios – pre-planning program
- Geology Mapping – create comprehensive geological mapping of the County coastline
- Geology Mapping – create comprehensive geological mapping of the County to identify coastal storm/erosion areas
- Topographic Mapping - acquire high resolution DEM data for creation of well defined topographic/terrain maps (slopes, aspect, and contour elevations)

Hazards: Landslides / Rockslides

Landslides / Rockslides Goal 1: Identify areas prone to hazards

Objectives
- Avoid the effects of and better prepare for Landslides and Rockslides

Strategies:
- Update the existing inventory and expand on aerial mapping
- Develop scenarios – pre-planning program
- Geology Mapping – create comprehensive geological mapping of the County landslide and rockslide prone areas

Hazard: Naturally-Occurring Biological Threats

Naturally-Occurring Biological Threats Goal 1: Prevent agents from entering the County

Objectives
- Secure the County from unintentional, as well as intentional, introduction of naturally occurring biological agents

Strategies:

- Establish a comprehensive Vector Control District / mechanism
- Implement and manage a screening program for pets, plants, and produce entering the County to protect the County's ecosystem and highly vulnerable agricultural industry
- Create a Sudden Oak Death outbreak and vulnerable area inventory
- Vegetation Mapping – acquire detailed vegetation mapping to identify areas of vulnerability

Hazard: Insect Infestation

Insect Infestation Goal 1: Prevent pests from entering the County

Objectives

- Secure the County from unintentional, as well as intentional, introduction of pests

Strategies:

- Establish a comprehensive countywide Vector Control District / mechanism
- Increase monitoring, and testing
- Provide assistance to private property owners with controlling pests on private land
- Expand public outreach
- Undertake more detection and exclusion efforts

6. County of San Luis Obispo Action Plan

Mitigation Action Plan Requirements Cross-Reference Table

Element	Requirement	County LHMP Response
Implementation of Mitigation Actions - A	Mitigation Strategy Includes How Actions are Prioritized	Page 150
Implementation of Mitigation Actions - B	Mitigation Strategy Addresses How Actions will be Implemented and Administered	Page 151
Implementation of Mitigation Actions - C	Prioritization Process Includes an Emphasis on the Use of a Cost-Benefit Review	Pages 150- 151

The process used to prioritize mitigation strategies involved lengthy discussions with various County stakeholders, followed by citizen and community review. The end result is a hazard mitigation action plan with a prioritized list of strategies that San Luis Obispo County would like to carryout during the next five years. However, it is understood that financial resources are limited and funding for projects and other strategies must be considered in the context of the County's overall budget and priorities.

Each strategy brought forward may be required to provide a cost-benefit analysis. Although, it is recognized that due to limited financial resources, not all desired projects may have funding available, especially from local sources.

Prioritizing Strategies

The process used by the County first prioritized goals and their respective objectives based on priority maps created during the risk assessments. Available resources and public input were also considered. The County next assessed each strategy listed under the prioritized list of goals. In assessing and evaluating each strategy, San Luis Obispo County considered the following factors:

1. The cost was justified
2. Financial resources would need to be pursued
3. Staff resources would need to prioritized
4. Minimal impact on County department functions

5. Strategies mitigate risks for the riskiest hazard events
6. Strategies reflect the goals and objectives

San Luis Obispo County then prepared a draft action plan that listed goals followed by a prioritized list of strategies which included the principal contact and cooperating parties, the cost, and the time involved in carrying out the strategy. This step involved lengthy discussions with County departments and staff.

Implementation

Each year the action plan will be revisited and the first year will be dropped as those activities are completed or rescheduled and another year will be added so that the action plan always reflects a five-year time frame and remains current. Strategies undertaken and completed will be evaluated as to their effectiveness. Those activities not completed during the first year will be re-evaluated and included in the first year of the new action plan if still appropriate.

Even though individual strategies have been assigned a principal contact to ensure implementation, general administrative oversight of the action plan rests with the Office of Emergency Services, unless otherwise assigned by the County Administrative Office or the Board of Supervisors.

The Office of Emergency Services, unless another County entity is otherwise assigned by the County Administrative Office or the Board of Supervisors, may work with the principal contact agencies as necessary to develop or coordinate tasks such as development of a cost/benefit analysis, timelines for actions, or possibly other related needs.

For financial purposes, this action plan may serve as a guide to spending priorities but should be adjusted annually to reflect current needs and to recognize financial resources and limitations. Some strategies will require outside funding to implement. If outside funding is not available, then the strategy will be set aside until new sources of funding can be identified.

Action Plan

Hazard	Goal / Strategy	Action	Priority	Responsible Party
Naturally-Occurring Biological Threats	Minimize risk of introduction of agents to the County	Consider establishment of a Vector Control District	1	County of San Luis Obispo
Flood	Reduce the risks and effects of Flooding	Consider implementing the "Six Communities Drainage Study"	2	County of San Luis Obispo
Wildfire	Reduce the risks of Wildfire	Consider an expanded Vegetation Management Program	3	County of San Luis Obispo working with other agencies with specific jurisdiction over vegetation management
Wildfire, Landslides, Liquefaction, Coastal Erosion, Naturally Occurring Biological Threats	Reduce the risks and effects of Wildfire, Landslides, Liquefaction, Coastal Erosion, Naturally Occurring Biological Threats	Consider an expanded array of mapping	4	County of San Luis Obispo working with other agencies with specific jurisdiction(s)
Earthquakes	Mitigate severity of incident	Consider development of a Pre-Event Plan	5	County of San Luis Obispo

How the Mitigation Actions Identified Address Existing and New Buildings and Infrastructure

The matrices on the following pages cross references the proposed mitigation actions enumerated above to the specific hazards, buildings, and infrastructure that are addressed by the actions.

How the Mitigation Actions Identified Address Existing and New Buildings and Infrastructure

	Existing Infrastructure							New Infrastructure							
	Electrical and Power Infrastructure	Dams and Water Management	Communication Facilities	Critical Roads	Coastal Harbors, Bays and Fisheries	Agricultural Infrastructure	Public Structures	Woodlands Development (Southwestern Nipomo Mesa): streets, water, sewer, 1,320 residential units and 65 commerrcial acres)	Cypress Ridge (northwestern Nipomo Mesa): adding to the existing residential and golf course development - Hotel/Resort of 81 individually owned hotel units, 200 seat restaurant and 3,500 sq. feet of conference rooms	Residential subdivision development in San Miguel, Templeton, Nipomo and other unincorporated communities	Various mixed use projects (residential and commercial) in Avila Beach, Oceano, Templeton, Nipomo and other unincorporated communities	Nacimiento Water Pipeline project (Nacimiento Lake through Paso, Templeton and Atascadero to San Luis Obispo)	Ag Clusters. Recently approved Talley Farms (upper Arroyo Grande Valley). In review Latetita (Los Berros foothills) Santa Margarita Ranch, Weyrich (behind Rolling Hills Estates)	Los Osos swere project	San Luis Obispo Airport Master Plan Development (new terminal, runway extension, etc.)
Wildfire Goal 1: Reduce risks of wildfires ***Wildfire Mitigation Action Plan*** *a. Expand vegetation management program* *b. More discrete vegetation mapping.* *c. Expansion of the chipping program* *d. Develop a Countywide pre-plan handbook, including firefighter risks assessment matrix* *e. Topographic mapping*	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Flooding Goal 1: Reduce risks of flooding . ***Flooding Mitigation Action Plan*** *a. Acquire funding for the "6 Communities Drainage Study"* *b. Topographic mapping models with slopes, contour-elevations, man made features included*	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Extreme Weather Goal 1: Improve public awareness. ***Extreme Weather Mitigation Action Plan:*** *a. Notification system enhancements*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tsunami Goal 1: Increase Public Awareness. ***Tsunami Mitigation Action Plan:*** *a. Increase public awareness* *b. Evacuation route determination*	X	X	X	X	X		X	X	X	X	X	X	X	X	X

	Existing Infrastructure						New Infrastructure								
	Electrical and Power Infrastructure	Dams and Water Management	Communication Facilities	Critical Roads	Coastal Harbors, Bays and Fisheries	Agricultural Infrastructure	Public Structures	Woodlands Development (Southwestern Nipomo Mesa): streets, water, sewer, 1,320 residential units and 65 commerrcial acres)	Cypress Ridge (northwestern Nipomo Mesa): adding to the existing residential and golf course development - Hotel/Resort of 81 individually owned hotel units, 200 seat restaurant and 3,500 sq. feet of conference rooms	Residential subdivision development in San Miguel, Templeton, Nipomo and other unincorporated communities	Various mixed use projects (residential and commercial) in Avila Beach, Oceano, Templeton, Nipomo and other unincorporated communities	Nacimiento Water Pipeline project (Nacimiento Lake through Paso, Templeton and Atascadero to San Luis Obispo)	Ag Clusters. Recently approved Talley Farms (upper Arroyo Grande Valley). In review Latetita (Los Berros foothills) Santa Margarita Ranch, Weyrich (behind Rolling Hills Estates)	Los Osos swere project	San Luis Obispo Airport Master Plan Development (new terminal, runway extension, etc.)
Earthquakes Goal 1: Increase Public Awareness. ***Earthquake Mitigation Action Plan:*** *a. Increase public education* *b. Develop scenarios – pre-planning program* *c. Mapping – create comprehensive geological mapping of the County to identify earthquake faults, liquefaction and landslides*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fault Rupture / Groundshaking / Liquefaction Goal 1: Better prepare communities for the effects of and reaction to Fault Rupture, Groundshaking and Liquefaction. ***Fault Rupture / Groundshaking / Liquefaction Mitigation Action Plan:*** *a. Increase public education* *b. Develop scenarios – pre-planning program* *c. Mapping – create comprehensive geological mapping of the County to identify earthquake faults, liquefaction and landslides*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Coastal Storm / Costal Erosion Goal 1: Limit development on or near bluffs. ***Coastal Storm / Costal Erosion Mitigation Action Plan:*** *a. Update the existing inventory and expand on aerial mapping* *b. Develop scenarios – pre-planning program* *c. Mapping – create comprehensive geological mapping of the County coastline*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

	Existing Infrastructure							New Infrastructure							
	Electrical and Power Infrastructure	**Dams and Water Management**	**Communication Facilities**	**Critical Roads**	**Coastal Harbors, Bays and Fisheries**	**Agricultural Infrastructure**	**Public Structures**	**Woodlands Development (Southwestern Nipomo Mesa): streets, water, sewer, 1,320 residential units and 65 commerrcial acres)**	**Cypress Ridge (northwestern Nipomo Mesa): adding to the existing residential and golf course development - Hotel/Resort of 81 individually owned hotel units, 200 seat restaurant and 3,500 sq. feet of conference rooms**	**Residential subdivision development in San Miguel, Templeton, Nipomo and other unincorporated communities**	**Various mixed use projects (residential and commercial) in Avila Beach, Oceano, Templeton, Nipomo and other unincorporated communities**	**Nacimiento Water Pipeline project (Nacimiento Lake through Paso, Templeton and Atascadero to San Luis Obispo)**	**Ag Clusters. Recently approved Talley Farms (upper Arroyo Grande Valley). In review Latetita (Los Berros foothills) Santa Margarita Ranch, Weyrich (behind Rolling Hills Estates)**	**Los Osos swere project**	**San Luis Obispo Airport Master Plan Development (new terminal, runway extension, etc.)**
Landslide / Rockslides Goal 1: Identify areas prone to hazards. ***Landslide / Rockslides Mitigation Action Plan:*** *a. Update the existing inventory and expand on aerial mapping* *b. Develop scenarios – pre-planning program* *c. Mapping – create comprehensive geological mapping of the County landslide and rockslide prone areas*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Naturally-Occurring Biological Threats Goal 1: Prevent agents from entering the County ***Naturally Occuring Biological Threats Mitigation Action Plan:*** *a. Establish a comprehensive Vector Control District / mechanism* *b. Implement and manage a screening program for pets, plants, and produce entering the County to protect the County's ecosystem and highly vulnerable agricultural industry* *c. Create a Sudden Oak Death outbreak and vulnerable area inventory* *d. Conduct infrared / thermal vegetation mapping of the County*					X	X		X	X	X	X	X	X	X	X
Insect Infestation Goal 1: Detect explosives early. ***Insect Infestation Mitigation Action Plan:*** *a. Establish a comprehensive Vector Control District / mechanism* *b. Increase monitoring, and testing* *c. Provide assistance to private property owners with controlling pests on private land* *d. Expand public outreach* *e. Undertake more detection and exclusion efforts*					X	X		X	X	X	X	X	X	X	X

7. Assets at Risk

List of Jurisdiction's Assets at Risk for All Applicable Hazards

(Including Location and Potential Dollar Losses; values may reflect insured amount, not total value)

List of all Jurisdictional Assets at risk including Buildings, Critical Facilities, Infrastructure, Private Property and Areas (Residential, Environmental, Historical and Economic)

List Critical Facilities and Infrastructure	Asset Location (Latitude and Longitude)	(Estimated Potential Loss) % / Total Value in Dollars (K for thousands or M for millions) (NOTE: Repeat facility if loss estimate is different for different Hazards)	Wildfire	Flood	Extreme Weather	Tsunami	Earthquake	Fault Rupture/ Groundshaking / Liquefaction	Coastal Storm / Coastal Erosion	Landslides / Rockslides	Naturally-Occurring Biological Threats	Insect Infestation
HOSPITALS												
Twin Cities, Templeton	35.5546°N, 120.7186°W	5% / $138.6M		X			X	X			X	
FIRE STATIONS												
#21 SLO Airport	35.2384°N, 120.6361°W	5% / $3.5M					X	X			X	X
#62 Avila Valley	35.1905°N, 120.7191°W	10% / 1M		X	X		X	X			X	X
#22 Nipomo Mesa	35.0473°N, 120.5839°W	10% / $1M					X	X			X	X
#33 Heritage Ranch	35.7275°N, 120.8952°W	10% / $2M			X		X	X				
#36 Meridan	35.6600°N, 120.5786°W	10% / $2M		X			X	X			X	X

SHERIFF FACILITIES												
Sheriff HQ	35.3215°N, 120.7297°W	15% / $6.1M			X		X	X		X	X	X
Sheriff Jail	35.3215°N, 120.7297°W	5% / $13M			X		X	X		X	X	X
Women's Jail	35.3215°N, 120.7297°W	5% / $13.1M			X		X	X		X	X	X
Sheriff's Honor Farm	35.3203°N, 120.7166°W	20% / %2.67M			X		X	X			X	X
Sheriff Coast Station	35.3131°N, 120.8324°W	20% / $482K		X	X		X	X				
Sheriff / AG North	35.5649°N, 120.7017°W	5% / $3.6M					X	X				
BRIDGES												
Jack Creek, 1.3 miles SW of Vineyard Drive	35.5516°N, 120.7769°W	100% /$530K		X	X		X	X				
San Simeon Creek Road, 3.7 miles E of State Route 1	35.5994°N, 121.1190°W	100% / $899K		X	X		X	X				
Arroyo Grande, Huasna River, 2.55 mi E of Huasna	35.1291°N, 120.3843°W	100% / $1.6M		X	X		X	X				
San Simeon Creek Road, 2.65 mi E of State Route 1	35.5991°N, 121.1212°W	100% / $1.4M		X	X		X	X				
Huasna Townsite Road, Husana River, 3.1 mi SE of Huasna	35.1169°N, 120.3918°W	100% / $1.5M		X	X		X	X				
Davenport Creek Road, Davenport Creek, .2 mi S of Buckley Road	35.2283°N, 120.6492°W	100% / $722K		X	X		X	X				
Toro Creek Road, Toro Creek, 2.7 mi W of State Route 41	35.4117°N, 120.8360°W	100% / $378K		X	X		X	X				
Branch Mill Road, Tar Springs Creek, .25 mi SW of Huasna Road	35.1322°N, 120.5433°W	100% / $764K		X	X		X	X				
Main Street, Cambria 1.2 mi N of State Route 1	35.5630°N, 121.0923°W	100% / $773K		X	X	X	X	X				
ROADS												
Santa Rosa Creek Road, Cambria	35.5719°N, 120.9748°W	100% per site / $300K per site *		X			X					

Cypress Mountain Road, Cambria	35.5725°N, 120.9736°W	100% per site / $300kKper site *					X			X			
Chimney Rock Road, Lake Nacimiento	35.6785°N, 120.9336°W	100% per site / $200K per site *					X			X			
Nacimiento Lake Drive, West Paso Robles	35.7499°N, 120.8768°W	100% per site / $300K per site *					X						
Peachy Canyon Road, West Paso Robles	35.6250°N, 120.7883°W	100% per site / $200K per site *					X			X			
Vineyard Drive, Templeton	35.6312°N, 120.8535°W	100% per site / $300K per site *					X						
Estrella Road, San Miguel	35.6543°N, 120.5105°W	100% per site / $200K per site *		X			X						
River Road, San Miguel	35.6562°N, 120.6906°W	100% per site / $250K per site *		X			X						
Geneseo, Creston	35.6436°N, 120.5609°W	100% per site / $200K per site *					X						
Creston Road, Creston	35.5725°N, 120.5996°W	100% per site / $200K per site *					X						
El Pomar Road, Templeton	35.5574°N, 120.6290°W	100% per site / $200K per site *					X						
South Bay Boulevard, Los Osos	35.3332°N, 120.8235°W	100% per site / $350K per site *		X			X						
Los Osos Valley Road, Los Osos	35.3107°N, 120.8279°W	100% per site / $300K per site *					X						
Foothill Road, SLO	35.2865°N, 120.7006°W	100% per site / $250K per site *					X						
Orcutt Road, SLO	35.2575°N, 120.6319°W	100% per site / $200K per site *					X						
Price Canyon, Pismo Beach	35.1816°N, 120.6201°W	100% per site / $250K per site *					X			X			
Lopez Drive, Arroyo Grande	35.1502°N, 120.5372°W	100% per site / $300K per site *		X			X						
Huasna Road, Arroyo Grande	35.1390°N, 120.5190°W	100% per site / $200K per site *		X			X						
Pomeroy Road, Nipomo	35.0719°N, 120.5408°W	100% per site / $200K per site *					X	X					
Tefft Street, Nipomo	35.0390°N, 120.4817°W	100% per site / $350K per site *					X	X					
Division Street, Nipomo	35.0234°N, 120.4875°W	100% per site / $300K per site *					X	X					
Orchard Ave, Nipomo	35.0159°N, 120.4794°W	100% per site / $250K per site *					X	X					

List of Commercial or Industrial Buildings or Areas	Asset Location (Latitude and Longitude)	(Estimated Potential Loss) % / Total Value in Dollars (K for thousands or M for millions) (NOTE: Repeat facility if loss estimate is different for different Hazards)	Wildfire	Flood	Extreme Weather	Tsunami	Earthquake	Fault Rupture/ Groundshaking / Liquefaction	Coastal Storm / Coastal Erosion	Landslides / Rockslides	Naturally-Occurring Biological Threats	Insect Infestation
COMMERCIAL BUILDINGS												
Woodlands Development: streets, water, sewer, 1,320 residential units and 65 commercial acres	35.0190°N, 120.5157°W	5% / Undetermined (high M)		X	X		X	X				
INDUSTRIAL PLANTS												
PG&E Electrical and related facilities, including Diablo Canyon Power Plant	Various locations; Diablo Canyon is at approximately 35.2122°N, 120.8574°W	5% / $2.167B	X		X	X	X	X	X			
Conoco Phillps Refinery and Pipeline	Various locations; refinery is at approximately 35.0473°N, 120.5839°W	5% Unknown (high M)					X	X				
BUSINESSES												
Cypress Ride proposal; in addition to proposed additional residential, includes hotel/resort/restaurant, conference rooms	35.0663°N, 120.5730°W	5% / Proposed development (multi-M)		X	X		X	X				
Various small businesses in Cambria	35.5641°N, 121.0807°W	10% / Unknown (high M)	X	X	X	X	X	X	X	X	X	

Various small businesses in Cayucos	35.4428°N, 120.8921°W	10% / Unknown (high M)		X	X	X	X	X	X	X	X	
Various small businesses in Santa Margarita	35.3900°N, 120.6091°W	10% / Unknown (high M)	X	X	X		X	X			X	X
Various small businesses in Oceano	35.0989°N, 120.6124°W	10% / Unknown (high M)		X	X	X	X	X	X		X	X
Various small businesses in San Miguel	35.7525°N, 120.6963°W	10% / Unknown (high M)		X	X		X	X			X	X
Various small businesses in San Simeon	35.6439°N, 121.1908°W	10% / Unknown (high M)		X	X	X	X	X	X	X	X	
Various small businesses in Los Osos/Baywood Park	35.3111°N, 120.8324°W	10% / Unknown (high M)	X	X	X	X	X	X	X		X	
Various small businesses in Creston	35.5189°N, 120.5238°W	10% / Unknown (high M)	X	X	X		X	X			X	X
Various small businesses in Nipomo	35.0428°N, 120.4760°W	10% / Unknown (high M)	X	X	X		X	X		X	X	X
Various small businesses in Shandon	35.6552°N, 120.3754°W	10% / Unknown (high M)		X	X		X	X			X	X
Various small businesses in Templeton	35.5497°N, 120.7060°W	10% / Unknown (high M)	X	X	X		X	X				
Various small businesses in other unincorporated areas	35.367°N, 120.533°W and surrounding areas all directions	10% / Unknown (high M)	X	X	X	X	X	X	X	X	X	X
OTHER (LIST)												
Health Clinic, SLO	35.4958°N, 120.6618°W	50% / $1.7M		X			X	X			X	X
Health Clinic Morro Bay	35.4958°N, 120.6618°W	50% / %441K		X	X		X	X			X	X
Health Clinic Paso Robles	35.3657°N, 120.8443°W	50% / $763K		X	X		X	X			X	X
South County Regional Center	35.1246°N, 120.5910°W	15% / $1.8M		X	X		X	X				
South County Library	35.1246°N, 120.5910°W	15% / $1.8M		X	X		X	X				
Veteran's Building	35.1185°N, 120.5782°W	15% / $327K		X	X		X	X				
Recreation Bldg. (Jocelyn)	35.5652°N, 121.0975°W	35% / $925K		X	X	X	X	X				
Veteran's Bldg., Cayucos	35.4513°N, 120.9041°W	30% / $721K		X	X		X	X				
Senior Center, Nipomo	35.0442°N, 120.4719°W	15/% / $335K		X	X		X	X				
Veteran's Bldg., SLO	35.2894°N, 120.6526°W	15% / $2.7M		X	X		X	X				

Original Courthouse	35.2824°N, 120.6615°W	15% / $15.2M		X	X		X	X				
Cambria Library	35.5656°N, 121.0979°W	30% / $1M		X	X		X	X				
South Bay Library	35.3111°N, 120.8324°W	20% / $1.8M		X	X		X	X				
Santa Margarita Lake Res. Facilities	35.3375°N, 120.5024°W	30% / $1M	X	X	X		X	X		X	X	X
RV Park and Pool	35.1049°N, 120.6235°W	5% / $853K		X	X		X	X			X	
San Miguel Library	35.7514°N, 120.6984°W	50% / $327K		X	X		X	X				
Morro Bay Library	35.3670°N, 120.8463°W	20% / $1.6M		X	X		X	X				
City-County Library, SLO	35.2825°N, 120.6620°W	20% / $11.5M		X	X		X	X				
Atascadero Library	35.4815°N, 120.6662°W	15% / $3.2M		X	X		X	X				
Nipomo Library	35.0302°N, 120.4955°W	15% / $3.4M		X	X		X	X				
County Hospital Campus	35.2746°N, 120.6463°W	20% / $15.9M		X	X		X	X				
County Hospital Annex	35.2747°N, 120.6464°W	$2.4M		X	X		X	X				
Mental Health Services	35.2746°N, 120.6463°W	$3.1M		X	X		X	X				
Lopez Lake Store and Marina	35.1875°N, 120.4581°W	$500K		X	X		X	X			X	X
Store/Marina	35.3375°N, 120.5024°W	$425K		X	X		X	X			X	X
JSC	35.3225°N, 120.7212°W	$2.5M		X	X		X	X				
Veteran's Bldg, SLO	35.2894°N, 120.6526°W	15% / $2.7M		X	X		X	X				
Original Courthouse	35.2824°N, 120.6615°W	15% / $15.2M		X	X		X	X				
Cambria Library	35.5656°N, 121.0979°W	30% / $1M		X	X		X	X				
South Bay Library	35.3111°N, 120.8324°W	20% / $1.8M		X	X		X	X				
Santa Margarita Lake Res. facilities	35.3375°N, 120.5024°W	30% / $1M	X	X	X		X	X		X	X	X
RV Park and Pool	35.1049°N, 120.6235°W	5% / $853 k		X	X		X	X			X	
San Miguel Library	35.7514°N, 120.6984°W	50% / $327K		X	X		X	X				
Morro Bay Library	35.3670°N, 120.8463°W	20% / $1.6M		X	X		X	X				
City-County Library, SLO	35.2825°N, 120.6620°W	20% / $11.5M		X	X		X	X				
Atascadero Library	35.4815°N, 120.6662°W	15% / $3.2M		X	X		X	X				
Nipomo Library	35.0302°N, 120.4955°W	15% / $3.4M		X	X		X	X				
County Hospital Campus	35.2746°N, 120.6463°W	20% / $15.9M		X	X		X	X				
County Hospital Annex	35.2747°N, 120.6464°W	$2.4M		X	X		X	X				
Mental Health Services	35.2746°N, 120.6463°W	$3.1M		X	X		X	X				
Lopez Lake Store and Marina	35.1875°N, 120.4581°W	$500K		X	X		X	X			X	X
Store/Marina	35.3375°N, 120.5024°W	$425K		X	X		X	X			X	X
JSC	35.3225°N, 120.7212°W	$2.5M		X	X		X	X				
DSS Building	35.2540°N, 120.6691°W	20% / $10.4M		X	X		X	X				
DSS	35.1199°N, 120.5969°W	30% / $541K		X	X		X	X				

Health Dept Facilities, Lab	35.2742°N, 120.6465°W	20% / $1.9M		X	X		X	X			X	X
PH Facility	35.6285°N, 120.6728°W	20% / $817K		X	X		X	X			X	X
Los Osos Sewer Project	35.3126°N, 120.8368°W	5% / $150M (Note: Project is just beginning construction)		X	X		X	X			X	
AG Commissioner	35.2745°N, 120.6478°W	15% / $2M		X	X		X	X			X	X
County Airport - Terminal Bldg.	35.2390°N, 120.6395°W	15% / $2.55M		X	X		X	X				
Airport facilities	35.1027°N, 120.6240°W	25% / $750K		X	X		X	X				
Animal Services Complex	35.3209°N, 120.7185°W	15% / $933K	X	X	X		X	X			X	X
Clerk's Office	35.2832°N, 120.6593°W	20% / $1.4M		X	X		X	X				
Court Facilities	35.1178°N, 120.6123°W	25% / $403K		X	X		X	X				
Drug & Alcohol Services	35.4995°N, 120.6840°W	15% / $691K		X	X		X	X				
American Legion Templeton	35.5476°N, 120.7068°W	20% / $575K		X	X		X	X				
County Govt Center	35.2822°N, 120.6601°W	5% / $32.3M		X	X		X	X				
County Govt Facility, Grover Beach	35.1192°N, 120.6126°W	20% / $1.2M		X	X		X	X				
Community Center San Miguel	35.7514°N, 120.6984°W	30% / $481K		X	X		X	X				
Community Center Santa Margarita	35.3894°N, 120.6083°W	30% / $363K		X	X		X	X				
Courthouse Annex	35.2830°N, 120.6611°W	15% / $11.3M		X	X		X	X				
1050 Govt Center	35.2824°N, 120.6607°W	15% / $19.5M		X	X		X	X				
Simmler Community Bldg	35.3513°N, 119.9961°W	50% / $313K		X	X		X	X				X
Nipomo Communtiy Center	35.0442°N, 120.4719°W	25% / $426K		X	X		X	X				
Gen Svs	35.2819°N, 120.6595°W	20% / $1.3M		X	X		X	X				
Public Works Shops/Yard	35.3203°N, 120.7166°W	20% / $1.3M		X	X		X	X				
Public Works Shops/Yard, Atascadero	35.4997°N, 120.6588°W	25% / $546K		X	X		X	X				
Lopez Lake Water Treatment Plant	35.1725°N, 120.5302°W	10%/12M		X	X		X	X			X	X
Public Works Road Yard, Paso Robles	35.6280°N, 120.6851°W	20% / $1M		X	X		X	X				
Salinas Dam	35.3375°N, 120.5024°W	10% / $1.9M					X	X				
Oak Shores Sewer Treatment	35.7638°N, 120.9356°W	15% / $3.7M		X	X		X	X			X	X
Road Yard	35.1250°N, 120.5922°W	25% / $528K		X	X		X	X				
Section 3 Road Yard	35.3203°N, 120.7166°W	25% / $426K		X	X		X	X				

Public Works Offices, SLO	35.2832°N, 120.6593°W	20% / $453K		X	X		X	X				
Community Center (San Miguel)	35.7514°N, 120.6984°W	30% / $481K		X	X		X	X				
Community Center (Santa Margarita)	35.3894°N, 120.6083°W	30% / $363K		X	X		X	X				
Courthouse Annex	35.2830°N, 120.6611°W	15% / $11.3M		X	X		X	X				
1050 Govt Center	35.2824°N, 120.6607°W	15% / $19.5M		X	X		X	X				
Simmler Community Bldg	35.3513°N, 119.9961°W	50% / $313K		X	X		X	X				X
Nipomo Communtiy Center	35.0442°N, 120.4719°W	25% / $426K		X	X		X	X				
GEN SVS	35.2819°N, 120.6595°W	20% / $1.3M		X	X		X	X				
Public Works Shops/Yard	35.3203°N, 120.7166°W	20% / $1.3M		X	X		X	X				
Public Works Shops/Yard, Atascadero	35.4997°N, 120.6588°W	25% / $546K		X	X		X	X				
Lopez Lake Water Treatment Plant	35.1725°N, 120.5302°W	10% / $12M		X	X		X	X			X	X
Public Works Road Yard, Paso Robles	35.6280°N, 120.6851°W	20% / $1M		X	X		X	X				
Salinas Dam	35.3375°N, 120.5024°W	10% / $1.9M					X	X				
Oak Shores Sewer Treatment	35.7638°N, 120.9356°W	15% / $3.7M		X	X		X	X			X	X
Road Yard	35.1250°N, 120.5922°W	25% / $528K		X	X		X	X				
Section 3 Road Yard	35.3203°N, 120.7166°W	25% / $426K		X	X		X	X				
Public Works Offices, SLO	35.2832°N, 120.6593°W	20% / $453K		X	X		X	X				
Water Operations Plant, Cayucos	35.4374°N, 120.8867°W	10% / $4.5M		X	X		X	X	X	X	X	X
Water/Treatment Operations Facility, Graystone, rural SLO	35.2102°N, 120.6242°W	10% / $3.4M		X	X		X	X			X	X
Outlet Control Building, Lopez Drive, AG	35.1872°N, 120.4582°W	20% / $900K	X	X	X		X	X			X	X

List of Residential or Private Property Areas	Asset Location (Latitude and Longitude)	Potential Loss / Total Value	Wildfire	Flood	Extreme Weather	Tsunami	Earthquake	Fault Rupture/ Groundshaking/Liquefaction	Coastal Storm / Coastal Erosion	Landslides / Rockslides	Naturally-Occurring Biological Threats	Insect Infestation
Residential Developments												
Woodlands Development: Streets, water, sewer, 1,320 residential units and 65 commercial acres	35.0190°N, 120.5157°W	5% /Undetermined (high M)	X	X	X		X	X				
San Miguel residential subdivision projects	35.7525°N, 120.6963°W	5% / Undetermined (high M)	X	X	X		X	X			X	X
Templeton residential subdivision projects	35.5497°N, 120.7060°W	5% / Undetermined (high M)	X	X	X		X	X			X	X
Nipomo residential subdivision projects	35.0428°N, 120.4760°W	5% / Undetermined (high M)	X	X	X		X	X	X	X	X	X
Private Property (Land / Facilities)												
Various mixed use projects (residential and commercial)	Various areas of the county, including Avila Beach, Oceano, Templeton, and Nipomo; 35.367°N, 120.533°W and surrounding areas all directions	5% / Undetermined (high M)	X	X	X	X	X	X	X	X	X	X

List of Environmental, Historical and Economic Areas	Asset Location (Latitude and Longitude)	Potential Loss / Total Value	Wildfire	Flood	Extreme Weather	Tsunami	Earthquake	Fault Rupture/ Groundshaking/Liquefaction	Coastal Storm / Coastal Erosion	Landslides / Rockslides	Naturally-Occurring Biological Threats	Insect Infestation
Historical Buildings/ Areas												
Rios Caledonia Adobe	35.7449°N, 120.6982°W	70% / $416K		X	X		X	X				
San Miguel Adobe	35.7449°N, 120.6982°W	75% / $314K		X	X		X	X				
Museum/Historical Bldg, SLO	35.2801°N, 120.6648°W	20% / $113K		X	X		X	X				
Tourist / Economic Areas:												
Cayucos Pier	35.4489°N, 120.9064°W	10% / $3.3M		X	X	X	X	X	X			X
END of List of all Jurisdictional Assets at risk												

Notes: * Road damage estimates are based on a per site cost figure, with each site covering an estimate road length of 2 to 300 feet. Each road may experience multiple damaged sites from one hazard event, or multiple roads may experience one event each. There is no way to make an accurate estimate of the potential limits one hazard may cause.

8. Plan Maintenance

Plan Maintenance Requirements Cross-Reference Table

Element	Requirement	County LHMP Response
Monitoring, Evaluating, and Updating the Plan – A	Description of the Method and Schedule for Monitoring Plan	Pages 164 – 165
Monitoring, Evaluating, and Updating the Plan – B	Description of the Method and Schedule for Evaluating the Plan	Pages 164 – 165
Monitoring, Evaluating, and Updating the Plan – C	Description of the Method and Schedule for Updating the Plan within the Five-Year Cycle	Pages 164 – 165
Incorporation into Existing Planning Mechanisms - A	Identification of Other Local Planning Mechanisms Available for Incorporating the Requirements of the Mitigation Plan	Page 164 – 165
Incorporation into Existing Planning Mechanisms - B	Identification of Process by Which County will Incorporate the Requirements of Other Plans, When Appropriate	Page 164 – 165
Continued Public Involvement – A	Explanation of How Continued Public Participation will Be Obtained	Page 165

The County of San Luis Obispo has developed a method to ensure that regular review and update of its Local Hazard Mitigation Plan (LHMP) occurs. FEMA regulations require an update every five years. The County Office of Emergency Services will poll agencies that participated in the development of the LHMP ("Planning Team") to see if they want to continue to participate and if their elements of the plan are up-to-date.

The Planning Team will review each goal and objective to determine its:

- Relevance to the evolving situation in San Luis Obispo County
- Consistency with changes in State and Federal policy
- Relevance to current and expected conditions.

The Planning Team will review the risk assessment portion of the plan to determine if the information should be updated or modified. The parties responsible for the various implementation actions will report on:

- Status of their projects

- Implementation processes that worked well
- Any difficulties encountered
- How coordination efforts are proceeding
- Which strategies should be revised

The County of San Luis Obispo is committed to involving the public in the continual reshaping and updating of the Local Hazard Mitigation Plan. The Planning Team members are responsible for the review and update of the plan. Although they represent the public to some extent, the public will be able to directly comment on and provide feedback about the plan.

The County of San Luis Obispo currently uses comprehensive land use planning, capital improvements planning, and building codes to guide and control development within the County. This LHMP will be provided to those responsible for the County's General Plan development mechanisms to insure that consistency is maintained. Whenever there are substantive changes to this LHMP, those involved in other relevant planning mechanisms in the County will be included in the review process.

Copies of the plan will be kept on hand at County offices and the County library. The existence and location of these copies will be publicized. These copies of the plan will include the address and phone number of County staff responsible for tracking public comment.

San Luis Obispo County LHMP

November 2005

Revision 1

Appendix I: Plan Development Documentation

Appendix I consists of documentation related to development of the LHMP which is not included elsewhere in the Plan; the contents of Appendix I are shown below – the page "numbers" relate to the print copy only; see information below related to where to find the info on the CD:

Page "A"	County Board of Supervisors Agenda Item, Adoption on LHMP, 11/1/2005 (Note: on the CD version, the "Page A" information is in PDF format and is titled "bos_adopt_lhmp"
Page "B"	Minutes of the Board of Supervisors related to adoption of the LHMP, 11/1/2005 (Note: on the CD version, the "Page B" information is in a larger PDF document titled "bos_minutes_see_page12_d2" to indicate the minutes for Board approval on page 12, item D2 in that document)
Page "C"	News Release dated September 12, 2005 regarding the LHMP being ready for public review
Page "D"	Notice of Public Meeting: notification to the media and the public regarding a public meeting being held on September 23, 2005 for discussion and input into the LHMP.
Page "E"	Facsimile document related to sending out the "Notice of Public Meeting"
Page "F"	E-mail documentation related to public review opportunities
Pages "G"	Document related to other agency notification/opportunity to comment (e-mail format)
Page "H"	Second page of the document noted in "G", above.

End of LHMP