CITY OF PASO ROBLES
HAZARD MITIGATION PLAN

Prepared for:

City of Paso Robles

1000 Spring Street

Paso Robles, CA 93446

Prepared by:

URS Corporation

130 Robin Hill Road, Suite 100

Santa Barbara, CA 93117

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ACKNOWLEDGEMENTS

City of Paso Robles Council

Frank Mecham	Mayor
Jim Heggarty	Mayor Pro Tem
George Finigan	Council Member
Fred Strong	Council Member
Gary Nemeth	Council Member
Duane Picanco	Council Member

City of Paso Robles Hazard Mitigation Plan Team

Ed Gallagher	Team Leader, Housing Programs Manager, Community Development Department
Jim Heggarty	Mayor Pro Tem
Gary Nemeth	Council Member
Jim App	City Manager
Dennis Cassidy	Police Chief, Police Department
Dennis Fansler	Maintenance Supervisor, Public Works Department
Ken Johnson	Chief of Emergency Services
Lisa Solomon	Police Lieutenant, Police Department
Meg Williamson, AICP	Assistant To City Manager

Other Participants

Robert Bavier	Union Pacific Railway
Jim Bonnifield	El Paso de Robles Youth Correctional Facility
Art Dueck	California Department of Transportation
Tim Griffin	California Department of Transportation
Bob Gundrum	El Paso de Robles Youth Correctional Facility
Gary Hoskins	Paso Robles Public Schools
Judy Lautner	City of Pismo Beach
Ashley Lightfoot	Paso Robles Public Schools
Dick Short	California Highway Patrol

Consultant Team

Brian Sands, AICP	Project Manager, URS Corporation
James Diven	Deputy Project Manager, URS Corporation
Chris Barkley, PE	FEMA Liaison, URS Corporation
David Denniston	GIS Manager, URS Corporation
Angela Dombrowki	GIS Specialist, URS Corporation
John Hart, AICP, AIA	Hazard Mitigation Program Manager, URS Corporation
Amy Keeley	GIS Manager, URS Corporation
Autumn McKee	Senior Environmental Scientist, URS Corporation
Stuart Wallace, AICP, RLA	Hazard Mitigation Program Director, URS Corporation

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ACRONYMS

CADA	California Department of Agriculture
CADEMA	California Department of Emergency and Military Affairs
CEQA	California Environmental Quality Act
CDFG	California Department of Fish and Game AL Annualized Loss
ANSI	American National Standards Institute
APA	American Planning Association
CARS	California Revised Statutes
ASCE	American Society of Civil Engineers
BLM	Bureau of Land Management
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DFIRM	Digital Flood Insurance Rate Map
DMA 2000	Disaster Mitigation Act of 2000
EHS	Extremely Hazardous Substance
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
FEMA	Federal Emergency Management Agency
FTE	Full-Time Equivalent
HAZMAT	Hazardous Material
HAZUS-99	Hazards United States1999
HAZUS-MH	Hazards United States Multi-Hazard
HUD	Department of Housing and Urban Development
IOM	Institute of Medicine
LEPC	Local Emergency Planning Committee
MMI	Modified Mercalli Intensity
NCDC	National Climate Data Center
NESDIS	National Environmental Satellite, Data and Information Service
NFIP	National Flood Insurance Program
NHC	National Hurricane Center

NIBS	National Institute of Building Services
NID	National Inventory of Dams
NIST	National Institute of Standards and Technology
NFIP	National Flood Insurance Program
NSF	National Science Foundation
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center
NWS	National Weather Service
OIE	Office International des Epizooties
PSDI	Palmer Drought Severity Index
RL	Repetitive Loss
SARA	Superfund Amendments and Reauthorization Act
SERC	State Emergency Response Commission
UBC	Uniform Building Code
URS	URS Corporation
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
WMD	Weapon(s) of Mass Destruction

1.0 EXECUTIVE SUMMARY

Across the United States, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The toll on families and individuals can be immense after a disaster and damaged businesses may not be able to contribute to the economy afterward. The time, money and emotional effort to respond to and recover from these disasters divert public resources and attention from other important programs and problems. The City of Paso Robles recognizes the consequences of disasters and the need to reduce the impacts of natural and human-caused hazards. In addition, the recent San Simeon earthquake that shook the City of Paso Robles in December, 2003, caused damage and loss of life that has focused the City's attention on the necessity of a Hazard Mitigation Plan.

The elected and appointed officials of the City of Paso Robles know that with careful selection, mitigation actions in the form of projects and programs can become long-term, cost effective means for reducing the impact of natural and human-caused hazards. Applying this knowledge, the City of Paso Robles Hazard Mitigation Planning Team has collaborated to prepare this *City of Paso Robles Hazard Mitigation Plan* (Plan) with the support of various city officials, URS Corporation consultants, the County of San Luis Obispo Department of Emergency Services, California Office of Emergency Services, and the Federal Emergency Management Agency (FEMA). This Plan is the result of approximately one year of work to develop a Hazard Mitigation Plan that will guide the City toward greater disaster resistance in full accord with the character and needs of the community and the Disaster Mitigation Act of 2000. A complete description of how this Plan is organized is given in Section 3.3 (Plan Description).

People and property in the City of Paso Robles are at risk from a variety of hazards that have the potential for causing loss of life and damage to property, infrastructure, and the environment. These potential hazards are identified and assessed in Section 6 (Risk Assessment) of this Plan and include the following: drought, earthquake, expansive soils, extreme heat, flood, hazardous materials, landslides, subsidence, and wildland fires. Historical experience and the risk assessment results confirm that earthquakes pose the greatest risk to the community.

The purpose of hazard mitigation is to implement actions that eliminate the risk from hazards, or reduce the severity of the effects of hazards on people and property. Mitigation actions are both short-term and long-term activities that reduce the cause or occurrence of hazards; reduce exposure to hazards; or reduce effects of hazards through various means to include preparedness, response, and recovery measures. The City's proposed mitigation actions are defined in Section 7 (Mitigation Strategy) of this Plan.

Following each major disaster declaration, the City is required to review and update the Plan's mitigation strategy. Additionally, in compliance with FEMA regulations, the Plan must be reviewed, revised if appropriate, and resubmitted for approval within the next five years in order to continue to be eligible for various hazard mitigation grant-funding sources, including FEMA's Hazard Mitigation Grant Program (HMGP). It is however, recommended that the Plan be reviewed annually to ensure it remains current.

2.0 OFFICIAL RECORD OF ADOPTION

The purpose of this section is to provide an overview of the Disaster Mitigation Act of 2000. This includes a review of the requirements, City adoption and supporting documentation.

2.1 DMA 2000 REQUIREMENTS

The Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) provides an opportunity for States, Tribes, and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act) by repealing the previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322). This new section emphasizes the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. It continues the requirement for a State mitigation plan as a condition of disaster assistance, and creates incentives for increased coordination and integration of mitigation activities at the State level through the establishment of requirements for two different levels of State plans: "Standard" and "Enhanced." States that demonstrate an increased commitment to comprehensive mitigation planning and implementation through the development of an approved Enhanced State Plan can increase the amount of funding available through the Hazard Mitigation Grant Program (HMGP). Section 322 also established a new requirement for Local Mitigation Plans, and authorized up to 7% of HMGP funds available to a State to be used for development of State, Tribal, and Local Mitigation Plans.

To implement the DMA 2000 planning requirements, FEMA published an Interim Final Rule (the Rule) in the Federal Register on February 26, 2002. This Rule (44 CFR Part 201) established the mitigation planning requirements for States, Tribes, and local communities. Normally FEMA publishes a proposed rule for public comment before publishing a final rule. This process can result in a lengthy comment and response period, during which the proposed rule is not legally effective or enforceable. Because certain types of Stafford Act assistance are conditioned on having an approved mitigation plan, FEMA wanted to publish an effective rule providing the DMA 2000 planning requirements in order to position State and local governments to receive these mitigation funds as soon as possible.

TABLE 2-1
DMA 2000 REQUIREMENTS - PREREQUISITES

Adoption by the Local Governing Body
Requirement §201.6(c)(5): [The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).
Element
A. Has the local governing body adopted the plan?
B. Is supporting documentation, such as a resolution, included?

Source: FEMA March 2004.

2.2 ADOPTION BY THE LOCAL GOVERNING BODY AND SUPPORTING DOCUMENTATION

The Paso Robles Hazard Mitigation Plan meets the requirements of Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act) and Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000). This includes meeting the requirement that the Plan be adopted by the City of Paso Robles.

The City of Paso Robles Hazard Mitigation Plan has been prepared by the Paso Robles Hazard Mitigation Planning Team (HMPT) and adopted by the Paso Robles City Council via resolution on April 19, 2005, which is attached as Appendix D.

3.0 BACKGROUND

The purpose of this section is to provide an overview of the *City of Paso Robles Hazard Mitigation Plan*. This includes a review of the background, authority and purpose of the Plan, and a description of the Plan document.

3.1 INTRODUCTION

The Disaster Mitigation Act of 2000 (DMA), commonly known as the 2000 Stafford Act amendments, was approved by Congress on October 10, 2000. On October 30, 2000, the President signed the bill into law, creating Public Law 106-390. The purposes of the DMA are to amend the Stafford Act, establish a national program for pre-disaster mitigation, and streamline administration of disaster relief.

3.2 PLAN PURPOSE AND AUTHORITY

This Plan meets the requirements of the federal DMA, which calls for all communities to prepare hazard mitigation plans. By preparing this Plan, Paso Robles is eligible to receive federal mitigation funding after disasters and to apply for mitigation grants before disasters strike. This Plan starts an ongoing process to evaluate the risks for different types of hazards to Paso Robles, and to engage the City and the community in dialogue to identify which steps are most important to pursue to reduce these risks. This constant focus on planning for disasters will make the City, its residents and businesses, much safer.

The local mitigation planning requirements encourage agencies at all levels, local residents, businesses, and the non-profit sector to participate in the mitigation planning and implementation process. This broad public participation enables the development of mitigation actions that are supported by these various stakeholders and reflect the needs of the entire community.

States are required to coordinate with local governments in the formation of hazard mitigation strategies, and the local strategies combined with initiatives at the State level form the basis for the State Mitigation Plan. With the information contained in Local Mitigation Plans, States are better able to identify technical assistance needs and prioritize project funding. Furthermore, as communities prepare their plans, States can continually improve the level of detail and comprehensiveness of statewide risk-assessments.

For the Pre-Disaster Mitigation (PDM) program, local jurisdictions must have an approved mitigation plan to receive a project grant. Local jurisdictions must have approved plans by November 1, 2004, to be eligible for Hazard Mitigation Grant Program (HMGP) funding for Presidentially declared disasters after this date. Plans approved at any time after November 1, 2004, will make communities eligible to receive PDM and HMGP project grants.

Adoption by the local governing body demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in the Plan. Adoption legitimizes the Plan and authorizes responsible agencies to execute their responsibilities. The Plan includes documentation of the resolution adopting the Plan (Appendix D).

FEMA's Interim Final Rule requires that Local Plans be submitted to the State Hazard Mitigation Officer for initial review and coordination, with the State then forwarding the plans to FEMA for formal review and approval.

3.3 PLAN DESCRIPTION

The City of Paso Robles Hazard Mitigation Plan consists of the following primary functions:

<u>Community Description</u>

To provide an adequate background for the hazard profiles and risk assessments that are presented in subsequent chapters Paso Robles is described in some detail. This description includes a general history and background, and also includes a discussion regarding the historical trends for demographic, population, and economic conditions that

have shaped the area. A community profile is also included to briefly identify growth trends and general plan themes that are currently being experienced in the area.

Historical Record, Hazard Profiles, Vulnerability Assessment

Through this procedure the planning team identified and compiled relevant data on all potential natural hazards that threaten Paso Robles and the immediately surrounding area. Information collected includes historical data on natural hazard events that have occurred in and around the City and how these events impacted residents and their property.

Based upon historical occurrences and best available data from agencies such as FEMA, U.S. Geological Survey, California Geologic Survey, and the National Weather Service, the planning team identified and described all natural hazards that threaten Paso Robles. Detailed hazard profiles include information on the frequency, magnitude, location and impact for each hazard in addition to estimating the probabilities for future hazard events. Maps are included to delineate identified hazard areas and previous hazard occurrences.

Risk Assessment

This section reflects the collection and integration of the best available data, including an inventory of assets that may be affected by natural hazards such as people, housing units, critical facilities, special facilities, infrastructure and lifelines, hazardous materials facilities and commercial facilities. This data was compiled by assessing the potential impacts from each hazard using FEMA's Hazards U.S. (HAZUS) multi-hazard loss estimation model and other risk modeling techniques. The subsequent information provides the City with information that outlines the full range of hazards the City may face and potential social impacts, damages and economic losses.

Mitigation Strategy

Based upon the findings of the capability assessment and the risk assessment, the consultant team worked with the Paso Robles Hazard Mitigation Planning Team towards drafting an overall mitigation strategy for the City. These groups collaborated to engage in an interactive planning process by facilitating discussion on possible mitigation activities and by gaining consensus on the identification of the general planning goals and target objectives for the hazard mitigation plan. Based upon these goals and objectives, the City of Paso Robles reviewed and adopted a comprehensive range of appropriate mitigation measures to address the risks facing the community. Such measures include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services and public information and awareness activities.

4.0 PLANNING PROCESS

This section includes a delineation of various DMA 2000 regulatory requirements, as well as an identification of key stakeholders and planning team members within the City of Paso Robles. In addition, the necessary public involvement meetings and actions that were applied to this process are summarized.

4.1 DMA 2000 REQUIREMENTS

The table below summarizes the DMA 2000 requirements for documentation of the planning process. These requirements are addressed in the following text.

TABLE 4-1
DMA 2000 REQUIREMENTS – PLANNING PROCESS

PLANNING PROCESS: *§201.6(b): An open public involvement process is essential to the development of an effective plan.*
Documentation of the Planning Process *Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process* ***shall*** *include:* *(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;* *(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and* *(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information. Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*
Element A. Does the plan provide a narrative description of the process followed to prepare the plan? B. Does the plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?) C. Does the plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?) D. Was there an opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process? E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?

Source: FEMA, March 2004.

4.2 PLANNING PROCESS

The City of Paso Robes hired URS Corporation (URS) to assist with the development of this Plan. The first step in the planning process was to establish a Planning Team comprised of existing City agencies, elected officials and federal representatives. Ed Gallagher, Housing Programs Manager for the City, served as the primary point of

contact for the City and as primary point of contact for the public. The Planning Team was formed as an advisory body to undertake the planning process and meeting dates were set for all members of the committee and interested parties to attend. Local jurisdictional representatives included the individuals listed in Section 4.3 below.

The Planning Team also provided an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as business, academia and other private and non-profit interests to be involved in the planning process. Some of those parties are listed in Section 4.5 below.

Once the Planning Team was organized, the following four-step planning process was implemented:

1. Organize Resources – From the beginning of the process, the City of Paso Robles focused on the resources needed for a successful mitigation planning process. Essential steps included organizing interested members of the community as well as the technical expertise required during the planning process
2. Assess Risks – Next the City identified the characteristics and potential consequences of hazards. Special attention was focused on the number of affected community for each hazard and what impacts were important to community assets.
3. Mitigation Planning – After understanding the risks posed by each hazard, the City determined priorities and assessed various methods to avoid or minimize any undesired effects. The result of this study was a hazard mitigation plan and strategy for implementation.
4. Implementation of Plan and Monitoring Progress – The next step for the City is implementation and to ensure the success of an on-going program to minimize hazard impacts to the community. Periodic evaluations will be conducted and revisions will be incorporated as needed.

The Plan was prepared primarily during the six-month period from June 2004 to November 2004. During this period, the Hazard Mitigation Planning Team Leader, Ed Gallagher, organized a number of meetings for the Hazard Mitigation Planning Team (HMPT), other interested parties, and the planning consultant (URS Corporation). All parties worked very closely together during the preparation period.

HMPT Meeting #1

In order to initiate efforts to bring the Plan into compliance with DMA 2000, a meeting of the HMPT and other interested parties was held on June 3, 2004. Eleven individuals attended the meeting, including the HMPT Leader, two Paso Robles City Council members, the City Manager, Police Chief, Fire Chief, three other City staff, and three consulting team staff. Topics addressed at the meeting included the following:

- Background
- Why Pre-Disaster Mitigation Planning?
- Creating the Plan
- Phase 1 – Organize Resources
- Phase 2 – Assess Risks
- Next Steps
- Q&A

A URS presentation designed for the City discussed the objectives of DMA 2000, the hazard mitigation planning process, the public outreach process, and the steps involved in developing the Plan and achieving the City's goals. The presentation also entailed a review of GIS as a tool for identifying and mapping known hazards in the City, and

discussed the need for the HMPT to network with other people in their city, other agencies, as well as other professionals who might have specialized knowledge on hazards that may affect the City.

A hazard risk identification exercise was conducted to familiarize the HMPT with the approach and concepts that would be utilized in the risk identification phase of the Plan development. The exercise identified the specific hazards the HMPT wanted to address in their Plan. A list of 22 potential hazards was initially discussed and reduced to 9 hazards considered of greatest immediate threat to the City (see Section 6.2). The potential hazards that were identified by the group for profiling (see Section 6.3) and, where possible, vulnerability assessment (see Section 6.5) included: dam failure, drought, earthquakes, expansive soils, extreme heat, flooding, land subsidence, landslides, severe winter storms, wildfires, and hazardous material shipment. There was also discussion about including other possible hazards in the assessment, but after further consideration by the HMPT, it was decided that these secondary hazards would be addressed in the primary hazards or were not of sufficient importance to consider currently.

The following main action items were determined at the end of the meeting:

- The City was tasked with preparing a letter to be sent to several local agencies that may participate in or comment on the LHMP.
- URS was tasked with contacting Barclay Maps to determine what GIS data is available for the City.
- URS was tasked with preparing a press release for the City to distribute and provide meeting materials in PDF format for posting on the City's website.
- URS was tasked with profiling the hazards identified by the HMPT to present in a preliminary analysis in the next meeting in July.
- URS was tasked with providing a capability assessment survey form for completion by the City.
- URS was tasked with preparing draft goals and objectives as well as potential actions for preliminary consideration at the next meeting in July.

See Appendix A for a copy of this meeting's sign in sheet, which demonstrates the attendees. During the approximately eight weeks prior to the next HMPT meeting, the HMPT Leader and URS focused on completing the draft risk assessment and draft capability assessment. This work required a high level of interaction between the HMPT Leader, other HMPT members, URS, and other relevant parties.

HMPT Meeting #2

A second meeting of the HMPT and other interested parties was held on August 5, 2004. The meeting was attended by fifteen individuals, including the HMPT Leader, a Paso Robles City Council member, Police Chief, Fire Chief, and nine representatives from other interested organizations, and two consulting team staff. At this meeting, the HMPT was given an interim draft of the risk assessment for review and comment. Topics addressed at the meeting included the following:

- Status
- Phase 2 – Assess Risks
- Phase 3 – Mitigation Strategy
- Next Steps
- Q&A

Estimated values and analysis for the risk assessment was presented to the HMPT, to describe how values were estimated and assessed. The mitigation priorities were determined initially via an evaluation of potential mitigation actions by the HMPT Team Leader using a modified version of the STAPLEE criteria (see Section 7.2.2.1) and subsequently agreed upon by the HMPT at the third meeting.

This meeting brought up some questions regarding specific values of bridges and railways in the City, as well as the details regarding maintenance of these transportation corridors. The conclusion of this meeting tasked URS with coordinating with Caltrans and the local contact for the Union Pacific Railroad to confirm these structure locations and values in the City.

See Appendix A for a copy of this meeting's sign in sheet, which demonstrates the attendees.

During the approximately eight weeks prior to the next HMPT meeting, the HMPT Leader and URS focused on completing the draft mitigation strategy and Plan maintenance. In addition, the HMPT provided comments on the draft risk assessment. This work required a high level of interaction between the HMPT Leader, other HMPT members, URS, and other relevant parties.

HMPT Meeting #3

The third meeting for the HMPT was held on September 23, 2004 to discuss the mitigation strategy and plan maintenance. The meeting was attended by seven individuals, including the HMPT Leader, two other City staff members, two representatives from other interested organizations, and two consulting team staff. At this meeting, the HMPT was given an interim draft of the mitigation strategy and plan maintenance procedures for review and comment. Topics addressed at the meeting included the following:

- Schedule
- Phase 3 – Mitigation Strategy
- Phase 4 – Implementation and Monitoring
- Next Steps
- Q&A

See Appendix A for a copy of this meeting's sign in sheet, which demonstrates the attendees.

Following the third meeting, the HMPT provided comments on the draft mitigation strategy and plan maintenance procedures. This was combined with additional sections to produce an Administrative Draft Paso Robles Hazard Mitigation Plan, which the HMPT reviewed.

Following incorporation of the HMPT comments, the Public Review Draft Paso Robles Hazard Mitigation Plan was prepared. This version of the Plan was released for comment by the public and other interested parties on October 12, 2004. A Paso Robles Planning Commission workshop, which was open to the public, was held on October 26 and signaled the end of the public comment period. Refer to Section 4.4 (Public Involvement) for details about how interested members of the community were included in the planning process.

A Paso Robles City Council meeting, which was open to the public, took place on March 15, and the formal adoption of HMP was proposed. No public comments were received, however one councilmember had further questions/comments on the Plan, which were incorporated over the next few weeks. The Plan was adopted at the subsequent City Council meeting on April 19, 2005.

4.3 DIRECTLY INVOLVED PARTIES

The City of Paso established a Hazard Mitigation Planning Team. Members of the Planning Team represented a wide range of City departments and included the following:

- Ed Gallagher Team Leader, Housing Programs Manager, Community Development Department
- Jim Heggarty Mayor Pro Tem
- Gary Nemeth Council Member
- Jim App City Manager
- Dennis Cassidy Police Chief, Police Department
- Dennis Fansler Public Works Department
- Ken Johnson Fire Chief, Fire Department
- Lisa Solomon Police Lieutenant, Police Department
- Meg Williamson Assistant To City Manager

The City also hired a consultant, URS Corporation (URS), to assist with the planning process, analysis, and Plan preparation. URS provided expertise in the areas of risk assessment, hazard mitigation policies, and documentation. URS worked under the direction of the City throughout the process.

The information contained in the Plan was provided by a wide range of sources that are cited throughout the Plan as well as in the Acknowledgement and Sources. The City staff on the HMPT provided local technical expertise in the following areas: governance; management and finance; emergency response, management, and hazard mitigation; public works; and planning and housing. The HMPT Leader reviewed preliminary drafts of the Plan, followed by the entire HMPT, as well as the public, Planning Commission, and City Council.

The HMPT Leader drafted notification letters inviting other agencies and potentially interested parties to participate in the City's HMPT. Several San Luis Obispo County departments were invited (the fire department, the planning department, and the county's Office of Emergency Services), as were local utility departments, education facilities and nearby cities. Representatives from the county and adjacent cities (i.e., Atascadero) did not choose to participate, however, one representative from the City of Pismo Beach did participate (in the August meeting), as did representatives from Caltrans, Union Pacific Railroad, and the El Paso de Robles Youth Correctional Facility.

Please refer to Appendix B for copies of the notification letters and the list of recipients.

4.4 PUBLIC INVOLVEMENT

Concurrent with the first HMPT meeting on June 3, 2004, a press release was sent to the local newspapers in early June 2004 regarding the preparation of the Plan and extending a welcome to interested organizations and the public to participate in the Plan preparation process. Information about the Plan and the meetings was also posted on the City's website.

This was repeated when the Public Review Draft Paso Robles Hazard Mitigation Plan was released for comment from the public and other interested parties on October 12, 2004. As noted above, a Paso Robles Planning Commission workshop, which was open to the public, was held on October 26 and signaled the end of the public comment period. A Paso Robles City Council meeting, which was open to the public on April 19, 2005, signaled the formal adoption of the Plan.

See Section 8.3 for details regarding continued public involvement, including the release of the adopted Plan.

Refer to Appendix B for copies of the notification letters and list of recipients, Appendix C for copies of the Press Releases, and Appendix D for the adoption/resolution.

4.5 OTHER INTERESTED PARTIES

As noted above, press releases were made at key stages in the planning process that provided all interested parties with the opportunity to be involved in the planning process. As shown in the Acknowledgements, six outside agencies/jurisdictions attended HMPT meetings and provided input on the Plan. Many additional agencies were also contacted during the planning process to obtain information for the risk assessment and mitigation strategy. In addition, the Planning Commission and City Council meetings were open to the public, including all interested parties.

4.6 INCORPORATION OF EXISTING PLANS AND OTHER INFORMATION

Existing plans, studies, reports and technical information were incorporated throughout the planning process. This included a review and incorporation of significant information from the following key documents:

- *City of El Paso de Robles General Plan* (particularly the Land Use Element and Safety Element) – the Land Use Element of the General Plan was used to identify existing land use and future development trends, and the Safety Element was used for initial hazard identification, hazard mapping, hazard mitigation policies, and assigning the City's Hazard Action Plan to the appropriate City individuals.
- *Draft City of El Paso de Robles Emergency Response Plan* – this Plan was used to identify what the City already does to respond to hazards and this helped the HMPT to come up with new possible actions for hazard mitigation that are not already planned and/or actions that can be done prior to hazards in order to ensure that the City's Emergency Response is smooth and effective.
- *San Luis Obispo County General Plan* - The County's General Plan was used to gather information on areas adjacent to the City (i.e., future planning areas that have not been incorporated into the City, etc.) and other demographic information.
- *Draft State of California Draft Multi-Hazard Mitigation Plan* - This plan was used to insure that the City's HMP was consistent with the State's Plan.
- FEMA *Multi-Hazard Identification and Risk Assessment – A Cornerstone of the National Mitigation Plan* - This document was used for general information on the HMP process.
- FEMA *How-To Guide #1: Getting Started: Building Support For Mitigation Planning (FEMA 386-1)* - This document was used for general information on the HMP process.
- FEMA *How-To Guide #2: Understanding Your Risks – Identifying Hazards and Estimating Loss Potential (FEMA 386-2)* - This document was used for general information on the HMP process.
- FEMA *How-To Guide #3: Developing The Mitigation Plan; Identifying Mitigation Actions And Implementing Strategies (FEMA 386-3)* - This document was used for general information on the HMP process.
- FEMA *How-To Guide #4: Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA 386-4)* - This document was used for general information on the HMP process.
- FEMA *Multi-Hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000* - This document was used for general information on the HMP process.

A complete list of the sources consulted for information is presented in Section 10, Sources.

5.0 COMMUNITY DESCRIPTION

The purpose of this section is to provide basic background information on Paso Robles. This includes general information concerning geography, climate, government, population, economy, infrastructure, and planning and development.

5.1 GEOGRAPHY AND VEGETATION

The City is located in the southern Salinas River Valley. The Salinas River itself flows through the center of the City from south to north. Steep hills and canyons bound the community on the west, and open rolling hills to the east. Agriculture surrounds the area, and ranchlands are transitioning to vineyards to support the growing wine industry. Suburban residential development approved by San Luis Obispo County frames the City on the southern and eastern edges, with lower density residential to the north and west of the City. Agricultural uses both north and south of the City eventually give way to the unincorporated communities of San Miguel and Templeton. See Figure 5-1 (Location Map) for a delineation of the study area for this plan.

The Paso Robles area is bordered on the south and west by the rugged mountainous ridges of the Santa Lucia Coastal Range, to the east by the low hills of the La Panza and Temblor Ranges, and to the north by the low hills and flat-topped mesas of the Diablo Range. The highest elevations in the vicinity are located in the Santa Lucia Coastal Range where many peaks are 2,000 to 3,400 feet above mean sea level (msl). The City's mean elevation is 720 feet above sea level. Substantial ridgelines are distributed throughout the western, southern, and eastern portions of the City. See Figure 5-1 for the major features within the study area. See Figure 5-2 for the soil types within the study area.

The topography within the City is mainly from nearly level interspersed with rolling hills and a few steeper escarpments. Several areas in the City, including the developed areas west of Highway 101, the Salinas River basin, and areas north of Highway 46 east, are characterized by relatively flat topography. The elevation of the Salinas River bed drops at a gentle gradient about nine feet per mile within the Paso Robles city limits. Topography immediately west of the riverbed is characterized by a gently sloping alluvial terrace rising to the gently rolling hillsides that comprise the area west of the City limits. Most of the downtown area and other areas west of the river have an average elevation of approximately 700 feet. In the hills to the west of the City, lands rise to an elevation of 1,300 feet. Land to the east of the Salinas River is characterized by low, undulating hills including relatively flat grassy plateaus, ridges, and steep oak tree-covered canyons and creek basins, and varies between 800 and 950 feet.

The City of Paso Robles is considered to be part of the Coast Range Physiographic Province. The Paso Robles area is exposed to seismic hazards from movement along several regional faults. The identified active fault zones in this area are the San Andreas (northeast of the City), Rinconada (south of the City), and Hosgri "Offshore Fault" (the Offshore Fault is seismically active, but available marine geophysical data indicate that future surface rupture is improbable along this fault). See Figure 6-2 (Fault Map).

The vegetation throughout the City is characteristic of Central California riverine valley habitats (see Figure 5-3), composed of oak woodlands, riparian vegetation along stream courses, grassland habitats, and agricultural lands (vineyards, orchards, and cultivated crops) that occur in a mosaic pattern across the landscape. There are also small wetland areas within the City, however they are too small to incorporate into the Vegetation Map. The non-native annual grassland vegetation comprises a large amount of the City area; approximately 1,580 acres (*City General Plan EIR, 2003*). The grassland vegetation is primarily a result of grazing activities that have occurred in the past. This habitat type is a naturalized community that has replaced previously existing native bunchgrass habitats and is now the most common vegetation type in the state of California. The riparian habitat along the Salinas River (defined as Freemont Cottonwood in Figure 5-3) is generally considered to be of high value because of the variety of flora and

fauna that occur in this habitat, their proximity to available water, and the cover and shade provided by the vegetation. The oak woodland habitat type (which also includes oak savanna) are generally located within grasslands and drainages and on alluvial terraces and floodplains. Oak woodland communities in the City are dominated by open to nearly closed canopies of blue oak (*Quercus douglasii*) with grass or shrub understories. The understory species composition can vary depending upon conditions such as moisture availability and soil type. Valley oaks also contribute to the oak woodlands along and near the City's drainages. Oak savanna habitats are composed of oak trees distributed far enough apart throughout a landscape so that the community lacks a closed canopy.

This natural setting of rolling hills, waterways and affiliated vegetation types forms a basis for the extent of impacts the potential hazards may have on the City. For example, steeper slopes and denser vegetation with multiple canopy layers pose a higher threat for wildfires than flatter areas with small amounts of vegetation (see Figures 6-17 and 6-18, Slope Model Map and Wildfire Hazard Areas).

5.2 CLIMATE

This portion of central western California generally has hot, dry summers and low rainfall. The Pacific Ocean is only about 25 miles west of the City, which exerts a moderating influence on seasonal temperature fluctuations and is negated somewhat by the mountainous terrain to the west.

The area is characterized by a Mediterranean climate with a wet season from October to early April and a dry summer season (low humidity). In general, most rainfall occurs in the range of hills and mountains nearest the coast (west) with a decreasing amount farther inland (east). In Paso Robles, the total annual precipitation is approximately 14 inches (see Figure 5-4). In winter, the average high temperatures range from the 50's to the 60's, with lows in the 30's. There are typically few winter nights when temperatures fall below freezing. In summer, the average daily highs are in the 90's, with some days exceeding 100. Summertime lows are typically in the 60's and 70's.

5.3 GOVERNMENT

The City of El Paso de Robles was organized, formed and incorporated under the laws of the State of California on March 11, 1889. It has a "Council-Manager" general law form of government where the City Manager is appointed by the City Council and is the Chief Executive Officer of the Municipal Corporation. The Council acts as the board of directors of the municipal corporation and meets in a public forum where citizens may participate in the governmental process.

The City Council consists of five members elected at-large, on a non-partisan basis. Residents elect the Mayor and four Council members, making each accountable to the entire citizenry. Council members serve four-year overlapping terms. The mayor is directly elected and serves a two-year term. The City Council establishes City policies, approves ordinances and resolutions, makes land use decisions, approves agreements and contracts, hears appeals on decisions made by City staff or advisory committees, and sets utility rates. The Mayor and City Council members receive a monthly stipend set by resolution.

The City Manager is the Chief Executive Officer of the City. The City Manager is appointed by the City Council to enforce city laws, to direct the operations of city government, to prepare and manage the municipal budget, and to implement the policies and programs initiated by the City Council. The City Manager is responsible to the City Council, and directs departments and operations.

The City Attorney is appointed by the City Council and works under contract to the City. The City Attorney is the legal advisor for the council. He or she provides general legal advice on all aspects of city business and represents the City in legal actions.

The Clerk is an elected official. The City Clerk is charged with responsibility of maintaining records of council actions, permanent records of all city transactions and documents, and coordinating the city's elections. The Deputy City Clerk is an appointed staff position that assists the City Clerk in carrying out all duties.

The City Treasurer is an elected position responsible for the custody and investment of all city funds. The City Treasurer is also responsible for administrating the City budget.

Boards, commissions and special committees composed of local citizens are frequently appointed by the City Council to advise the City Council in one or more aspects of city government. Typical advisory committees include Parks & Recreation, Streets and Utilities, Airport, Youth and Senior Citizens. The Planning Commission implements Council development and land use policy, and makes recommendations for policy revisions.

One of the major investments the City makes is the City's work force. City employees perform the day-to-day functions necessary to provide services to the community.

Department heads administer specific functions of city government and are responsible to the City Manager. Such positions are Public Works Director, Community Development Director, Library and Recreation Services Director, Administrative Services Director, Police and Fire Chiefs.

5.4 POPULATION

The City has seen sustained growth over the past decade (*2004 City of Paso Robles Economic Update*, UCSB Economic Forecast Project), as highlighted in Table 5-1, below. The current population of Paso Robles is 26,856 (California Department of Finance, January 2003). Between 1980 and 1990, the city grew from 9,200 to 18,600, at an average annual compounded rate of 7.3 percent. Since 1990, the City has grown at an average annual rate of 2.7 percent to approximately 27,000 in 2004.

The 2003 General Plan assumes continued steady population growth to 44,000 in the year 2025. Attaining that target would entail an average annual compounded growth rate of 2.3 percent between 2004 and 2025 or an average annual population growth of 800 persons in the same period.

TABLE 5-1
POPULATION, 1990-2025

Jurisdiction	1990	2000	2004	2010	2020	2025
Paso Robles	19,000	24,000	27,000	32,000	40,000	44,000

Source: City of Paso Robles General Plan Update 2004 / US Census 2000 / State Department of Finance 2001-2002. These numbers are rounded, and therefore, are approximations.

Table 5-2 shows the population breakdown vulnerable to potential hazards within the City (based on 2000 Census data). These numbers are the officially recorded population summary of the US Census Bureau, and are meant to demonstrate how the general composition of the City's people (children versus the elderly), merely for perspective. The total amount of population within the City is considered "vulnerable."

TABLE 5-2
POPULATIONS POTENTIALLY VULNERABLE TO HAZARDS, 2000

Jurisdiction	Population			Households	
	Total	<19 years	65+ years	Total	Median Household Income
Paso Robles	24,297	7,240	3,262	8,556	39,217

Source: US Census Bureau.

5.5 ECONOMY

The City of Paso Robles did not share in the recent national recession (2001). Unemployment has been remarkably low and job creation has been steady over the past decade. The forecast is that the economy of this area will continue to grow and create jobs, limited only by the availability of labor and affordable housing (*2004 City of Paso Robles Economic Update*, UCSB Economic Forecast Project). Table 5-3 displays the City's employment by industry.

TABLE 5-3
TOTAL EMPLOYMENT BY INDUSTRIAL DIVISION, 2003

Sector										
Agric.	Mining	Const.	Manuf.	TCPU	Whole. Trade	Retail Trade	FIRE	Services	Gov.	Total
1,270	N/A	850	2,360	240	450	2,690	370	1,490	1,170	10,890

Note: TCPU = Transportation, Communications and Public Utilities. FIRE = Finance, Insurance and Real Estate. Gov. = Local government and public schools.

Source: City of Paso Robles, California State Employment Development Department.

The City of Paso Robles has seen sustained economical growth since 1993. This is the longest run of uninterrupted real (inflation adjusted) growth for a municipality in the Tri-Counties area (San Luis Obispo, Santa Barbara and Ventura). The average growth during the 1997 to 2000 time frame was an extraordinary 10.6 percent. The data for 2004 indicate a bit of a slowdown but growth nevertheless (2004 *City Economic Update*, UCSB Economic Forecast Project).

The Paso Robles economy has a concentration of activity in the manufacturing sector that many communities in the Tri-Counties do not have. The City is one of the few areas in the region where manufacturing still accounts for a sizable fraction of employment. In 2001, manufacturing was 23.2 percent of the economy in Paso Robles. By comparison, manufacturing in San Luis Obispo County as a whole is approximately 8.0 percent.

As with economic growth, job growth has been relatively persistent in the City of Paso Robles. Based on data for 2001, an estimated 5,200 jobs have been created since 1992. Employment growth slowed from 3.5 percent in 2002 to negative 0.8 percent in 2003. However the *Economic Update* forecasts a quick return to growth, 2.0 percent in 2004 and 2.3 percent in 2005. The Paso Robles area average salary growth increased from 1.2 in 2002 to 3.3 in 2003. Growth of 3.1 percent is forecasted for 2004, and 3.6 percent growth in 2005.

In 2000 and 2001, the real (inflation adjusted) median home price in the City of Paso Robles rose into the double digits. During 2001, the increase was 17.2 percent to $214,000. This implies just over 20.0 percent in nominal or money terms. Real median home prices rose 14.0 percent in 2002 and 17.6 percent in 2003. This rapid growth is being fueled in part by demand for affordable housing. For example, workers from the City of San Luis Obispo who cannot or choose not to afford the more expensive housing there are commuting to the North San Luis County area, including Paso Robles. Also, Paso Robles is building a large quantity of new homes. The City, with a base of 10.0 percent of the County's population, built 21.0 percent of the County's new homes in 2001.

According to the UCSB Economic Forecast Project, the Median price of homes in Paso Robles was about $302,000 in 2003 and about $354,000 in 2004.

Commercial land uses are located primarily in downtown Paso Robles, on Niblick Road, west of South River Road, and along the west side of Theatre Drive, south of Highway 46 West. Industrial land uses are located primarily in the Commerce Industrial Park (at Sherwood Road and Commerce Way), at the Airport, in the area centered on the intersection of Highway 46 East and Golden Hill road, and on Ramada Drive, north of Highway 46 West. Presently there are two major commercial centers recently developed which house Wal-Mart, Target, Big 5 Sporting Goods, J.C. Penney's and Staples, to name a few. The construction of a multiplex theater complex designed to house nine screens has been completed, as well as a multi-modal transportation center which serves Amtrak, regional bus systems, local fixed-route transit, and City dial-a-ride services. Paso Robles also has a City-owned airport, located at Highway 46 East and Airport Road (just east off Highway 101), which consists of 1,231 City-owned acres and is classified as a General Aviation-Transport Airport.

Paso Robles is also more recently known as one of the fastest growing vineyard and winery regions in California. With over 60 wineries and almost 24,000 acres of wine grapes planted in the "Pass of Oaks"--the literal Spanish translation of the town originally named Paso de Robles—the Paso Robles American Viticultural Area (AVA), includes over 650,000 acres. As the leading agricultural business in the county, the area's wine industry attracts more than half a million visitors to San Luis Obispo County annually. Paso Robles winery and festival visitors contribute a large share to its estimated $130 million spent in annual wine sales - most of which is generated from outside the County. This has helped the economy enjoy approximately $25 million annually in gross lodging, retail sales, and services.

5.6 INFRASTRUCTURE AND SERVICES

The City maintains many facilities, from parks to the airport to City Hall. Figures 5-5 (City-Owned facilities) and 5-7 (Critical Facilities) show the locations of each of these facilities and Table 5-4 below provides a description of each facility including the general use, year built, square footage, and building material. Table 5-4 is not an exhaustive list of City-owned facilities, but merely a list of the major (i.e., "critical") facilities that provide essential services. Therefore, museums, libraries, and/or recreational facilities are not included. Furthermore, facilities that may be located within the City boundary but are not owned specifically by the City are not included (i.e., the state-owned fairgrounds).

Table 5-5 below describes the City's critical facilities and infrastructure throughout the study area (how many there are and the overall estimated values) and Figure 5-7 shows their locations. The utilities infrastructure in the City includes water provision, and wastewater collection and treatment. The public services infrastructure in the City include the fire protection and emergency services, police protection, public schools, the municipal airport, and solid waste collection and disposal.

The estimated average values for these facilities were mainly derived from HAZUS-MH, a natural hazard loss-estimation program developed by FEMA. It is assumed that the HAZUS-MH estimated values for facilities are generally determined by classifying each census tract into one of an unknown number of census tract types and each

type of census tract is assigned a value for each of the critical facility types. This methodology for estimating facility values has been questioned and yet to be confirmed by the FEMA headquarters (URS Corporation, October 2004).

TABLE 5-4
CITY-OWNED FACILITIES

Name / Address	Description / Function	Year Built	Building Material	Building Size (Sq. Ft.)
City Hall/Library 1000 Spring Street	Offices and Library	1995	Steel frame/ stucco/ brick	Library/City Hall 28,686
Senior Center Scott Street	Senior recreation and life enhancing programs	2002	Wood frame and stucco	5,375
Veteran's Center Scott Street	Veteran's recreation and life enhancing programs	2002	Wood frame and stucco	3,780
Centennial Park buildings, Activity Center and Gym 600 Nickerson Drive	Sports and leisure activities and programs	1989	Gym – Concrete tilt up Activity Center – Wood frame/ stucco	32,889
Airport Terminal building, 4900 Wing Way	Food service, aviation services, offices	2001	Wood Frame and Block	6,700
Public Safety Center 10th/Park Street	Police and Fire station offices	2003	Wood Frame and Block	40,715
North County Transportation Center, Pine Street	Transit services	1999	Wood Frame/ stucco/ block	2,890
Maintenance Building(s), 625 Riverside	Equipment and vehicle storage and maintenance		Metal	4,500 2,639 1,000
Water Yard, 1240 Paso Robles Street	Water equipment		Unreinforced masonry (1 or 2 buildings); Quonset hut	3 buildings
Wastewater Treatment Plant, 3200 Sulphur Springs Rd	Wastewater treatment plant	1954 * 1970 ** 1989 ***		
Fire Station #2, 235 Santa Fe Avenue	Fire Station	1960	Metal	3,500
Airport Fire Station, 3125 Buena Vista Rd	Fire Station	1983	Metal	2,400
Golden Hill Reservoir	Reservoirs			
West Side Reservoir	Reservoirs			

Source: City of Paso Robles

* Original construction of treatment plant

** Expansion #1 of treatment plant

*** Expansion #2 of treatment plant

TABLE 5-5
CRITICAL BUILDINGS, FACILITIES AND INFRASTRUCTURE BY TYPE AND ESTIMATED VALUE, 2000

		No. of Facilities	Estimated Average Value of Facilities
Essential Facilities	Police Stations	1	$1,652,000
	Fire Stations / Emergency Operations Centers	3	$472,925
	Schools	19	$3,883,540
Transportation Systems	Airways - Airports	1	$6,431,000
	Railways - Trackage, Tunnels, Bridges, Rail Yards, Depots	1	$7,425,00
	Highways	2	$35,422,230
	Bridges	4	$8,184,133
Lifeline Utility Systems	Wastewater	1	$39,377,400
	Sewer	1	$519,961
	Reservoirs	3	$2,469,182
Total Critical Facilities		36	N/A

Source: City of Paso Robles (facilities) and FEMA HAZUS-MH (estimated values)

Fire prevention and suppression services are provided by the City of Paso Robles Department of Emergency Services (PRDES), a fire and emergency service organization. PRDES provides fire suppression, emergency medical care, hazardous materials emergency intervention and control, water rescue, entrapment extrication, fire safety inspections of businesses, public fire safety education, fire investigation, and disaster management and planning. PRDES operates from three fire stations located within the City.

The Insurance Service Office (ISO), a national rating service sponsored by fire insurance carriers to measure fire fighting capability to reduce structural fire losses, provides rankings of fire fighting capability on a scale of 1-10 with 1 being best level of service and 10 being no service at all. The ISO assigned the Paso Robles community a class 5 rating for property within 1,000 feet of a fire hydrant and a class 9 rating for all other property.

The Paso Robles Police Department (PRPD) provides law enforcement services for the City. According to PRPD, the department is adequately staffed (approximately 40 officers) to serve the entire population of Paso Robles at a ratio of 1.4 to 1.6 officers per 1,000 residents.

The Paso Robles Joint Unified School District (PRJUSD) serves grades K-12, and is the only public school system with facilities within the City. In addition to the PRJUSD, there are several private/parochial schools that serve the City's residents. All sites currently operate on a September-through-June schedule. The current student enrollment in the PRJUSD is approximately 7,000 students. The average increase in student population/enrollment is approximately 2% per year (Paso Robles Joint Unified School District, Business Services Department. *Long-Range Facility Master Plan K-12, 1999-2023*).

The City administers operates water production, storage and conveyance services, including wells and reservoirs, through its own municipal system, known as the City of Paso Robles Water Division, which serves all users within the

City limits. The City derives its water from two sources, the Salinas River Alluvial flow and the Paso Robles Groundwater Basin, which is a regional aquifer. In the Paso Robles area, the two sources are replenished primarily from uncontrolled runoff originating from several major and minor stream tributaries of the Salinas River, from wastewater treatment plant discharge of effluent into the Salinas River, and to a lesser extent, direct infiltration from precipitation and irrigation.

The City relies on groundwater for 100 percent of its water supply. Groundwater from the Paso Robles Ground Water Basin and from Salinas River underflow is currently the sole supply of water to the City. City wells furnish nearly all of the water supply for urban use, and a limited number of private wells serve agricultural uses within the city limits. The City has annual rights to eight cubic feet per second from the wells situated adjacent to the Salinas River. Water stored in reservoirs is used to provide water to the City during peak demand periods. Storage also serves as an emergency source of water for firefighting and periods when pumping facilities are out of service. The City has three reservoirs.

Concurrent with the preparation of this Local Hazard Mitigation Plan, the County of San Luis Obispo prepared a draft updated Paso Robles Groundwater Basin Study. This document should be consulted for the most current information on groundwater supply and will be used in the next update to this Local Hazard Mitigation Plan.

There is the potential for water from Lake Nacimiento to be used for the City. It is assumed that groundwater (underflow and basin groundwater) would remain as the sole source of supply until 2010, when 9,345 Acre Feet per Year (AFY) of water supply would be needed. Lake Nacimiento water would supply 4,000 AFY and the remaining 5,345 AFY of this demand would be satisfied through the City's Salinas River underflow supply and basin wells. By 2010 when Nacimiento water becomes available, excess groundwater production capacity would exist (*San Luis Obispo Local Agency Formation Commission*).

The City is in the process of managing the water shortage problem caused by the earthquake damage to one of their four million gallon storage tanks. A water conservation program that calls for a 25 percent reduction in water use by residents is being implemented. The water system is being closely monitored and high water users are being targeted for conservation measures.

The City has recently upgraded specific water system infrastructure components throughout the City. The City has substantially improved the water system network, boosters, and storage throughout the City. The downtown area 4" main lines have been upgraded with a minimum of 8" lines on numerous streets to increase fire flow capabilities. Water distribution mains have also been installed throughout the eastern portions of the City.

The City owns and operates wastewater collection and disposal services for residential, commercial, and industrial facilities within the City's limits, the airport area, and the Templeton Community Services District (TCSD). The sewage collection system consists of approximately 102 miles of public sewer mains ranging in size from 4 inches to 27 inches in diameter. In addition, the City maintains 13 lift stations, ranging in capacity from 100 to 4,900 gallons per minute (gpm). The City's Public Works Department operates and maintains the City's wastewater treatment plant, where all City wastewater is pumped into the plant and treated by the secondary trickling filtration method. Ultimately, the treated wastewater effluent is discharged into the Salinas River, and dried solids are used at the City Landfill as vegetative cover.

The major transportation routes (considered to be "critical infrastructure") through the City are US Route 101 (extends north/south) and Highway 46 (extends east/west). Spring Street runs parallel to US Route 101 and is considered the main downtown corridor. Niblick Road and Creston Road are east of US Route 101, and these two major corridors provide transportation through the eastern residential and commercial areas of the City. The Union Pacific Railroad also traverses through the City (parallel to US Route 101), and the City harbors its own airport, in the northeast corner of the City boundary.

5.7 PLANNING AND DEVELOPMENT

Table 5-6 gives a general summary of the City's vulnerability to loss in terms of the critical facilities, residential parcels and nonresidential parcels. The values for the parcels were determined by averaging improvement values throughout the City. Parcels that didn't have an assigned improvement value were calculated by estimating the value per square foot ($10.99) for each land use category (commercial, residential, etc.). This average value (per square foot) was then used for the parcels without an assigned improvement value. Figure 5-8 shows the General Plan Land Use Map for the City. Expected future development is shown in Figure 5-10 and described in Table 5-7.

Of the facilities described in Table 5-6 some are unreinforced masonry structures. Unreinforced masonry buildings can be a serious threat to residents during an earthquake, as they tend to collapse or portions of the buildings tend to break free of the rest of the building. The remaining unreinforced masonry structures within the City are shown on Figure 5-9. A list of commercial unreinforced masonry buildings has been attached as Appendix F.

TABLE 5-6
BUILDINGS BY TYPE AND ESTIMATED IMPROVEMENT VALUE, 2004
CITY OF PASO ROBLES

Critical Facilities			Residential Parcels			Nonresidential Parcels		
No.	Avg. Value of all facilities ($ million)	Total Value of individual facilities ($ million)	No.	Avg. Value of parcels ($ million)	Total Value of individual parcels ($ million)	No.	Avg. Value of parcels ($ million)	Total Value of individual parcels ($ million)
36	6.7	241.6	8,831	1.0	8,977.6	1,120	0.4	438.7

Source: City of Paso Robles, 2004.

TABLE 5-7
FUTURE DEVELOPMENT AREAS

Development Area	Description of Potential/Planned Buildout
C1	This is the Chandler Ranch area, for which a Specific Plan is currently being prepared. The 837-acre site contains various land use designations, although it is predominantly designated RS- Residential Suburban (1 du/2.5 ac), with other areas designated RSF-2 (Residential Single Family). The land is designated by the Natural Resources Conservation Service Farmland Mapping and Monitoring Program (FMMP) as Grazing Land (approximately 350 acres), Farmland of Local Importance (approximately 350 acres), and Farmland of Local Potential (approximately 100 acres). The site is currently used as rangeland, with oak woodlands. Depending upon what is ultimately approved via a Specific Plan for the site, Area C1 has the potential to result in the loss of the above-stated acres of agricultural-related land.
C2	This area is known as the Hanson property and comprises 11.0 acres. It is currently designated RSF with an existing build out potential of 33 units. The proposed General Plan Update would redesignate this area as RSF-4 on the two level acres adjacent to S. River Road, and RSF-6 on the remainder of the site, resulting in a build out potential of 47 units.
C3	Area C3 is comprised of 5.5 acres on the east side of River Road, north of Niblick Road near the river. It is currently designated RSF with a buildout potential of 20 units. With the proposed project, it would be designated RMF-12 with a buildout potential of 50 units.
C4	This area is referred to as Subarea D, Borkey Area Specific Plan off Highway 46 East. It is comprised of 13.07 acres currently designated RSF-1 with a buildout potential of 12 units. With the proposed project, it would be designated RMF-12 with a buildout potential of 122 units.
C5	This would redesignate the existing RMF-H site that is currently 12 acres in size and undeveloped to RMF-20, thereby increasing the buildout potential from 16 units per acre to 20 units per acre.
C6	This is the Mixed-Use Overlay, which would apply to areas designated for Community Commercial (CC) or Commercial Service (CS) use in the portion of downtown bounded by 24th Street, Vine Street, 1st Street, and Riverside Street. With this overlay district, vacant lands in the Downtown area with these commercial designations could be developed with multi-family residential uses, and multi-family residential units could be established on second stories above existing commercial or office uses. Approximately 319 additional housing units could be created within this area, assuming 20% of the Overlay area is used for residential, at 75% of the potential maximum density of 20 du/acre.
C7	In Area C-7, the project would create a Salinas River (SR) Overlay for properties along the Salinas River in the river corridor. Standards would be developed to address conservation, access and recreation. This action of the proposed project would serve to reduce potential land use conflicts between the recreational uses and conservation goals of the river, and the adjacent urban uses.
C8	This area would allow second units in RSF 1-4 designations, resulting in an additional 305 units, using the assumption that 5% of all such designated parcels in the City would utilize this provision.
C9	This planning area is for the Purple Belt Policy. The proposed General Plan would not, at this time, establish the boundaries of the belt, but would establish a policy to study and determine the boundaries of a purple belt and a process through which the City could purchase of development rights in the purple belt area. The General Plan Update includes Policy LU-1E, (Emphasis of Urban Edge), which states, “Arrange land uses, evaluate development design, and protect resources to emphasize a distinct urban edge between the City and surrounding rural areas, open space and agriculture.” This policy is intended to create a distinct urban edge, which could result in an inadequate buffer between agricultural uses and urban uses.

TABLE 5-7 (CONTINUED)
FUTURE DEVELOPMENT AREAS

Development Area	Description of Potential/Planned Buildout
C10	This would, on a citywide basis, change RSF to RSF-4, thereby making the RSF designation consistent with the terms used for RSF-1, RSF-2 and RSF-3.
C11	This would, on a citywide basis, create the RSF-6 land use designation to accommodate single-family residences up to 6 units per acre (4,000 sf lots similar to Sierra Bonita, etc).
C12	This would be a Senior Housing Overlay that would provide for senior housing subject to specific design and construction standards. The Overlay would be applied to the area south of Highway 101, west of the Railroad, north of 24th Street, and east of Oak Street.
C13	This would be an Employee Housing Overlay that would be applied citywide that would allow the opportunity for employers to provide workforce housing onsite. To date, the City has a commitment for such housing totaling 45 units.
C14	This is the Sherwood Acres North site, consisting of 12.5 acres designated RSF, with a buildout potential of 38 units. With the proposed project, it would be designated RMF-8 with a buildout potential of 75 units.
C15	This area is no longer a component of the proposed General Plan Update.
C16	This area is the Mixed-Use Overlay for the area designated RC/NC, located south of Niblick Road. This overlay would result in a total of 110 housing units.
C17	This area is referred to as the Pankey property, which is 5.0 acres in size and designated OP, with a buildout potential of no residential units, although office would be able to be constructed. With the proposed project, this site would be designated RMF-20 with a buildout potential of 75 units. This would provide a transition from the RSF properties fronting Rolling Hills Road and the RMF properties fronting Creston Road, west of the subject properties.
C18	This would be a Historical and Architectural Preservation Overlay District on the Westside.
C19	This area comprises 9.5 acres north of Meadowlark, and is currently designated RSF-2 with a buildout potential of 14 units. The existing land use is rural, and this area is directly north of Planning Areas E1 and E2. With the proposed project, Area C-19 would be designated RMF-3 with a buildout potential of 21 units.

Source: City of Paso Robles General Plan, *Land Use Element*, 2003

6.0 RISK ASSESSMENT

The purpose of this section is to identify the hazards that can affect the City of Paso Robles, profile the major hazards, assess the risk of such hazards, describe the City's vulnerability, and estimate potential losses from the hazards. Each of these tasks is described in detail below. It is notable that this is the first time that a comprehensive effort of this kind has been undertaken for the City.

Information is provided here on the City of Paso Robles and, when appropriate, San Luis Obispo County. This integrated information-gathering method was employed because many hazard events are likely to affect numerous jurisdictions within such a consolidated urban area. However, evaluation of hazard event scenarios is complicated because information is not always available at the jurisdictional level for many hazards and may only be available at the county or state level. Because of this inconsistency, hazard and community information has been provided at the most localized level possible.

6.1 DMA 2000 REQUIREMENTS

The overall requirements for the risk assessment according to *DMA 2000* are shown in Table 6-1 and detailed further in subsequent tables. While technically only natural hazards must be addressed, most human-caused hazards are included in this plan in at least a preliminary manner. In order to meet these requirements, the City of Paso Robles used the step-wise approach to the risk assessment detailed in *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA 2001). This approach consists of the following major steps:

- Identify and screen hazards
- Profile hazards
- Inventory assets
- Estimate losses
- Identify future risks

TABLE 6-1
DMA 2000 REQUIREMENTS – RISK ASSESSMENT – OVERALL

RISK ASSESSMENT: *§201.6(c)(2): The plan* ***shall*** *include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

Source: FEMA, March 2004.

6.2 IDENTIFY AND SCREEN HAZARDS

The first step in the risk assessment process is the identification and screening of hazards, as shown in Table 6-2. Hazards identified include natural and human-caused hazards that might affect persons and property in the City of Paso Robles. This includes hazards that have occurred in the past as well as those that may occur in the future (even if they have not yet occurred). The list of all possible hazards is screened to focus on the most likely or most damaging hazards.

TABLE 6-2
DMA 2000 REQUIREMENTS – RISK ASSESSMENT – IDENTIFYING HAZARDS

Identifying Hazards	
Requirement §201.6(c)(2)(i): [The risk assessment ***shall*** *include a] description of the type … of all natural hazards that can affect the jurisdiction.*	
Element	
A.	Does the plan include a description of the types of all natural hazards that affect the jurisdiction? If the hazard identification omits (without explanation) any hazards commonly recognized as threats to the jurisdiction, this part of the plan cannot receive a Satisfactory score. Consult with the State Hazard Mitigation Officer to identify applicable hazards that may occur in the planning area.

Source: FEMA, March 2004.

At the first meeting of the Paso Robles Hazard Mitigation Planning Team (in June, 2004), a comprehensive list of potential hazards affecting communities in California was reviewed. The hazards considered for identification and screening are shown in Table 6-3. The hazards on the list were evaluated and screened by the team for profiling and vulnerability assessment. This hazard list was developed by URS and the HMPT based on hazards known to affect the region. The "why or why not?" column in Table 6-3 briefly explains why each hazard was (or was not) chosen for profiling in this Plan. In making screening decisions, the Team considered a range of factors, including the following:

- Prior knowledge or perception of the relative risk presented by the hazards
- The ability to mitigate the hazard
- The known or expected availability of information on the hazard

6.3 HAZARD PROFILES

The DMA 2000 requirements for profiling the hazards are shown in Table 6-4. The intention is to present significant information on the location, extent (magnitude/severity), history, and probability of the hazards.

It is important for a community's risk mitigation and preparedness efforts to be founded on accurate information about the types and scale of damage that hazards could cause to the community. This section contains a description of the major hazards that threaten Paso Robles – drought, earthquakes, expansive soils, extreme heat, floods, hazardous materials accidents, landslides, subsidence and wildfires – and the exposure and vulnerability of elements of the City to these hazards. It presents descriptions of potential damage and consequences.

The best available data and technical methods were used to estimate possible losses caused by these various hazards. City and County databases, which include information about building types, natural features, and important property uses, were extensively used to characterize the city's hazards. HAZUS-MH, a natural hazard loss-estimation program developed by FEMA, was also used to estimate the values of some critical facilities and infrastructure in the City.

The City of Paso Robles is exposed to a number of natural hazards that vary in their potential intensity and impact on the City. This mitigation plan assesses the City's vulnerability to these hazards, which were selected because of their likelihood of occurrence and potential consequences. These hazards are of great concern because they can occur independently, or in combinations, and can trigger secondary hazards.

TABLE 6-3
HAZARD IDENTIFICATION AND SCREENING FOR PASO ROBLES

Hazard	Include?	Why or why not?	Other Comments
Avalanche	No	City not located in snow and mountain area.	
Airplane Crash	No	No experience / low probability.	
Coastal Erosion	No	City not located on coast.	
Coastal Storm	No	City not located on coast.	
Dam Failure	No	Failure of San Luis Dam on Santa Margarita Lake will not affect City.	City's General Plan confirms that the City is outside of the Dam's inundation zone
Disease	No	No experience / low probability.	
Drought	Yes	Water storage and supply currently affected by drought conditions.	Could also affect ability to fight fires
Earthquake (Seismic)	Yes	Recent and historic earthquakes. Proximity to San Andreas fault.	Major historic earthquakes include 1983 Coalinga, 2003 San Simeon (Presidential disaster declaration), 2004 Parkfield
Expansive Soils	Yes	Currently affects some City areas.	
Extreme Heat	Yes	Historic events experienced by City.	110 degrees plus experienced
Flood	Yes	Historic events experienced by City.	Major historic floods include 1969 100-year flood, 1995 flood/landslide
Hailstorm	No	Low experience / low probability	
Hazardous (Hazmat)	Yes	Hazmat facilities located within and near City. Major hazmat transportation routes transect City.	
Hurricane	No	No experience / low probability	
Land Subsidence	Yes	Experienced following earthquakes.	
Landslide	Yes	Experienced following heavy rains.	1995 flood/landslide
Tornado	No	No experience / low probability.	
Tsunami	No	City not located on coast.	
Volcano	No	City not located near volcanic area.	
Wildfire	Yes	Historic events experienced by City.	

TABLE 6-3 (CONTINUED)
HAZARD IDENTIFICATION AND SCREENING FOR PASO ROBLES

Hazard	Include?	Why or why not?	Other Comments
Windstorm	No	No significant historic events experienced by City.	
Winter Storm	No	No significant historic events experience by City	

Source: Paso Robles Hazard Mitigation Team, URS, June 2004.

TABLE 6-4
DMA 2000 REQUIREMENTS – RISK ASSESSMENT – PROFILING HAZARDS

Profiling Hazards
Requirement §201.6(c)(2)(i): [The risk assessment **shall** *include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan* **shall** *include information on previous occurrences of hazard events and on the probability of future hazard events.*
Element
A. Does the risk assessment identify the **location** (i.e., geographic area affected) of each natural hazard addressed in the plan?
B. Does the risk assessment identify the **extent** (i.e., magnitude or severity) of each hazard addressed in the plan?
C. Does the plan provide information on **previous occurrences** of each hazard addressed in the plan?
D. Does the plan include the **probability of future events** (i.e., chance of occurrence) for each hazard addressed in the plan?

Source: FEMA, March 2004.

The natural hazards included in this plan were identified through a community-based process just a few months after the San Simeon earthquake in December 2003, when the awareness of the potential for natural hazards was heightened.

The worst potential disaster that Paso Robles could face involves multiple hazards occurring at the same time. A major earthquake could trigger significant landslides, spark wildfires and release hazardous materials. If an earthquake occurred during the rainy winter season, landslides would be worsened and flooding could occur, exacerbated by damaged stream culverts and storm drains. The City's fire chief and council members recently updated and revised their *Multi Hazard Emergency Response Plan* (Fall 2003) as well as the appendices of the plan, which specifically address response procedures for storms and floods, earthquakes, fires, multi-casualties, hazardous materials incidents, and terrorist attacks.

The specific hazards selected by the City for profiling have been examined in a methodical manner based on the following three factors, with each factor considered in detail for the hazards profiled:

- **Nature**: This topic provides basic information about the hazard that is sufficient to enable a user of the plan to comprehend its nature and distinguish it from other hazards. It also provides a basis for leaders to understand the subsequent vulnerability assessment and loss estimates. The information for this section is drawn mainly from FEMA and other national agencies.

- History: Background information about previous occurrences of the hazard is provided. The focus is on disasters and other events that have occurred in Paso Robles and, where Paso Robles information is lacking, on major occurrences elsewhere in San Luis Obispo County, California or the United States. The information in this section is drawn mainly from databases of historical hazard events. Figures that display historical occurrences of the hazards in the City are referenced, where available.
- Future Events: The focus of this topic is the probability of the hazard as well its magnitude. The information in this section is drawn from a combination of FEMA and other national sources, San Luis Obispo County expertise, and the hazard event databases. Where possible, figures have been produced to display the susceptibility of areas to the hazards.

In an effort to provide as much information as possible about each hazard, extensive text analysis as well as associated tables and graphics have been included for each of the hazard profiles below. These hazard profiles should be considered introductory, with additional and more detailed analysis available via the many sources cited below and at the end of this document.

6.3.1 Drought

6.3.1.1 Nature

Drought is different from normal aridity, which is a permanent characteristic of the climate in areas of low rainfall. Drought is the result of a natural decline in the expected precipitation over an extended period of time, typically one or more seasons in length. Drought may occur in any climate, including in areas of normally high or low rainfall. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity (FEMA, 1997).

Drought is a complex natural hazard that is reflected in the following four definitions commonly used to describe it:

- Meteorological drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Hydrological drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Agricultural drought is defined principally in terms of soil moisture deficiencies relative to water demands of plant life, usually crops.
- Socioeconomic drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. This may also be called a water management drought.

A drought's severity depends on numerous factors, including duration, intensity, and geographic extent as well as regional water supply demands by humans and vegetation. Due to its multi-dimensional nature, drought is difficult to define in exact terms and poses difficulties in terms of comprehensive risk assessments.

Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments.

Droughts may cause a shortage of water for human and industrial consumption, hydroelectric power, recreation, and navigation. Water quality may also decline and the number and severity of wildland fires may increase. Severe droughts may result in the loss of agricultural crops and forest products, undernourished wildlife and livestock, lower land values, and raise unemployment.

6.3.1.2 History

During the 20th century, nine notable droughts have occurred in the United States. While damage estimates are not available for most, estimates suggest that the Great Plains Drought of the 1930's, precipitating the Oklahoma Dust Bowl, and lasting approximately a decade, cost $475 million in federal funds. However, not figured into this cost is the loss of at least five inches of topsoil from nearly 10 million acres and by 1938 nearly ten percent of the State of Oklahoma's population had left. In 1976-1977 drought again hit the Great Plains, the Upper Midwest, and the far western portion of the United States causing direct losses of $10-15 billion. Furthermore, the drought in the Central and Eastern States during 1987-89 caused an estimated $39 billion in damages (FEMA, 1997, Oklahoma Department of Libraries, State of Oklahoma History and Culture).

Droughts in California typically occur gradually over several years. The driest single year of California's measured hydrologic record was in 1977. California's most recent multi-year drought was 1987-92 although severe droughts have also occurred in 1929-1934 and 1976-1977 (DWR, 2004). However, California is currently in its fifth year of below-average rainfall conditions (NCDC, 2004).

The average annual precipitation in the City of Paso Robles (calculated over a period of three decades; 1961-1990) has only been 10-14 inches per year (see Figure 5-4, San Luis Obispo Precipitation). This reflects a relatively dry recent history in regards to rainfall, especially in comparison to the nearby cities of Atascadero and San Luis Obispo, which average anywhere from 16 to 20 inches per year.

6.3.1.3 Future Events

No commonly accepted approach exists to assessing risks associated with drought. The Palmer Drought Severity Index (PSDI) is a commonly used index that measures the severity of drought for agriculture and water resource management. It is calculated from observed temperature and precipitation values and estimates soil moisture. However, the Palmer Index is not considered to be consistent enough to characterize the risk of drought on a nationwide basis (FEMA, 1997).

The principal objective of the *National Study of Water Management During Drought* was to develop strategies for improving water management to reduce the nation's vulnerability to drought (USACE, September 1995). An outcome of this study was the *National Drought Atlas*, which was managed by the United States Army Corps of Engineers and was the first nationwide study of drought frequency. The *Atlas* provides a useful tool for answering questions about the likely duration, timing, and severity of drought in a region (Willeke et al, 1994). It is based on precipitation, stream flow, and Palmer Drought Severity Index data from 1,119 sites (grouped into 111 regions) in the National Climate Data Center's Historical Climate Network (with an average record length of 85 years).

While there is no commonly accepted return period or non-exceedance probability for defining the risk from hydrological drought (such as the 100-year or 1 percent annual chance of flood), as noted above, the *National Drought Atlas* can be used to answer questions on drought at the regional level (FEMA, 1997). The estimated mean stream flow in Paso Robles during the dry season (July-to-January) is normally (95% of the time) less than 0.1 feet^3/second/mile^2, which is the lowest measure of stream flow calculated by the U.S. Army Corps of Engineers for national hydrologic studies (see Figure 6-1, Hydrologic Drought Map). The map indicates that the City of Paso Robles will be subject to a drought every twenty years in which mean stream flows are 0.1 cubic feet per second per square mile or less. The recent history of very low rainfall and mean stream flow reflects the City's high potential for drought.

When attempting to evaluate the probability and magnitude of drought in San Luis Obispo County, it is helpful to remember that potable water in Paso Robles is derived from the Salinas River alluvial flow and the Paso Robles Ground Water Basin (PRGB), which is a regional aquifer. A drought's greatest impact will be on the City's water supply. In the Paso Robles area, the two sources are replenished primarily from uncontrolled runoff originating from several major and minor stream tributaries of the Salinas River, from wastewater treatment plant discharge of effluent into the Salinas River, and to a lesser extent, direct infiltration from precipitation and irrigation. The State allocates 8 cubic feet of water per second from the Salinas River to the City of Paso Robles. Wells furnish nearly all of the water supply for urban use, and a limited number of private wells serve agricultural uses within the city limits. The City owns 14 active wells and one standby well. The 14 active wells combined generate an average of 11 million gallons per day (*Paso Robles General Plan, 2003*).

Water stored in reservoirs is used to provide water to the City during peak demand periods. Storage also serves as an emergency source of water for firefighting and periods when pumping facilities are out of service. The City has one reservoir and three holding tanks, as follows: the 4 million gallon West Side Reservoir, located on 21st Street; two 4 million gallon tanks, located on the east side of town; and a 150,000 gallon tank, which is known as the West Side Pressure Zone (*Paso Robles General Plan, 2003*).

An evaluation of the PRGB aquifer storage, water quality, and hydrologic budget, titled the *Paso Robles Groundwater Basin Study*, was conducted by Fugro West Inc. and Cleath and Associates in 2002. According to this study, the sum of all components of outflow from the PRGB exceeded the sum of all the components of inflow by an estimated 2,700 acre-feet per year (AFY) between 1980 and 1997. Total net groundwater pumpage in the basin declined steadily from 1984 through 1998. However, groundwater production data since 1998 shows that groundwater pumpage may again be increasing. Pumpage in 2000 was higher than at any previous time since 1992. It should also be noted that groundwater pumpage exceeded the perennial yield from the start of the base period in 1980 through 1990. Depending on new trends or pressures in the agricultural industry, it is likely that basin pumpage will approach or exceed the perennial yield in the near future. The *San Luis Obispo County Master Water Plan Update* projects future water demands for the area to be 120,620 AFY by the year 2020, which suggests that future water demands may soon exceed the 94,000 AFY perennial yield of the basin (*Paso Robles General Plan, 2003*).

The population of the City will continue to grow. To mitigate for potential overdraft of the aquifer in the future, supplementary water supplies and groundwater recharge systems will be needed to put more water into the aquifer. Recycling water by using stored rainwater, reclaimed water, or water reuse for irrigation will reduce the need for groundwater pumping. Water conservation efforts will further reduce the water demand for the City of Paso Robles (*Paso Robles General Plan, 2003*).

It is notable that temperatures in the Western U.S. rose 2-5°F during the 20th century. While this increase was accompanied by precipitation increases of up to 50 percent in some areas of the West, some places have become drier and experienced more droughts. Figure 6-8 (Summer Heat Severity) displays that the City of Paso Robles' "summer heat index" (extreme summer weather based on the NWS heat index) is 100-105°F. The two major climate change models, the Canadian Model and the Hadley Model, both forecast continued temperature increases in the West of 5-11°F during the 21st century. However, both models also forecast significant increases in rainfall in much of the West. These increases may lead to elevated water supplies, although current reservoir systems may be inadequate to control earlier spring runoff and to maintain supplies for the summer (National Assessment Synthesis Team, May 2001).

6.3.2 Earthquake

6.3.2.1 Nature

An earthquake is "…a sudden motion or trembling caused by an abrupt release of accumulated strain from the tectonic plates that comprise the earth's crust." These rigid plates, known as tectonic plates, are between 50 to 60 miles in thickness and move slowly and continuously over the earth's interior. The plates meet along their edges, where they move away, past or under each other at rates varying from less than a fraction of an inch up to five inches per year. While this sounds small, at a rate of two inches per year, a distance of 30 miles would be covered in approximately one million years (FEMA, 1997).

The tectonic plates continually bump, slide, catch, and hold as they move past each other which causes stress that accumulates along faults. When this stress exceeds the elastic limit of the rock, an earthquake occurs, immediately causing sudden ground motion and seismic activity. Secondary hazards may also occur, such as surface faulting, ground failure, and tsunamis. While the majority of earthquakes occur near the edges of the tectonic plates, earthquakes may also occur at the interior of plates.

The vibration or shaking of the ground during an earthquake is described by ground motion. The severity of ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. Ground motion causes waves in the earth's interior, also known as seismic waves, and along the earth's surface, known as surface waves. The following are the two kinds of seismic waves:

- P (primary) waves are longitudinal or compressional waves similar in character to sound waves that cause back-and-forth oscillation along the direction of travel (vertical motion), with particle motion in the same direction as wave travel. They move through the earth at approximately 15,000 mph.
- S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side-to-side (horizontal motion) due to particle motion at right-angles to the direction of wave travel. Unreinforced buildings are more easily damaged by S waves.

There are also two kinds of surface waves, Raleigh waves and Love waves. These waves travel more slowly and typically are significantly less damaging than seismic waves.

Seismic activity is commonly described in terms of magnitude and intensity. Magnitude (M) describes the total energy released and intensity (I) subjectively describes the effects at a particular location. Although an earthquake has only one magnitude, its intensity varies by location. Magnitude is the measure of the amplitude of the seismic wave and is expressed by the Richter scale. The Richter scale is a logarithmic measurement, where an increase in the scale by one whole number represents a tenfold increase in measured amplitude of the earthquake. Intensity is a measure of how strong the shock felt at a particular location, expressed by the Modified Mercalli Intensity (MMI) scale.

Another way of expressing an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. If an object is dropped while standing on the surface of the earth (ignoring wind resistance), it will fall towards earth and accelerate faster and faster until reaching terminal velocity. The acceleration due to gravity is often called "g" and is equal to 9.8 meters per second squared (980 cm/sec/sec). This means that every second something falls towards earth, it velocity increases by 9.8 meters per second. Peak ground acceleration (PGA) measures the rate of change of motion relative to the rate of acceleration due to gravity. For example, acceleration of the ground surface of 244 cm/sec/sec equals a PGA of 25.0 percent.

It is possible to approximate the relationship between PGA, the Richter scale, and the MMI, as shown in Table 6-5. The relationships are, at best, approximate, and also depend upon such specifics as the distance from the epicenter and depth of the epicenter. An earthquake with 10.0 percent PGA would roughly correspond to an MMI intensity of V or VI, described as being felt by everyone, overturning unstable objects, or moving heavy furniture.

One of the secondary hazards from earthquakes is surface faulting, the differential movement of two sides of a fault at the earth's surface. Linear structures built across active surface faults, such as railways, highways, pipelines, and tunnels, are at high risk to damage from earthquakes. Displacement along faults, both in terms of length and width, varies but can be significant (e.g., up to 20 feet), as can the length of the surface rupture (e.g., up to 200 miles).

Earthquake-related ground failure, due to liquefaction, is another secondary hazard. Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the empty spaces between granules to collapse. Pore-water pressure may also increase sufficiently to cause the soil to behave like a fluid (rather than a soil) for a brief period and causing deformations. Liquefaction causes lateral spreads (horizontal movement commonly 10-15 feet, but up to 100 feet), flow failures (massive flows of soil, typically hundreds of feet, but up to 12 miles), and loss of bearing strength (soil deformations causing structures to settle or tip).

6.3.2.2 History

The City of Paso Robles is considered to be part of the Coast Range Physiographic Province. The Paso Robles area is exposed to seismic hazards from movement along several regional faults. The identified active fault zones in this area are the San Andreas (northeast of the City), Rinconada (south of the City), and Hosgri "Offshore Fault" (the Offshore Fault is seismically active, but available marine geophysical data indicate that future surface rupture is improbable along this fault). See Figure 6-2 (Fault Map). Also, a broad set of short, discontinuous faults between Santa Maria and Big Sur occur near the Paso Robles area, often referred to as the Nacimiento fault zone.

Historically, most of the earthquakes that have occurred near Paso Robles have originated from movement along the San Andreas Fault, which lies approximately 38 miles northeast of the City (see Figure 6-3, Historic Earthquakes Map). An additional fault known as segments of the Jolon Fault transects the southwestern portion of the City, but converges with the Rinconada Fault to form one fault or fault zone near Mountain springs Road. Regional data regarding the activity of the Rinconada and Jolon Faults indicate that these faults may have been active as recently as the late Pleistocene (1.8 million to 11,000 years ago) in the vicinity of Paso Robles. However, there is no evidence that either fault has moved during the Holocene (approximately the last 11,000 years). It is estimated that the Rinconada Fault may be capable of producing a maximum credible earthquake (MCE) of 7.0. Neither of these faults are active with respect to fault rupture. Until recently, the largest historical earthquake in the vicinity was the magnitude 6.2 Bryson earthquake of November 1952. The location of the Bryson earthquake is not well determined, owing to the sparseness of instrumentation at that time. Recently, an earthquake of magnitude M_w 6.5 struck the area at 11:15:56 a.m. PST on Monday, December 22, 2003. The epicenter was 11 km NE of San Simeon, at a depth of 7.6 km (35.706N 121.102W). The earthquake struck in San Luis Obispo County. The 1952 Bryson epicenter was generally believed to have been located less than 10 miles northwest of this San Simeon earthquake. The San Simeon earthquake was a reverse event, where one side of the fault overrides the other side on an inclined fault plane, whereas the Bryson earthquake was a strike-slip first-motion mechanism. (California Integrated Seismic Network).

The earthquake was felt as far north as the San Francisco Bay area, and as far east as the San Joaquin Valley. Located 39 km from the epicenter, two people were killed in the City of Paso Robles, 47 people were reported injured, one building collapsed, and 20 buildings were severely damaged. Countywide, 290 homes and 190 commercial structures were damaged. Structural damage was also noted in the City of Atascadero and in unincorporated areas of the county. The hospital in Templeton had the largest recorded ground motion of 0.48g, indicating rupture directivity to the SE from this earthquake. Local, state and federal disasters were declared.

TABLE 6-5
EARTHQUAKE PGA, MAGNITUDE, AND INTENSITY COMPARISON

PGA (%g)	Magnitude (Richter)	Intensity (MMI)	Description (MMI)
<0.17	1.0 - 3.0	I	I. Not felt except by a very few under especially favorable conditions.
0.17 - 1.4	3.0 - 3.9	II - III	II. Felt only by a few persons at rest, especially on upper floors of buildings.
			III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing automobiles rock noticeably.
			V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 - 34	5.0 - 5.9	VI - VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
			VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
34 - 124	6.0 - 6.9	VII - IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
			IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
>124	7.0 and higher	VIII or higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
			XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
			XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: Wald, Quitoriano, Heaton, and Kanamori, 1999.

There was a surprising amount of liquefaction and related ground damage due to the 2003 San Simeon earthquake for what were relatively low levels of ground shaking. A directional preference of ground shaking was evident in the observed ground damage patterns and strong motion recordings. Besides liquefaction, geotechnical effects included lateral spreading, seismic compression, and potential basin effects. Repair costs from ground displacements were related mainly to the damage to highways from seismic compression, and to houses and infrastructure from lateral

spreading. There was significant damage to structures in the historic downtown area of Paso Robles. One building collapsed, and more than 40 were damaged, many of which were "unreinforced masonry structures" (URMs), see Figure 5-9.

After the earthquake, the California State Office of Emergency Services (OES) dispatched certified inspectors to examine all buildings that are used by the public, and closed some with "red-tags" and ordered them to be retrofitted. The majority of the buildings in Paso Robles that were "red-tagged" to be closed were within a three-block area of the historic downtown district of the City, delineated by 12th Street between Spring and Pine Streets, and Park Street between 12th and 13th Streets.

The City also updated its Seismic Safety Ordinance to accelerate the compliance schedule for the owners of the identified URMs and to update the strengthening standards (more details regarding the City's revised seismic code is provided in Section 6.3.2.3, below).

Even more recently, On September 28, 2004 a magnitude 6.0 earthquake struck Central California near the town of Parkfield (approximately 30 miles northeast of Paso Robles). The quake caused no injuries or property damage in Paso Robles or Parkfield. However, in 1984 the United States Geological Survey predicted that a Magnitude 6 earthquake would occur on the San Andreas Fault near Parkfield within five years of 1988. The prediction was based on a sequence of 6 similar earthquakes that occurred every 22 years (on average) from 1857 to 1966. Although the 2004 Parkfield earthquake occurred over a decade later than predicted, its magnitude and behavior fulfilled the prediction.

6.3.2.3 Future Events

Probabilistic ground motion maps are typically used to assess the magnitude and frequency of seismic events. These maps measure the probability of exceeding a certain ground motion, expressed as PGA, over a specified period of years (Figure 6-4). For example, displays the probability of exceeding a certain ground motion, expressed as PGA, in 50 years in the Western United States. This is a common earthquake measurement that shows three things: the geographic area affected, all colored areas on the map; the probability of an earthquake of each level of severity, 10.0 percent chance in 50 years; and the severity, the PGA as indicated by color. Note that this map expresses a 10.0 percent probability of exceedance and, therefore, there is a 90.0 percent chance that the peak ground acceleration displayed will not be exceeded during 50 years. The use of a 50-year period to characterize the percent chance of exceedance is arbitrary and does not imply the structures are thought to have a useful life of only 50 years. Similar maps exist for other measures of acceleration, probabilities, and time periods.

It is useful to note that, according to the US Geological Survey (USGS), a PGA of approximately 10.0 percent gravity is the approximate threshold of damage to older (pre-1965) dwellings or dwellings not made resistant to earthquakes. The 10.0 percent measure was chosen because, on average, it corresponds to the Modified Mercalli Intensities of VI to VII levels of threshold damage in California within 25 km of an earthquake epicenter. The earthquake hazard maps combine near and distant ground motions indiscriminately and should not be used for particular buildings (USGS, February 7, 2003).

Figure 6-5 (Peak Acceleration Map), displays the City's estimated probability of exceeding a 20-40% PGA in 50 years. With intensity ranges defined through Table 6-5, the City of Paso Robles demonstrates MMI scale levels of VI-IX. In general, these MMI levels indicate earthquake damage in the City of Paso Robles that potentially could be substantial.

Figure 6-6 (Ground Shaking Map) measures the potential intensity of ground shaking in and around the City of Paso Robles. Ground shaking is a measure calculated by the California Geological Survey (CGS) and USGS seismic hazards model considering amplification in near surface soils using the amplification factors recommended by the building Seismic Safety Council (1997). The areas within and around the City are color-coded on the map as having

a moderate or medium potential for ground shaking. The ground shaking potential drastically increases to the northeast, towards the active San Andreas Fault. Areas of highest ground shaking potential within the City include along the Salinas River corridor, either side of Highway 46 in north central Paso Robles, and the area in northeast Paso Robles, which includes the airport.

The City consequently revised their seismic code in 2004 after the 2003 San Simeon earthquake, in an effort to protect lives during major seismic events in the future. The City's seismic code was previously based upon the 1994 Uniform Code for Building Conservation. The revised seismic code adopted the 2003 International Existing Building Code, which incorporates newer standards, including structural lessons learned from the 1994 Northridge Earthquake. The current, updated seismic code has established deadlines for compliance that include: (a) One year (from the date of the letter sent by the City's Building Official to all owners of URM buildings) for owners of URM buildings to submit structural analyses and construction plans to the City for seismic strengthening of their buildings, and (b) two years (from the date of the letter sent by the City's Building Official to all owners of URM buildings) for owners to complete construction of those improvements necessary to strengthen URM buildings. This has translated to a deadline of May 2005 for submitting plans to the City for retrofit work, and August 2005 is the deadline for obtaining a building permit to construct retrofit improvements. Additionally, the deadline for completing retrofit work is February 2007.

6.3.3 Expansive Soils

6.3.3.1 Nature

Expansive soils are naturally occurring materials found in low-lying regions and flood plains. Expansive soils are easily recognized by large surface cracks that form when they are dry and contracted. Expansive soils can cause damage to structure foundations. The effects can be dramatic if expansive soils supporting structures are allowed to become too wet or too dry. Patios, driveways and walkways may crack and heave as the underlying expansive soils become wet and swell. Sometimes the cracking and heaving appear temporary as the soils dry and shrink back to their original position. However, footings can behave differently. The concentrated weight of the structure will inhibit the soil's upward expansion. Outward expansion on the other hand may continue. The footings will not be returned to their original position as the soils dry and shrink. Instead, they can "ooze" down to a slightly lower level. This process can accumulate if the wetting and drying is allowed to continue season after season, year after year.

Summer or drought conditions can cause expansive soil problems around homes. Expansive soils can affect homes with suspended wood floors as well as those with concrete slab floors. Most of the movement occurs at the outside walls of a building, but the inside of a house can move if water finds its way under the house when it rains, through landscape watering or through a plumbing leak.

Much of California is underlain by expansive soils. However, expansive soil doesn't cause problems unless poorly designed structures are built on it. A house built on expansive soil will probably move if the foundation was not designed to take this soil type into account. Movement occurs because the soils expand so forcefully, the foundation actually moves. Different parts of the house can move at different rates and distances, thus cracking the foundation. Significant cracks often appear at the corners of windows and doors, in walls, garage slabs, walkways, and driveways. Doors and windows may become jammed. The integrity, design, value and use of a home could be affected. During extreme drought conditions, even homes that are not normally affected by expansive soil problems may experience slight cracking.

6.3.3.2 History

Each year in the United States, expansive soils cause billions of dollars in damage to buildings, roads, pipelines, and other structures. This is more damage than that caused by floods, hurricanes, tornadoes, and earthquakes combined (FEMA 1997).

There are three basic types of soil naturally occurring in and around the City of Paso Robles: sand, silt and clay. Clay soils are generally classified as "expansive." This means that a given amount of clay will tend to expand (increase in volume) as it absorbs water and it will shrink (lessen in volume) as water is drawn away. One of the most expansive of the clay soils is called “adobe.”

6.3.3.3 Future Events

Paso Robles is an area of moderately-highly expansive soils. A shrink-swell potential exists within the City, on the surrounding hillsides, and in areas along the Salinas River, Huerhuero Creek, and several unnamed creeks. The shrink-well characteristics of soils can vary widely within short distances, depending on the relative amount and type of clay (General Plan, 2003).

The potential for soil settlement could result in significant impacts to new development in the aforementioned areas. Detailed geologic studies are required prior to development to evaluate the potential for expansive soils, and it is required that these conditions are minimized or corrected during construction. Large-scale settlement problems should not be an issue provided that adequate soils and foundation studies are performed prior to construction and that Building Code guidelines are followed (General Plan, 2003).

Figure 6-7 (Expansive Soils Map) displays the concentration of expansive soils with “high shrink-swell potential,” mainly within the eastern portion of the City. The soil types that correspond to the high shrink-swell potential are mainly the Arbuckle-Positas complex (soil type 104), Arbuckle-San Ysidro complex (soil type 106), and Rincon clay loam (soil types 187 and 188), (see Figure 5-2, Soils Map). All of these soils are defined as having severe limitations for building sites and roads and streets. It is recommended that foundations and footings should be designed to prevent structural damage caused by shrinking and swelling of the subsoil (Paso Robles Soil Survey, U.S. Department of Agriculture, Soil Conservation Service).

6.3.4 Extreme Heat

6.3.4.1 Nature

Extreme summer heat is the combination of very high temperatures and exceptionally humid conditions. If such conditions persist for an extended period of time, it is called a heat wave (FEMA, 1997). The major human risks associated with extreme heat are as follows:

- Heatstroke: Considered a medical emergency, heatstroke is often fatal. It occurs when the body’s responses to heat stress are insufficient to prevent a substantial rise in the body’s core temperature. While no standard diagnosis exists, a medical heatstroke condition is usually diagnosed when the body’s temperature exceeds 105°F due to environmental temperatures. Rapid cooling is necessary to prevent death, with an average fatality rate of 15 percent even with treatment.
- Heat Exhaustion: While much less serious than heatstroke, heat exhaustion victims may complain of dizziness, weakness, or fatigue. Body temperatures may be normal or slightly to moderately elevated. The prognosis is usually good with fluid treatment.
- Heat Syncope: This refers to sudden loss of consciousness and is typically associated with people exercising who are not acclimated to warm temperatures. Causes little or no harm to the individual.
- Heat Cramps: May occur in people unaccustomed to exercising in the heat and generally ceases to be a problem after acclimatization.

In addition to affecting people, severe heat places significant stress on plants and animals. The effects of severe heat on agricultural products may include reduced yields and even loss of crops (Brown and Zeiher, 1997). Similarly, cows may become overheated, leading to reduced milk production and other problems. (Garcia, September 2002).

6.3.4.2 History

Extreme summer heat occurs with some regularity in the U.S. and in other countries. Major historic events have included the following:

- In 1980, summer temperatures reached all time highs in Central and Southern States, with over 1,700 deaths identified as heat related (FEMA, 1997).
- In July and August 2003, a heat wave across Europe caused thousands of deaths, including at least 11,000 in France alone. Again, a high proportion of the victims were elderly (Brock, September 14, 2003).

The climate of northern San Luis Obispo County is strongly influenced by its proximity to the Pacific Ocean and the location of the semi-permanent high-pressure cell in the northeastern Pacific. With a Mediterranean-type climate, Paso Robles is characterized by warm, dry summers and cool winters with occasional rainy periods (General Plan, 2003). Maximum summer temperatures average in the mid to high 90's although it is not uncommon for temperatures to reach into the 100's. The record high temperature in Paso Robles was tied in June 2000, reaching 115° F.

While summer temperatures in San Luis Obispo County often reach levels during the summer that would be considered extreme in many parts of the country, no extreme heat events affecting Paso Robles were recorded by the National Oceanic and Atmospheric Administration (NOAA), although arguably the June 2000 115° F temperature was an extreme event.

6.3.4.3 Future Events

The probability and frequency of heat hazards may be characterized by a heat index using temperature and humidity readings. Such an index has been developed for the entire U.S., and the City of Paso Robles portion is shown in Figure 6-8. The map was prepared using hourly readings between 2 PM and 5 PM for June, July, and August (based on the assumption that the annual maximum temperature and relative humidity occurs during summer afternoons). The data was used to conduct a frequency analysis from which the heat index map was prepared (with a 5.0 percent chance of exceedance in any given year).

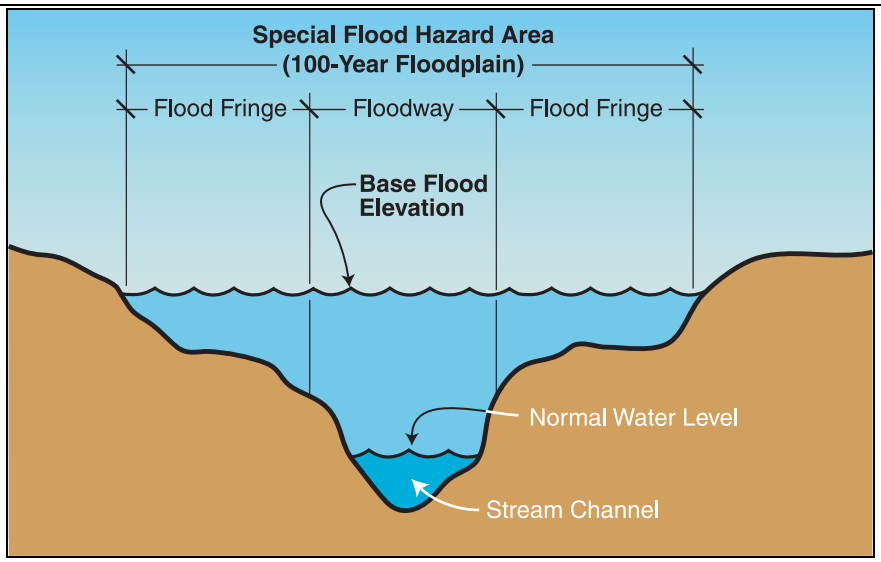
As illustrated in Figure 6-8, the City of Paso Robles is indexed as having 100-105° F during the summer. The National Weather Service (NWS) and the National Ocean and Atmospheric Administration (NOAA) defines these temperatures as having the probable effects of "sun stroke, heat cramps and heat exhaustion." The NWS also identifies heat stroke as a possibility when temperatures reach 105° F or more.

6.3.5 Flood

6.3.5.1 Nature

Flooding is the accumulation of water where there usually is not any or the overflow of excess water from a stream, river, lake, reservoir, or coastal body of water onto adjacent floodplains. As illustrated in Figure 6-9, floodplains are lowlands, adjacent to water bodies that are subject to recurring floods. Floods are natural events that are considered hazards only when people and property are affected. Floods occur in all 50 US states and territories, with an estimated four percent of the total area of the United States subject to the 1-percent annual chance floodplain (also known as the 100-year floodplain). An estimated nine million US households and $390 billion in property are at risk within the 1-percent annual chance floodplain.

FIGURE 6-9
FLOODPLAIN DEFINITION SKETCH



Source: FEMA, August 2001.

Nationwide damage from flooding has increased from $902 million annually during the period 1916-1950 to $2.15 billion annually, an increase of almost two-and-a-half times. The worst flood disaster in US history was caused by a series of storms from April to September of 1993 in the Upper Mississippi Basin. Nationwide there were 38 to 47 flood-related deaths and damage was estimated at $12 to $16 billion, including $4 to $5 billion in agricultural losses (FEMA, 1997).

There are a number of categories of floods in the U.S., including the following:

- Riverine flooding, including overflow from a river channel, flash floods, alluvial fan floods, ice-jam floods, and dam break floods
- Local drainage or high groundwater levels
- Fluctuating lake levels
- Coastal flooding, including storm surges
- Debris flows

The most common type of flooding event is riverine flooding, also known as overbank flooding. Riverine floodplains range from narrow, confined channels in the steep valleys of mountainous and hilly regions, to wide, flat areas in plains and coastal regions. The amount of water in the floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, and land use characteristics. Flooding in steep, mountainous areas is usually confined, strikes with less warning time, and has a short duration; while larger rivers typically have longer, more predictable flooding sequences and broad floodplains.

The cause of flooding in large rivers is typically prolonged periods of rainfall from weather systems covering large areas (e.g., tropical storms). These systems may saturate the ground and overload the rivers and reservoirs in numerous smaller basins that drain into larger rivers. Localized weather systems (e.g., thunderstorms), may cause

intense rainfall over smaller areas, leading to flooding in smaller rivers and streams. Annual spring floods, due to the melting of snow pack, may affect both large and small rivers and areas.

While there is no sharp distinction between riverine floods, flash floods, alluvial fan floods, ice jam floods, and dam-break floods, these types of floods are widely recognized and may be helpful in considering the range of flood risk and appropriate responses:

- Flash flood is a term in wide use by experts and the general population, but there is no single definition or clear means of distinguishing flash floods from other riverine floods. Flash floods involve a rapid rise in water level, high velocity, and large amounts of debris, which can lead to significant damage that includes the tearing out of trees, undermining of buildings and bridges, and scouring new channels. The intensity of flash flooding is a function of the intensity and duration of rainfall, steepness of the watershed, stream gradients, watershed vegetation, natural and artificial flood storage areas, and configuration of the streambed and floodplain. Dam failure and ice jams may also lead to flash flooding. Urban areas are increasingly subject to flash flooding due to the removal of vegetation, covering of ground cover with impermeable surfaces, and construction of drainage systems. Wildfires that strip hillsides of vegetation and alter soil characteristics may also create conditions that lead to flash floods and debris flows. Debris flows, which are described in detail in Section 6.3.7, are particularly dangerous due to the fact that they generally strike without warning and are accompanied by extreme velocity and momentum.

  Flash floods are the top weather-related killer in the United States, resulting in about 150 deaths every year, and are a significant hazard in California. Most, if not all, of these fatalities could have been avoided if those involved would have recognized the dangers of flash floods and taken a few simple actions to protect themselves (National Weather Service).

- As indicated by the name, alluvial fan floods occur in the deposits of rock and soil that have eroded from mountainsides and accumulated on valley floors in the pattern of a fan. Alluvial fan floods often cause greater damage than straightforward riverine flooding due to the high velocity of the flow, amount of debris, and broad area affected. Alluvial fan flooding is most prevalent in arid western states, such as California. Human activities may exacerbate flooding and erosion on alluvial fans via increased velocity along roadway acting as temporary drainage channels or changes to natural drainage channels from fill, grading, and structures. Alluvial fan floods are a significant hazard in California. Floods on alluvial fans are dangerous because they are unpredictable. Channels may migrate quickly, for example, and the water flow often travels at high velocity–much higher than usually found in rivers or streams. This velocity is usually much more of a problem than the depth of the flow. Such action on alluvial fans is often characterized as “sheet flow” because of the high speed and shallow depth. In contrast to other flood hazards (i.e. riverine situations), FEMA puts an average velocity on the Flood Insurance Rate Map (FIRM) when mapping an alluvial fan to draw attention to the additional hazard posed by velocity.

Local drainage floods may occur outside of recognized drainage channels or delineated floodplains due to a combination of locally heavy precipitation, a lack of infiltration, inadequate facilities for drainage and stormwater conveyance, and increased surface runoff. Such events frequently occur in flat areas, particularly during winter and spring in areas with frozen ground, and also in urbanized areas with large impermeable surfaces. High groundwater flooding is a seasonal occurrence in some areas, but may occur in other areas after prolonged periods of above-average precipitation. Losses associated with local drainage are most significant when they occur with other hazards described in this document, such as widespread flooding and thunderstorms; therefore, they are not analyzed as a distinct hazard.

Many urban areas that have historically been flood prone have been removed from the floodplain through the application of two construction types: (1) flood control dams, which reduce peak discharges; and, (2) levees, which redirect floods away from areas that would otherwise be inundated.

6.3.5.2 History

The greatest flood events in Paso Robles on record occurred during storms in the early months of 1969, 1973, and 1995. During these storm events, both storm drain and natural river channel capacities were exceeded resulting in substantial damage to public and private property throughout San Luis Obispo County. The Salinas River has a "flood stage" of 19 feet. The flood stage is the stage at which overbank flows are of sufficient magnitude to cause considerable inundation of land and roads and/or threat of significant hazard to life and property (California Department of Water Resources, Division of Flood Management).

The 1969 flood was one of the most severe flood years in San Luis Obispo County. There were two distinct floods, one at the end of January and the second a month later at the end of February. During the January flood, the Salinas River reached a discharge of over 28,000 ft^3/s and reached a stage of 23.8 feet from floodmarks (almost 5 feet above the river's flood stage), which resulted in water flooding into the 50-year and 100-year flood zone. (The USGS "flood peak data" estimates the Salinas River to inundate the Paso Robles 50-year flood zone when discharges reach approximately 27,000 ft^3/s.) The San Luis Obispo Telegram-Tribune of January 25, 1969 described the Salinas River as "on a rampage." Hundreds of people were evacuated and homes were destroyed along the North and South River Roads. This flood was later studied by FEMA in 1981 and used as the basis for FIRM Maps that the City still uses today.

On January 18, 1973, rainstorms flooded Paso Robles again. High winds cut the City's power, and the water in Lake Nacimiento approached the maximum capacity. Streets were flooded and sewer pump lift stations were inundated. Sand bagging the culvert at 23rd and Vine Streets required a full crew to prevent flooding damages to nearby homes. City street crews kept constantly on the move unclogging drains and barricading some areas (Daily Press, Paso Robles).

The flood of March 10,1995 also peaked at a maximum discharge of over 28,000 ft^3/s and reached a gage height of 22.99 feet, thereby inundating the 50-year flood zone once again (USGS Flood Peak Data). The City filed for FEMA public assistance to repair damage that occurred to settling ponds at the wastewater treatment plan adjacent to the Salinas River.

Local residents reported that, with the March 1995 rains, there was some flooding on North River Road that exceeded the 100-year flood levels identified by FEMA as part of their 1981 Flood Insurance Study.

6.3.5.3 Future Events

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as stream flow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

The most widely adopted design and regulatory standard for floods in the United States is the 1-percent annual chance flood and this is the standard formally adopted by FEMA. The 1-percent annual flood, also known as the base flood, has a 1 percent chance of occurring in any particular year. It is also often referred to as the "100-year flood," leading to the misconception that it should only occur once every 100 years. In fact, a 100-year flood may occur in any year, regardless of the time that has passed since the last one. Smaller floods occur more often than larger (deeper and more widespread) floods. Thus, a "10-year" flood has a greater likelihood of occurring than a "100-year" flood. Table 6-6 shows a range of flood recurrence intervals and their probabilities of occurrence.

TABLE 6-6
FLOOD PROBABILITY TERMS

Flood Recurrence Intervals	Percent Chance of Occurrence Annually
10 years	10.0%
50 years	2.0%
100 years	1.0%
500 years	0.2%

Source: FEMA, August 2001.

The San Luis Obispo County Planning Department has prepared maps delineating areas of known flood hazard (General Plan, 2003), which include:

- All areas along Huerhuero Creek, which flows approximately to the southeast.
- The area south of the airport is subject to flooding from Dry Creek, a tributary to Huerhuero Creek.
- The area along Linne Road is subject to flooding from Huerhuero Creek.
- Flooding may occur in the vicinity of Marquita Road, east of Route 101.
- The area bounded by Herdsman Way to the south, West Bethel Road to the west, and Highway 46 West to the north, is subject to flooding.
- Flooding may occur in an area north of Highway 46 West, west of Arbor Road, and south of Live Oak Road.

Additionally, FEMA has published a FIRM for the city, dated September 16, 1981. Figure 6-10 shows the 100-year floodplain areas within Paso Robles as determined by FEMA. The total Paso Robles area within the 100-year floodplain is shown in Table 6-7. As illustrated in this figure and table, the City of Paso Robles contains 1.38 square miles of identified floodplains. This represents 8 percent of the 17.34 total square miles that comprise Paso Robles. The majority of the flood prone areas within the City are associated with the Salinas River (which runs south-to-north through the center of the City) and its tributaries. Areas along the Huerhuero Creek and Dry Creek are also within the 100-year floodplain. Local flooding results when culverts become temporarily clogged during storms.

TABLE 6-7
100-YEAR FLOODPLAINS

Jurisdiction	Total Area in Square Miles	Area Within 100-Year Floodplain	
		Sq. Mi.	Percent
Paso Robles	17.34	1.38	7.9

Note: Floods may still occur outside of identified flood prone areas.

Source:FEMA, URS, July 2004.

The Salinas Dam, located on the Salinas River upstream of Paso Robles in the Vicinity of the City of san Luis Obispo, has reduced the threat of flooding from smaller, more frequent flood events on the river, but is not designed to provide protection from the 100-year flood (FEMA, 1981).

Figure 6-11 displays the 100-Year 24-hour Probable Maximum Precipitation (PMP) in Paso Robles. The PMP in Paso Robles over a 24-hour period is 5-6 inches in the west portion of the City, and 4-5 inches in the east portion. Note that this map displays an event with a 1 percent chance of being exceeded in any year, not an event that is expected to occur once every 100 years. The map was developed using multiple methods, including judgments based on record storms and related meteorological processes, with the results of the studies considered estimates because changes are likely to occur as understanding increases. The studies assumed that storm records for the preceding 80 years were representative and no allowance was made for climate change.

The hazard data provided above are based on currently available flood hazard data and mapping. Future flood hazards, and the mapping used to define them, may be affected by changing conditions, such as increased runoff due to development, construction of flood control facilities, and climatic factors. While increased precipitation in the Western U.S. is likely due to global warming, the greatest threat of increased flooding in Paso Robles can be expected to come from the nearly 50 percent increase in population forecasted for the coming twenty years. This is likely to lead to a significant increase in impervious surfaces and, hence, flooding.

Presently the City requires new development projects to detain the runoff they create and meter its outflow so as not to exceed historic flows. Detention basins are designed to accommodate runoff commensurate with 100-year storms.

Furthermore, a 66-mile pipeline project has been proposed to increase water availability to San Luis Obispo County. The $190 million pipeline project would transport 17,000 acre-feet of water from Nacimiento Lake (northeast of the City of Paso Robles) to San Luis Obispo, serving several communities along the way, including Paso Robles. It is a concern for some that this pipeline may introduce a potential flooding hazard to the City, if the pipeline were to break. Therefore, this potential issue will be assessed in future updates of this Plan.

6.3.6 Hazardous Material (HAZMAT) Event

6.3.6.1 Nature

Hazardous materials (HAZMAT) may include hundreds of substances that pose a significant risk to humans. These substances may be highly toxic, reactive, corrosive, flammable, radioactive or infectious. They are present in nearly every community in the U.S., where they may be manufactured, used, stored, transported, or disposed. Because of their nearly ubiquitous presence, there are hundreds of HAZMAT release events annually in the U.S. that contaminate air, soil, and groundwater resources, potentially triggering millions of dollars in clean-up costs, human and wildlife injuries, and occasionally cause human deaths (FEMA, 1997).

Hazardous material releases may occur from any of the following:

- Fixed site facilities (e.g., refineries, chemical plants, storage facilities, manufacturing, warehouses, wastewater treatment plants, swimming pools, dry cleaners, automotive sales/repair, gas stations, etc.)
- Highway and rail transportation (e.g., tanker trucks, chemical trucks, railroad tankers)
- Air transportation (e.g., cargo packages)
- Pipeline transportation (liquid petroleum, natural gas, other chemicals)

In response to concerns over the environmental and safety hazards posed by the storage and handling of toxic chemicals in the U.S., Congress passed the Emergency Planning and Community Right to Know Act (EPCRA) in 1986. These concerns were triggered by the 1984 disaster in Bhopal, India, in which more than 2,000 people died or

were seriously injured from the accidental release of methyl isocyanate from an American owned Union Carbide plant. To reduce the likelihood of such a disaster in the U.S., EPCRA established specific requirements on federal, state and local governments, Indian tribes, and industry to plan for hazardous materials emergencies.

EPCRA's Community Right-to-Know provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities working with facilities can use the information to improve chemical safety and protect public health and the environment (EPA, May 2003). Under EPCRA, hazardous materials must be reported to the Environmental Protection Agency (EPA), even if they do not result in human exposure. Such releases may include the following:

- Air emissions (e.g., pressure relief valves, smokestacks, broken pipes, water or ground emissions with vapors)
- Discharges into bodies of water (e.g., outflows to sewers, spills on land, water runoff, contaminated groundwater)
- Discharges onto land
- Solid waste disposals in onsite landfills
- Transfer of wastewater to public sewage plants
- Transfers of waste to offsite facilities for treatment or storage

In addition to accidental human-caused hazardous material events, natural hazards may cause the release of hazardous materials and complicate response activities. The impact of earthquakes on fixed facilities may be particularly bad due to the impairment of the physical integrity or even failure of containment facilities. The threat of any hazardous material event may be magnified due to restricted access, reduced fire suppression and spill containment, and even complete cut-off of response personnel and equipment. In addition, the risk of terrorism involving hazardous materials is considered a major threat due to the location of hazardous material facilities and transport routes throughout communities and the frequently limited anti-terrorism security at these facilities.

Due to the high level of risk posed by hazardous materials, numerous federal, state and local agencies are involved in their regulation, including the EPA, U.S. Department of Transportation (DOT), National Fire Protection Association (NFPA), FEMA, U.S. Army, and the International Maritime Organization.

Unless exempted, facilities that use, manufacture, or store hazardous materials in the U.S. fall under the regulatory requirements of EPCRA, enacted as Title III of the federal Superfund Amendments and Reauthorization Act (SARA) 42 U.S.C. §§11001-11050 (1988)). EPCRA has four major provisions:

- Emergency Planning (Section 301-303) is designed to help communities prepare for and respond to emergencies involving hazardous substances. It requires every community in the United States to be part of a comprehensive emergency response plan.
- The Governor of California has designated a State Emergency Response Commission (SERC) responsible for implementing EPCRA provisions within California. The SERC oversees Local Emergency Planning Committee (LEPC) districts. Emergency Release Notification (Section 304) includes a list of chemicals that if spilled must be reported, including Extremely Hazardous Substances (EHS). The SERC supervises and coordinates activities of each LEPC, establishes procedures for receiving and processing public requests for information collected under EPCRA, and reviews LEPC developed local emergency response plans. Facilities with an EHS at quantities exceeding the Threshold Planning Quantities (TPQ) must notify the SERC and LEPC and provide a representative to participate in the county emergency planning process.

- Hazardous chemical storage reporting requirements (Sections 311-312) that requires facilities possessing a threshold reporting quantity of a hazardous material under EPCRA (Section 311/312, 40 CFR Part 370) to submit an annual chemical inventory report (Tier II Hazardous Chemical Inventory Form) to the SERC, LEPC and local fire department; and
- Toxic chemical release inventory (Section 313).

Of the hundreds of hazardous materials, under the EPCRA regulatory scheme, those hazardous materials that pose the greatest risk for causing catastrophic emergencies are identified as an EHS. As noted above, the presence of EHSs in quantities at or above TPQ require additional emergency planning and mitigation activities. These chemicals are identified by the US EPA in the *List of Lists – Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA) and Section 112 of the Clean Air Act* (EPA, October 2001).

Releases of EHSs can occur during transport and from fixed facilities. Transportation related releases are generally more troublesome because they may occur anywhere, including close to human populations, critical facilities, or sensitive environmental areas. Transportation related EHS releases are also more difficult to mitigate due to the variability of locations and distance from response resources.

It should be noted that while comprehensive and readily accessible information is available on hazardous material release and facilities subject to EPCRA, there are numerous other sources of information on hazardous material facilities and incidents that are beyond the scope of this plan. A more in-depth analysis of potential hazardous material events would include the following:

- Risk Management Plan (RMP) facilities
- Tier II Hazardous Chemical Inventory Form facilities
- Toxic Release Inventory (TRI) facilities
- Pipelines and related facilities
- Railroad transportation facilities
- Explosive storage, sales, use, and manufacturing facilities
- Hazardous Materials Management Plan (HMMP) permit and Hazardous Materials Inventory Statement (HMIS) facilities
- Hazardous waste facilities (RCRA information and RMS databases)
- National Response Center Emergency Response Notification System (ERNS)
- U.S. Department of Transportation (DOT) Hazardous Materials Information Reporting System (HMIRS)
- California Hazardous Material Incident Reporting System (CHMIRS)
- California Department of Transportation (Caltrans)
- Trucking terminal facilities
- U.S. Office of Occupational Safety and Health Administration (OSHA) Injury, Illness, and Fatality Database
- 911 regional dispatch centers
- EPA Envirofacts and Window to My Environment
- EPA Enforcement and Compliance History Online (ECHO)

6.3.6.2 History

Some of the worst hazardous material events have occurred outside of the U.S., such the 1984 incident in Bhopal, India. Within the U.S., the National Response Center (NRC) reported an average of 280 hazardous material releases and spills occurred at fixed sites annually during the period 1987-1990. The US Department of Transportation reported an average of 6,774 hazardous material events annually during the period 1982-1991, with highways accounting for 81.4 percent, railroads 14.7 percent, and other events 6.6 percent. Additionally, highway transportation hazardous material events have caused more than 100 deaths, 2,800 injuries, and $22.4 million in damages (FEMA, 1997).

HAZMAT releases are a major concern for communities in San Luis Obispo County. The San Luis Obispo County Environmental Health Department (EHD) provided information on the hazardous material events within the City. In addition, hazardous material release reports were gathered from the NRC for the period 1990-2002 and screened to include only releases reported to the NRC of EHSs that met the Reportable Quantity (RQ) test under Section 304 of EPCRA (see *EPA List of Lists,* Section 304 EHS RQ). These materials pose the greatest risk for causing catastrophic emergencies.

A total of two significant HAZMAT release events (reported by the NRC) occurred within the City from 1987 to 2003, none of which prompted a state or federal disaster declaration. These release events are shown as red triangles on Figure 6-12. One event (located by the airport) was a CO_2 release into the atmosphere. The amount is unknown, however there was no reported damage, injury, fatality or evacuation of nearby facilities. The other event, which occurred in the southeast portion of the City at 1740 Commerce Drive, was a release of 500 gallons of caustic soda, spilled from a pump due to a seal failure. Local, county or state agencies responded to these incidents.

Seven releases within Paso Robles have been recorded by the U.S. Environmental Protection Agency, two of which occurred at the same site (see Figure 6-12). Of these releases none were incidents that were reported to the NRC. Three occurred within close proximity to residential neighborhoods, one occurred within an agricultural zoned area and the remaining three incidents occurred near the Paso Robles Municipal Airport, which is a substantial distance from residential property. Of the seven incidents, only two of the facilities are still in operation. No reportable incidents have occurred within a transportation corridor.

6.3.6.3 Future Events

In California the majority of hazardous materials incidents are handled prior to becoming a disaster. Nevertheless, the City's emergency organization needs to be flexible and evolutionary in its response to a developing incident in order to accommodate both the large number of relatively routine minor releases to truly disastrous hazardous materials releases. Paso Robles is considered by most to be rural in nature and therefore, does not include large industrial facilities which house or manufacture large quantities of hazardous materials that could potentially cause a devastating release.

Comprehensive information on the probability and magnitude of hazardous material events across all types of sources (e.g., fixed facility, transport vehicle) is not available. Wide variations in the characteristics of hazardous material sources and between the materials themselves make such an evaluation very difficult.

The US Department of Transportation's Hazardous Materials Transportation Program is one of the most advanced probability and magnitude estimation programs. The program collects information on unintentional releases of hazardous materials, including the consequences, and analyzes them. One of the major efforts of the program is to identify low probability, high consequence events (which may not be apparent from incident data) and providing appropriate levels of protection (DOT, September 2003).

Areas of concern in Paso Robles are the Union Pacific Railroad and Highway 101, which are major interstate transportation routes that pass through Paso Robles. In addition, Highway 46 East and West support relatively high traffic volumes. Trains and trucks commonly carry a variety of hazardous materials, including gasoline and various crude oil derivatives, and other chemicals known to cause human health problems. The City is exposed to the effects of a major catastrophic hazardous material emergency due to the proximity of these transportation routes to densely populated areas of the city. However, when properly contained, these materials present no hazard to the community. But in the event of an accident or derailment, such materials may be released, either in solid, liquid or gas form. In the case of some chemicals (such as chlorine), highly toxic fumes may be carried far from the accident site. Although standard accident and hazardous materials recovery procedures are enforced by the state and followed by private transportation companies, the City of Paso Robles is at relatively high risk because of its location along interstate rail and highway corridors (General Plan, 2003).

Informal surveys conducted by the County Office of Emergency Services have indicated the presence of the following classifications of hazardous materials: explosives, poisons, corrosives, flammable liquids, combustible liquids, cryogenics, compressed gasses (flammable and non-flammable), radioactive materials, and oxidizers. Large pressurized natural gas pipelines traverse the City. Pesticides are stored at several sites around the City, due to the number of vineyards and wineries in the vicinity of the City. Other small fixed facilities have varying uses of hazardous chemicals, but in general these do not pose a significant risk to the City. Air transportation of hazardous materials involves the smallest quantity, but still poses a potential hazard (Multi-Hazard Response Plan, 2003).

While it is beyond the scope of this plan to evaluate the probability and magnitude of hazardous material events in the City of Paso Robles in detail, it is possible to determine the exposure of population, buildings, and critical facilities should such an event occur. Of the facilities that were required to file an annual Tier II Material Inventory Report (under EPCRA) in San Luis Obispo County because of the presence of hazardous materials, seven were identified as having Extremely Hazardous Substance (EHS). The locations of these facilities are shown on Figure 6-13. The substances recorded at these facilities include common hazardous substances, such as nitric acid, sulfuric acid, acetone, hydrocarbons, cadmium, etc. EHSs pose the greatest risk for causing catastrophic emergencies. Therefore, facilities with EHSs are considered a greater threat than situations where non-EHSs are involved.

6.3.7 Landslide

6.3.7.1 Nature

Landslides are the downward and outward movement of slopes. The term is commonly used to refer to a number of types of events, including mudflows, mudslides, debris flows, rock falls, rock slides, debris avalanches, debris slides, and earth flows. Landslides may be any combination of natural rock, soil, or artificial fill. The type of movement and the type of material classifies landslides. The types of movement are slides, flows, lateral spreads, and falls and topples (FEMA, 1997).

Below is a brief discussion of the various types of landslide movements. A combination of two or more landslide movements is referred to as a complex movement.

- Slides are downward displacement along one or more failure surfaces of soil or rock. The material may be a single, intact mass or a number of pieces. The sliding may be rotational (turning about a point) or translational (movement roughly parallel to the failure surface).
- Flows are distinguished from slides by high water content and velocities that resemble those of viscous liquids. Flows are a form of rapid mass movement by loose soils, rocks and organic matter, together with air and water, which form a slurry flowing rapidly downhill.

- Lateral spreads are large movements of rock, fine-grained soils (e.g., quick clays), or granular soils, distributed laterally. Liquefaction may occur in loss, granular soils, which may occur spontaneously due to changes in pore-water pressure or due to earthquake vibrations.
- Falls and topples are masses of rocks or material that detach from a steep slope or cliff that free fall, roll, or bounce, with movements typically rapid to extremely rapid. Earthquakes commonly trigger rock falls.

Almost any steep or rugged terrain is susceptible to landslides under the right conditions. The most hazardous areas are canyon bottoms, stream channels, areas near the outlets of canyons, and slopes excavated for buildings and roads. Slide potentials are enhanced where slopes are destabilized by construction or river erosion. Road cuts and other altered or excavated area of slopes are particularly susceptible to landslides and debris flows. Rainfall and seismic shaking by earthquakes or blasting can trigger them.

Debris flows (also referred to as mudslides) generally occur during intense rainfall on water saturated soil. They usually start on steep hillsides as soil slumps or slides that liquefy and accelerate to speeds as great as 35 miles per hour. Multiple debris flows that start high in canyons commonly funnel into channels. Beginning in swales on steep slopes, they merge, gain volume, and travel long distances from their source, making areas down slope from swales particularly hazardous. Surface runoff channels, such as along roadways and below culverts, are common sites of debris flows and other landslides (USGS, 2000).

Landslides often occur together with other major natural disasters, such as the following, thereby exacerbating relief and reconstruction efforts:

- Landslides may occur simultaneously with widespread flooding. Both involve precipitation, runoff, and ground saturation, which may be the result of prolonged rainfall, such as during winter storms.
- Earthquakes may cause landslides ranging from rock falls and topples, to massive slides and flows.
- Wildfires may remove vegetation from hillsides, significantly increasing runoff and landslide potential.
- Landslides into a reservoir may indirectly compromise dam safety or a landslide may even affect the dam itself.

6.3.7.2 History

Landslides are a major geologic hazard because they are widespread, occurring in all 50 states. The Appalachian Mountains, the Rocky Mountains and the Pacific Coastal Ranges and some parts of Alaska and Hawaii have severe landslide problems. Any area composed of very weak or fractured materials resting on a steep slope can and will likely experience landslides.

On average, landslides cause $1-2 billion in damages annually and more than 25 fatalities. Landslides pose serious threats to highways and structures that support fisheries, tourism, timber harvesting, mining, and energy production as well as general transportation Expanding urban development and other land uses have increased the incidence of landslide disasters in the U.S. (USGS, June 7, 2002). Examples of major landslides in the U.S. include the following:

- Rains accompanying the El Nino effect triggered numerous landslides across Southern California in 1983-84 and 1995. In Paso Robles, two homes were damaged and there was major dirt slippage on River Road.
- The Northridge earthquake in 1994 in the San Fernando Valley triggered thousands of landslides in the Santa Susanna Mountains north of the epicenter.
- A massive landslide occurred on April 22, 1998, near Aromas, California, 15 miles north of Salinas. The slide severed two Pacific Gas And Electric (PG&E) natural-gas pipelines, cutting off gas service to 60,000 customers in Santa Cruz County and parts of Monterey County.

In 1995 there was a landslide in Paso Robles in which the hillside west of Olive Street, just north (and northeast) of Hilltop Drive slid into the back of 2-3 homes. The hillside area that slid was approximately 150 wide by 40 feet high, and the slope of the hillside was about 30%. Also, the cut slope on the east side of River Road (north of Niblick Road to the northern City boundary) tends to slide occasionally, dumping dirt and rocks onto River Road (see Figure 6-14, Landslide Susceptibility Map).

The earthquake that occurred in December 2003 resulted in numerous small landslides, particularly noticeable along Sate Routes 46 and 41, east and west of downtown. The larger surficial slides were observed in the Franciscan Formation along SR 46. Surficial slides were also observed along river Road in Paso Robles.

6.3.7.3 Future Events

A component of the USGS study titled *Landslide Overview of the Conterminous United States* (1997) is the mapping of landslide susceptibility. To prepare the map, individual formations or groups of formations were evaluated and classified as having high, medium, or low landslide susceptibility. This map builds on the previous landslide incidence map, with the assumption that anomalous precipitation or changes in the existing conditions could initiate movement in rocks and soils that have numerous landslides incidence in parts of their outcrop areas. If 15.1 percent or more of an area may be involved in a landslide, it is classified as having a high susceptibility to landslides. If 1.5-15.0 percent of an area may be involved in a landslide, it is classified as having a medium susceptibility to landslides. Note that the study authors acknowledge that the susceptibility categories are largely subjective due to the lack of data for precise determinations. Assigning an area the lowest susceptibility categories does not mean that landslides may not occur in that area. Also, due to the highly generalized nature of the map, it is unsuitable for local planning or site selection purposes.

In general, young sedimentary and poorly consolidated rocks of Pleistocene and Pliocene age in upslope areas are more susceptible to erosion and landsliding than older igneous and sedimentary rocks. Accordingly, the low hills east and west of the Salinas River that are underlain by Pliocene and Pleistocene sands and gravels of the Paso Robles Formation are susceptible to potential landslides. The weak sandstones and shale of the Monterey Formation, which outcrop in the steep elevations west of the City, are subject to the greatest landslide potential.

Many factors contribute to the instability of hill slopes; precipitation, soil and rock lithology and induration, seismic ground shaking, steepness of slope, and manmade grading. Steep slopes and occasional wet and intensive storm conditions increase the potential for mudslides, landslides, and debris flows. Moderate to strong earthquakes may initiate landslides and other types of slope failure. Wildfires remove vegetation, increasing unstable slope conditions and the likelihood of debris/mudflow events. Paso Robles land development near or at the base of canyons, cliffs, or landslides should take these hazards into consideration during the planning, construction and estimated life of the development.

The Landscape Architecture GIS Lab of San Luis Obispo County and California Polytechnic State University has produced maps of areas susceptible to landslides (Figure 6-14). The map portrays the main area with the highest potential to slide just west of the City boundary along Peachy Canyon, Fern Canyon and Mountain Springs Roads. This area corresponds to a population density index of 100-500 (see Figure 5-6), which indicates there is a significant amount of houses/people along those roads that would be potentially impacted. The remainder of Paso Robles is defined as having low to moderate susceptibility to landslides.

6.3.8 Subsidence

6.3.8.1 Nature

Land subsidence is the loss of surface elevation and affects nearly every U.S. state. Land subsidence has numerous causes, although the primary causes are underground coal mining, groundwater and petroleum withdrawal, and the

drainage of organic soils. Due to the diversity of causes and wide range of impacts, land subsidence has been analyzed primarily by federal, state, and local agencies independently, with comparatively little focus nationally (FEMA, 1997).

Land subsidence is caused by numerous human activities and natural processes including the following: mining of coal, metallic ores, limestone, salt, and sulfur; withdrawal of groundwater, petroleum, and geothermal fluids; dewatering of organic soils; wetting of dry, low-density deposits known as hydrocompaction; natural sediment compaction; melting of permafrost; liquefaction; and crustal deformation. Land subsidence takes three major forms:

- Collapse Into Voids: The collapse of surface materials into underground voids is the most dramatic form of land subsidence and is most frequently caused by coal mining. While typically collapses are human-caused, some cavities may be natural, such as in limestone or halite. Catastrophic subsidence is most commonly caused by lowering of the water table, rapid water table fluctuation, diversion of surface water, construction, use of explosives, or impoundment of water.
- Sediment Compaction: Typically causing broad regional subsidence or a few millimeters per year, total subsidence due to sediment compaction may reach several meters over decades. Sediment compaction is the result of underground fluid withdrawal (water or petroleum), natural compaction, or hydrocompaction,
- Drainage of Organic Soils: The draining of organic soils, such as peat and muck, causes a series of processes that reduce the volume of soil. This primarily affects large wetlands or river delta areas.

Subsidence is primarily an economic hazard, threatening buildings and infrastructure, as opposed to a threat to life. It may also lead to cracks in the earth's surface called fissures, which themselves are also hazardous.

Concurrent with the preparation of this Local Hazard Mitigation Plan had been drafted, the County of San Luis Obispo prepared a draft updated Paso Robles Groundwater Basin Study. This document should be consulted for the most current information on subsidence and will be used in the next update to this Local Hazard Mitigation Plan.

6.3.8.2 History

More than 17,000 square miles of land throughout the U.S. has been lowered due to subsidence, an area roughly the size of New Hampshire and Vermont combined. More than 80 percent of the identified subsidence nationally has been due to the removal of underground water. In 1991, the National Research Council (NRC) estimated that the cost of flooding and structural damage from land subsidence in the U.S. exceeded $125 million annually. The estimation of less direct or hidden costs is complicated by difficulties identifying and mapping affected areas, establishing cause and affect relationships, assigning economic values to environmental resources, and inherent legal system conflicts. As a result, the annual total cost of subsidence is probably significantly larger (USGS, 1999).

In 1991, the NRC estimated cumulative damages from subsidence by type for U.S. states. While broad ranges were used for these estimates, they provide an indication of the relative hazard level posed by different types of subsidence. According to the NRC, underground fluvial withdrawal (i.e., withdrawal of underground water) and drainage of organic soils are clearly the largest subsidence hazards in California, with greater than $100 million in estimated cumulative damages each in 1991, as shown in Table 6-8. Moderately high subsidence damage was posed by hydrocompaction, with $10-100 million in cumulative damage. Relatively minor subsidence damage was posed by mining and sinkholes, with $0-1 million in cumulative damages each.

During the 1990's, the population of San Luis Obispo County grew steadily, and some land use has been converted from dry farming and grazing to irrigated vineyards and urban areas. Because surface water supplies are insufficient to meet the growing demand for water, groundwater pumpage has increased and the resulting water level declines have raised concern that this water resource may become overstressed. According to a study conducted in 1999 by the U.S. Geological Survey (USGS), Interferometric Synthetic Aperture Radar (InSAR) was used to help locate

subsurface structures in groundwater basins by determining seasonal and historical land surface changes. Spaceborne InSAR has been used to identify displacements of the land surface caused by aquifer system compaction in groundwater basins.

InSAR displacement maps of the Paso Robles area (based on images collected in March and August 1997) were compared with maps of seasonal changes in groundwater levels to detect the presence of aquifer system compaction. The USGS study detected the presence of three areas of subsidence, located generally in the northeast portion of the City, indicating ground surface displacement from 0.6 to 2.1 inches, as indicated in Figure 6-15. The southern and northeastern areas appeared to coincide with an area of water level decline of over 60 feet (USGS, 2001).

TABLE 6-8
ESTIMATED CUMULATIVE DAMAGE
FROM SUBSIDENCE BY TYPE IN CALIFORNIA, 1991

Subsidence Type	Cumulative Damage ($million)
Mining	$0-1
Sinkholes	$0-1
Underground Fluid Withdrawal	$>100
Hydrocompaction	$10-100
Drainage of Organic Soils	$>100

Note: Costs not converted into constant dollars. Figures can be used as a general measure of risk associated with land subsidence, but do not indicate probability or magnitude of land subsidence.

Source: FEMA, 1997 (from National Research Council, 1991).

6.3.8.3 Future Events

Standard procedures to determine the probability and magnitude of land subsidence have not been developed. However, the areas of historic subsidence in Paso Robles identified by the USGS (shown in Figure 6-15) can generally be considered to be susceptible to subsidence in the future. The City of Paso Robles is portrayed by USGS as having moderate to very high subsidence susceptibility, with concentrations of very high subsidence areas along the Salinas River and Huerhuero Creek, as well as in the east and, especially, southeast portions of the City. The magnitude of subsidence is difficult to determine in advance, however Figure 6-15 defines the range of magnitude of subsidence by color. Each “fringe,” or one color cycle, represent 1.1 inches of vertical displacement.

6.3.9 Wildland Fire

6.3.9.1 Nature

A wildland fire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may fill the area for miles around. Wildfires can be human-caused through acts such as arson or campfires, or can be caused by natural events such as lightning. Wildfires can be categorized into four types:

- Urban fires are primarily those associated with structures and the activities in and around them. Most urban fires are caused by human activity.

- Wildland fires occur in forests or other generally uninhabited areas and are fueled primarily by natural vegetation.
- Interface or intermix fires occur where development and forest interface, with both vegetation and structures providing fuel. These are also referred to as urban-wildland interface fires.
- Prescribed fires and prescribed natural fires are intentionally set or natural fires that are allowed to burn for beneficial purposes.

Over the years, development standards have become more stringent to reduce the frequency and severity of urban fires. These are greatest in areas containing older buildings that do not meet current building codes. Utility facilities also present a potential urban fire hazard. Earthquakes or floods may rupture buried gas lines, while high winds or accidents could cause overhead electric lines to break. Either condition could result in a fire. Catastrophic earthquakes could cause widespread urban fires, as multiple gas and electrical lines could be broken or disrupted.

The following three factors contribute significantly to wildland fire behavior and, as detailed more fully later, they can be used to identify wildland fire hazard areas:

- Topography: As slope increases, the rate of wildland fire spread increases. South facing slopes are also subject to greater solar radiation, making them drier and thereby intensifying wildland fire behavior. However, ridgetops may mark the end of wildland fire spread, since fire spreads more slowly or may even be unable to spread downhill.
- Fuel: Weight and volume are the two methods of classifying fuel, with volume also referred to as fuel loading (measured in tons of vegetative material per acre). Each fuel is assigned a burn index (the estimated amount of potential energy released during a fire), an estimate of the effort required to contain a wildland fire, and an expected flame length. The fuel's continuity is also an important factor, both horizontally and vertically.
- Weather: Variations in weather conditions have a significant effect on the occurrence and behavior of wildfires. Short term conditions, such as high heat, low humidity, and high winds, facilitate the ignition and rapid spread of fires. Conversely, cool temperatures, high humidity, and little to no wind reduce the risk of fires and allow fires to be contained more readily. Long-term conditions, such as prolonged drought, also play a major role in fire susceptibility.

The frequency and severity of wildland fires is also dependent upon other hazards, such as lightning, drought, and infestations (e.g., Pine Bark Beetle). In California, these hazards combine with the three other wildland fire contributors noted above (topography, fuel, weather) to present an on-going and significant hazard across much of California.

If not promptly controlled, wildland fires may grow into an emergency or disaster. Firestorms occur during extreme weather (e.g., high temperatures, low humidity, and high winds) with such intensity that fire suppression is virtually impossible. These events typically burn until the conditions change or the fuel is exhausted.

Even small fires can threaten lives and resources, and destroy improved properties. It is also important to note that in addition to affecting people, wildland fires may severely affect livestock and pets. Such events may require the emergency watering/feeding, shelter, evacuation, and even burying of animals.

The indirect effects of wildland fires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams thereby enhancing flood potential, harming aquatic life and degrading water quality.

Lands stripped of vegetation are also subject to increased landslide hazards. The result may be catastrophic debris flows, such as occurred in Southern California following in the wildfires in summer 2003.

6.3.9.2 History

Historically, wildland fires have burned thousands of acres in San Luis Obispo County, as shown in Figure 6-16. On average, 58 percent of these wildland fires are human caused, while 42 percent are lightning caused. Information on the location and size of wildland fire events in San Luis Obispo County were collected from a variety of sources. However, most of the information came from the following two sources:

- The USDA Forest Service has published a study titled *Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management* (April 2002). This study describes and makes available seven coarse-scale (1 square kilometer) resolution spatial data layers for the conterminous U.S. to support national-level fire planning and risk assessments. One of the layers, National Fire Occurrence, 1986 to 1996, contains information on Federal and non-Federal wildland fire occurrence, including date, location, area burned, and cause. Information for wildland fires in California was retrieved from this layer. These events were screened to include only fires 100+ acres in size.
- The Fire and Resource Assessment Program (FRAP), which is part of the California Department of Forestry and Fire Protection (CDF). This data consists of CDF fires 300 acres and greater in size and USFS fires 10 acres and greater throughout California from 1950 to 2003. Some fires before 1950, and some CDF fires smaller than 300 acres are also included. BLM fires are complete since 2002 for fires greater than 10 acres in size.

TABLE 6-9
SIGNIFICANT WILDFIRES, 1968-2002 (USFS, CA DEPT. OF FORESTRY)

Jurisdiction	Wildfire Size			
	100-400 acres	400-999 acres	1,000+ acres	Total
Paso Robles	1	0	1 (just outside City boundary)	2
San Luis Obispo County Total	11	1	2	14

Note: Only those wildland fires that could be accurately located (geocoded) are counted above.

Source: USDA Forest Service, CA Department of Forestry; URS, July 2004.

While Paso Robles has had urban fires, most have been relatively small and easily contained. Paso Robles contains many older structures and the City requires that such buildings be brought up to code when made aware of such buildings. Despite these activities, one larger fire occurred east of the City boundary in 1968. The fire burned approximately 1,067 acres (see Figure 6-16).

No catastrophic fires have been recorded in recent history, particularly since emergency response and building codes have been improved. During the years 1997 through 1999 Paso Robles experienced $910,151 in cumulative fire loss in property valued at $17,632,226. This equates to an average fire loss to the value figure of $51.61 loss per $1,000 of value at risk.

6.3.9.3 Future Events

Paso Robles faces two types of fire hazards that threaten lives and property: urban and wildland fires. Wildland fire may also result in the loss of natural vegetation, loss of agricultural crops, and soil erosion. The outbreak and spread of wildland fires within the planning area is a potential danger, particularly during the dry summer and fall months. The buildup of understory brush, which under natural conditions would be periodically burned off, provides fuel to result in larger, more intensive fires.

The topography, climate, and vegetation of much of the Paso Robles are conducive to the spread of wildfires. According to the California Department of Forestry and Fire Protection San Luis Obispo County Fire Hazard Map, almost all of the hillsides south of Highway 46 East, and the areas of the City north of Highway 46 East are located within "Wildland Areas that may contain substantial fire hazards and risks" (GIS Solutions Group, January 6, 2000).

Depending upon the needs of the user and the availability of data, there are many different approaches to fire modeling. However, nationally accepted or utilized wildland fire models have not been developed for the evaluation of wildland fire risk or conducting vulnerability analysis. In addition, most wildland fire modeling conducted to date has been focused on wildland fire behavior, not true probability and magnitude modeling. This is because the probability of ignition and the probable wildland fire size has generally not been considered. In addition, there have been major limitations in terms of software systems, data availability, and data coverage/resolution.

These limitations aside, with improving Geographic Information Systems (GIS) programs and data availability, there are a growing number of wildland fire hazard assessment models. In addition, as a part of the National Fire Plan, communities have also been identified across the U.S. that are at risk to wildland fires. The Fire and Resource Assessment Program (FRAP), prepared by the California Department of Forestry and Fire Protection, offers a statewide GIS layer (GRID format) of potential fire behavior rankings derived from wildland fuels and topography. The fuel ranking methodology assigns ranks based on expected fire behavior for unique combinations of topography and vegetative fuels under a given severe weather condition (wind speed, humidity, and temperature). The fuel ranking procedure makes an initial assessment of rank based on an assigned fuel model (based on surface fuels) and slope, then raises ranks based on the amount of ladder and/or crown fuel present to arrive at a fuel rank.

The fuel ranks for Paso Robles fall within three degrees of hazard: extreme, high and medium. In Figures 6-17 and 6-18, it is apparent that fire hazard increases where the slope increases. The surface fuels are displayed in Figure 5-4 (Vegetation Map). The areas delineated as grassland and oak woodland corresponds to areas of high and extreme hazard designations in the Wildfire Hazard Areas map.

Generally, the City is defined as a medium to high hazard area, with more extreme hazard areas located west of the City, within the steeper terrain and canyons and east of the Salinas River, as slopes and vegetation increases (see Figure 6-17 Slope Model Map and 6-18 Wildfire Hazard Area). The areas in and around the City that pose the highest fire hazard have steep slopes of 10-15% or greater and dense or tall vegetation, consisting of oak woodlands, Freemont cottonwood, and grassland (see Figure 5-3, Vegetation Map). These occur primarily on hilltops and hillsides surrounding the developed areas of the City.

6.4 INVENTORY ASSETS

The third step in the risk assessment process is the identification of assets that may be affected by hazard events. The inventory of assets is divided into the following five major categories, each of which is analyzed in detail below:

- Population
- Buildings
- Critical facilities and infrastructure

Detailed information on these assets was provided in Section 5: Community Description. This information was from a variety of sources, including the US Census Bureau, Barclay Maps, and HAZUS-MH.

6.5 VULNERABILITY ASSESSMENT

Vulnerability refers to the susceptibility to physical injury, harm, damage, or economic loss of the exposed people, buildings and infrastructure. City elements (or "assets") exposed to each hazard have been listed and mapped, and their vulnerability is discussed below. The specific requirements for the vulnerability assessment are shown in Table 6-10 to Table 6-13.

TABLE 6-10
DMA 2000 REQUIREMENTS – RISK ASSESSMENT – ASSESSING VULNERABILITY – OVERVIEW

Assessing Vulnerability: Overview
Requirement §201.6(c)(2)(ii): *[The risk assessment* **shall** *include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description* **shall** *include an overall summary of each hazard and its impact on the community.*
Element
A. Does the plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?
B. Does the plan address the **impact** of each hazard on the jurisdiction?

Source: FEMA, March 2004.

The fourth step of the risk assessment and its primary intent is the vulnerability assessment. This provides an approximation of vulnerability and potential losses from hazards, typically based on a commonly accepted methodology and event type. Wherever possible, a quantitative and comparable assessment of vulnerability to hazards was made. A summary of the vulnerability assessment is provided in Table 6-14.

TABLE 6-11
DMA 2000 REQUIREMENTS – RISK ASSESSMENT – ASSESSING VULNERABILITY – IDENTIFYING STRUCTURES

Assessing Vulnerability: Identifying Structures
Requirement §201.6(c)(2)(ii)(A): *The plan* ***should*** *describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area .*
Element
A. Does the plan describe vulnerability in terms of the **types and numbers** of **existing** buildings, infrastructure, and critical facilities located in the identified hazard areas?
B. Does the plan describe vulnerability in terms of the **types and numbers** of **future** buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA, March 2004.

TABLE 6-12
DMA 2000 REQUIREMENTS – RISK ASSESSMENT – ASSESSING VULNERABILITY – ESTIMATING POTENTIAL LOSSES

Assessing Vulnerability: Estimating Potential Losses
Requirement §201.6(c)(2)(ii)(B): *[The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate … .*
Element
A. Does the plan estimate **potential dollar losses** to vulnerable structures?
B. Does the plan describe the **methodology** used to prepare the estimate?

Source: FEMA, March 2004.

TABLE 6-13
DMA 2000 REQUIREMENTS – RISK ASSESSMENT – ASSESSING VULNERABILITY – ANALYZING DEVELOPMENT TRENDS

Assessing Vulnerability: Analyzing Development Trends
Requirement §201.6(c)(2)(ii)(C): *[The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*
Element
A. Does the plan describe land uses and development trends?

Source: FEMA, March 2004.

Note that the loss estimates provided herein use the best data currently available and the methodologies applied result in an approximation of risk. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards, their effects on the built environment, as well as approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and critical facilities and infrastructure to hazards. It is beyond the scope of this first City of Paso Robles Hazard Mitigation Plan to analyze other types of hazard impacts (e.g., people injured or killed, shelter requirements, loss of facility/system function, and economic losses). The data necessary for this detailed level of analysis is also not currently available. Such impacts may be addressed as possible with future updates of the plan.

An important detail to note for the Vulnerability Assessment summarized in Table 6-14 below, is that the earthquake hazard considers liquefaction, ground shaking and fault proximity. Several GIS maps were created to assess the earthquake hazard (see Figures 6-2 through 6-6), and therefore all the data displayed in these maps were considered in assessing the City's vulnerability to earthquakes. The hazard zones identified in the figures were combined (a "layering effect" used in GIS analyses), creating a composite earthquake map that enables a more thorough analysis of the hazard.

TABLE 6-14
POTENTIAL HAZARD VULNERABILITY ASSESSMENT

Hazard	Methodology	Population (approximate)	Residential Parcels		Nonresidential Parcels		Critical Buildings, Facilities and Infrastructure		Development Trends: Future Development Areas Affected? Which?
			No.	Estimated Improvement Value (x$1000)	No.	Estimated Improvement Value (x$1000)	No.	Estimated Improvement Value (x$1000)	
Drought	Descriptive		NA	NA	NA	NA	NA	NA	
Earthquake identified zones (liquefaction, shaking, fault proximity)	Exposure: High	2,478	1,113	3,195,532	313	214,321	7	133,775	C1, C7
	Exposure: Moderate	23,464	7,915	7,992,245	903	316,559	28	177,223	C1, C2, C3, C4, C5, C6, C7, C12, C14, C15, C16, C17, C18, C19
Expansive Soils	Exposure: High	8,312	4,248	5,162,690	205	171,240	18	98,347	C1, C2, C4, C5, C7, C16, C17, C19
	Exposure: Moderate	7,689	2,363	4,808,385	653	173,242	19	82,301	C1, C6, C7, C12, C16, C18
Extreme Heat	Descriptive		NA	NA	NA	NA	NA	NA	
Flood	Exposure: 100-year flood zone	570	205	422,830	170	89,735	9	86,517	C1, C6, C7, C16
HazMat	Exposure: 1-mile radius EHS facilities	22,892	7,451	4,759,843	941	307, 975	28	168,147	C1, C2, C3, C5, C6, C7, C12, C14, C16, C18, C19
	Exposure: 1-mile buffer transport corridors	9,164	2,296	3,687,424	896	299,559	27	216,405	C1, C3, C4, C6, C7, C12, C16, C18
Landslide	Exposure: High/Historic	99	6	34,534	0	0	1	940	None
	Exposure: Moderate	10,306	4,842	7,939,067	155	123,327	18	34,420	C1, C2, C3, C4, C7, C15, C17, C18, C19
Subsidence	Exposure: identified zones	2,875	1,130	1,485,798	145	126,472	7	67,661	C1, C14, C17, S2
Wildland Fire	Exposure: High	19	68	351,088	17	14,495	7	49,017	C7, C17
	Exposure: Medium	3,026	2,880	7,282,822	373	264,399	29	121,138	C1, C2, C3, C4, C5, C6, C7, C12, C14, C15, C16, C17, C18, C19
	Exposure: Low	14,441	7,437	8,493,538	1,081	434,927	36	212,320	C1, C2, C3, C4, C5, C6, C7, C12, C14, C15, C16, C17, C18, C19

In addition, several of the hazards that are profiled in the preceding sections may not include corresponding exposure and loss data and are, therefore, not included in the vulnerability assessment which follows. Drought and winter-storms, for example, are wide-ranging, unpredictable and often long-term hazards to humans, animals, and plants. This variability in historic occurrence of these phenomena prevents meaningful predictability. Due to these factors the Drought and Extreme Heat hazards, though creating vulnerability for the residents and structures in Paso Robles, do not include a quantitative analysis in the vulnerability assessment.

6.5.1 Methodology

Most of the hazards analyzed in this Plan, except for Drought and Extreme Heat, have associated boundaries and/or levels of impact that represent the potential area and severity in which the hazard may occur. In most cases, the impact boundaries are divided into areas that reflect different levels or zones of impact. Within these areas are assets, which are vulnerable to damage or harm from the hazards. These assets are grouped into five major categories for the purpose of the vulnerability assessment:

- Population
- Residential parcels
- Nonresidential parcels
- Critical buildings, facilities and infrastructure
- Areas planned for future development

Population information was obtained for the City of Paso Robles from census block data. Using an integrated Geographic Information System (GIS) platform, each specific hazard and degree of impact (when applicable) was overlaid (using a “grid” method) on the census block data and impact was determined based on whether the hazard area intersected any portion of the census block. Affected census blocks were selected this way and the total population affected was summarized. Parcel data was obtained through a consultant for the City (Barclay Maps). Land use was assigned to the parcels as defined in the City’s General Plan. The Assessor’s improvement value was used to determine dollar value for buildings for each residential and nonresidential parcel. Where the assessor’s improvement value was not available, the average cost per residential/nonresidential acre for the City was used to estimate approximate values.

Critical facilities were identified by the City and by downloading national data from FEMA’s HAZUS-MH program. The critical facilities provided by HAZUS-MH were reconciled and joined with the critical facilities provided by the City. These facilities were then incorporated into the GIS parcel layer, yielding one layer to indicate locations of residential, nonresidential and critical facilities. The City supplied URS with values for the critical facilities. When values were not available, facility values estimated by HAZUS-MH were used.

Each specific hazard and degree of hazard, when applicable (i.e. wildfire hazard was analyzed for extreme, high and moderate risks), was overlaid onto the GIS parcel layer. Impact was determined based on whether the hazard boundary intersected any portion of a specific parcel. These selected parcels were then summarized based on what types of structures are on the parcel: residential, nonresidential and/or critical facility. Numbers of parcels affected and dollar amounts for each category were summarized for each hazard and degree of hazard.

Future development was created from the City’s parcel layer and the General Plan. Impact on future development was determined by overlaying each hazard boundary with the parcels marked for future development according to the General Plan (refer to Table 6-15). Impact was determined based on whether the hazard area intersected any portion of a specific parcel designated for future development.

6.5.2 Earthquake

Of all the hazards assessed in this section, an earthquake poses the greatest exposure and potential loss for the City of Paso Robles, as shown in Table 6-14. All of the city's population, residential and nonresidential structures, and critical buildings, facilities, and infrastructure are exposed to either high or moderate ground shaking zones.

Figures 6-2 through 6-6 clearly display the City's vulnerability to earthquakes. The City's close proximity to the active San Andreas Fault and the affiliated potential for intense ground shaking, as calculated by CGS and USGS, results in a potential hazard that could impact the entirety of the City. The City is defined by CGS and USGS as having a probable peak ground acceleration (PGA) of 20 - 40 percent (Figure 6-5). Table 6-5 defines this PGA as corresponding to an earthquake somewhere around a magnitude 5.0 to 7.0 on the Richter scale.

The City falls within two designated zones of ground shaking (another earthquake measurement, similar to peak ground acceleration), also defined by CGS and USGS (Figure 6-6). The northeast end of the City has potential for high ground shaking intensity, as well as small areas along the east side of Highway 101 and the southeast end of the City. Fortunately, these areas are not as highly populated as other portions of the city, although they do include 2,478 people, 1,113 residential parcels (worth $3.2 billion), 313 non-residential (worth $214.3 million), and 7 critical facilities (worth $133.8 million).

The remainder of the city is in an area of moderate ground shaking. This includes 23,464 people, 7,915 residential parcels (worth $7.9 billion), 903 non-residential parcels (worth $316.6 million), and 28 critical buildings (worth $177.2 million). Included in this is a cluster of approximately 30 structures in the main downtown area, west of Highway 101, which the City has designated as unreinforced masonry structures (URMs). These buildings have a high potential for damage if an earthquake occurred, especially an earthquake of a magnitude 5.0 or greater.

The risk from earthquakes will continue to increase as the city's population grows and residential and nonresidential structures are built. The occurrence of the San Simeon earthquake in 2003 has heightened awareness of the hazard among city officials as well as the population, providing opportunity for appropriate planning for future events.

6.5.3 Expansive Soils

Expansive soils pose a moderate risk to Paso Robles, particularly given the slow nature of the hazard. Figure 6-7 shows that the expansive soils in the City are fairly evenly distributed between highly expansive soils and moderately expansive soils.

The highly expansive soils mainly occur in the southeast and northeast portions of the City, which are only moderately populated. This includes approximately 8,312 people, 4,248 residential parcels (worth $5.2 billion), 205 non-residential (worth $171.2 million), and 18 critical facilities (worth $98.3 million).

The moderately expansive soils occur mostly on the west end of the City, which is also moderately populated. This includes 7,689 people, 2,363 residential parcels (worth $4.8 billion), 653 non-residential (worth $173.2 million), and 19 critical facilities (worth $82.3 million).

The main area of concern, relative to population, is the center and western portions of the City where the population density is the densest, per square mile (see Figure 5-6). This area displays some low potential shrink-swell soils, but mostly moderate and high shrink-swell soils. There is also a large amount of highly expansive soils in the southeast section of the City, which displays a population density of 10,000 – 69,000 people per square mile in a few small areas.

In regards to structures, the majority of the unreinforced masonry structures and the critical facilities fall within the moderate hazard designation for shrink-swell potential. Many schools are built on soils that are highly expansive (refer to Figures 5-7 and 6-7).

6.5.4 Flood

The risk posed by stream and riverine flooding to Paso Robles is moderate, as shown by Table 6-14 and Figure 6-10. Exposed within the 100-year flood zone are 570 people, 205 residential parcels (worth $422.8 million), 170 nonresidential buildings (worth $89.7 million), and 9 critical facilities (worth $86.5 million).

The 100-year flood zone is comprised of a relatively small portion of the City. However, the floodplain of the Salinas River affects a significant portion of the city's downtown area. The Salinas Dam, located on the Salinas River upstream of Paso Robles in the vicinity of the City of San Luis Obispo, has reduced the threat of flooding from smaller, more frequent flood events on the river, but is not designed to provide protection from the 100-year flood (FEMA, 1981). However, the Salinas River floodplain is not densely occupied. Tributaries to the Salinas River, such as Huerhuero Creek, are more likely to flood during smaller, more frequent storms, and the risk of flood damage to structures along these streams is likely to be greater.

In addition to identified flood hazards along riverine flooding sources, the city is at risk from locally heavy runoff and slope failures during heavy rainfall, such as the 1998 El Nino event.

Furthermore, a 50-mile pipeline project has been proposed to increase water availability to San Luis Obispo County. The $190 million pipeline project would transport 17,000 acre-feet of water from Nacimiento Lake (northeast of the City of Paso Robles) to San Luis Obispo, serving several communities along the way, including Paso Robles. It is a concern for some that this pipeline may introduce a potential flooding hazard to the City, if the pipeline were to break. Mitigation of this concern was addressed in the Environmental Impact Report for the Nacimiento Pipeline (2003). This potential issue will be assessed in future updates of this Plan.

6.5.5 Hazardous Materials

Overall, the City of Paso Robles faces a moderate risk from exposure to hazardous materials incidents, as shown in Table 6-14. This exposure was determined via two methods, the first of which is a one-mile buffer around the seven Extremely Hazardous Substance (EHS) sites and the second of which is a 1-mile buffer around the major transportation corridors (Highway 101 and 46 East, and the railroad line, which is predominantly parallel to Highway 101).

Within the one-mile buffer around the seven EHS sites, exposed are 22,892 people, 7,451 residential parcels (worth $4.8 billion), 941 nonresidential parcels (worth $308.0 million), and 28 critical facilities (worth $168.1 million). These figures are for all seven EHS facilities (Figure 6-13) and, therefore, overstate the exposure since the probability of all seven facilities having an event simultaneously is very low. These facilities are predominantly located within industrial and public facility zoned areas within the City (e.g., near the airport and along Highway 101). However, three EHS facilities are located in downtown Paso Robles adjacent to residential neighborhoods.

Within the one-mile buffer around the transportation facilities, exposed are 9,164 people, 2,296 residential parcels (worth $3.7 billion), 896 nonresidential parcels (worth $299.6 million), and 27 critical facilities (worth $216.4 million). As above, these figures are for the entirety of the transportation corridors and, therefore, overstate the exposure since a hazmat event along the corridors is unlikely to affect all of the area within the one-mile buffer.

6.5.6 Landslide

Overall, Paso Robles faces a moderate risk from landslides. The low hills east and west of the Salinas River have a moderate risk from landslides (see Figure 6-14). In this area are 10,306 people, 4,842 residential parcels (worth $7.9 billion), 155 nonresidential buildings (worth $123.3 million), and 18 critical facilities (worth $34.4 million).

The steep elevations west of the city, as well as a steep ridge along the east side of the Salinas River, are subject to the greatest landslide potential. These areas of high landslide risk area include 99 people and 6 residential parcels (worth $34.5 million), and 1 critical facility (worth $940 thousand).

6.5.7 Subsidence

The data for subsidence in Paso Robles is largely unrefined. Figure 6-15 (Subsidence Susceptibility Map) is a pixilated map, which is difficult to read, however, the available data does generally demonstrate areas with higher potential for subsidence. These areas are mainly along the south side of Huerhuero Creek and in the southeast portion of the City where a tributary of the Salinas River branches to the east.

In these areas demonstrated as having a relatively high subsidence potential (Figure 6-15), there are 2,875 people, 1,130 residential parcels (worth $1.5 billion), 145 non-residential parcels (worth $126.5 million), and 7 critical facilities (worth $67.7 million).

Concurrent with the preparation of this Local Hazard Mitigation Plan had been drafted, the County of San Luis Obispo prepared a draft updated Paso Robles Groundwater Basin Study. This document should be consulted for the most current information on subsidence and will be used in the next update to this Local Hazard Mitigation Plan.

6.5.8 Wildland Fire

Much of the densely populated areas within the City (see Figure 5-6) have wildfire hazard designations of medium or low, with a smaller portion of the city designated as having high wildfire hazard (see Figure 6-18). Within this area of high wildfire exposure are 19 people, 68 residential parcels (worth $351.1 million), 17 nonresidential parcels (worth $14.5 million), and 7 critical facilities (worth $49.0 million). The high wildfire hazard exists mainly in the hills west of the City along Mountain Springs Road and Peachy Canyon Road, as well as south of the City in areas along Spanish Camp Road and Prospect Avenue (see Figure 6-18).

Of less danger, but much greater exposure, are areas of medium wildfire hazard. This includes 3,026 people, 2,880 residential parcels (worth $7.3 billion), 373 nonresidential parcels (worth $264.4 million), and 29 critical facilities (worth $121.1 million).

Again of lesser danger, but of even greater exposure, are areas of low wildfire hazard. This includes 14,441 people, 7,437 residential parcels (worth $8.5 billion), 1,081 nonresidential parcels (worth $435.0 million), and 36 critical facilities (worth $212.3 million).

7.0 MITIGATION STRATEGY

The City of Paso Robles's Hazard Mitigation Strategy describes the City's blueprint for reducing potential losses due to natural and human-caused hazards. This Strategy is based on the ability of Town authorities, policies, programs, and resources to expand on and improve existing tools that will mitigate the effects of natural and human-caused hazards in the City's physical and human environment. Table 7-1 defines the DMA requirements for planning a hazard mitigation strategy. The City's hazard mitigation goals, along with their corresponding objectives, have guided the development and implementation of the specified mitigation actions.

TABLE 7-1
DMA 2000 REQUIREMENTS – MITIGATION STRATEGY

MITIGATION STRATEGY: *§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

Source: FEMA, March 2004.

7.1 CAPABILITY ASSESSMENT

While not required by the *Disaster Mitigation Act of 2000*, an important component of the Mitigation Strategy is a review of the City's resources in order to identify, evaluate, and enhance the capacity of local resources to mitigate the effects of hazards. The first part of the Capability Assessment is a review of Paso Robles's legal and regulatory capability, including ordinances, codes, and plans to address hazard mitigation activities. This Assessment also describes the administrative and technical ability of Paso Robles's staff and personnel resources. The third part of the Assessment, which crosses all technical and regulatory boundaries, is the fiscal capability of Paso Robles to provide the financial resources to implement the mitigation strategy. The final part of the Capability Assessment is a summary review of the activities of each administrative division within the City of Paso Robles that supports hazard mitigation activities, and details any previous mitigation activities undertaken by these entities.

The legal and regulatory hazard mitigation capability of the City of Paso Robles, as shown in Table 7-2, including a review of existing ordinances and codes that affect the physical or built environment in Paso Robles. In particular, the City's applicable Building Codes, Zoning Ordinance, Subdivision Regulations, Capital Improvement Plan, and other regulatory development guides provide specified support to hazard mitigation activities. Other less prescriptive documents that describe Paso Robles's hazard mitigation capability include the City's various General Plan elements, Economic Development Strategy, Emergency Response Plan, and Post-Disaster Recovery Plans, among others. This section lists these various tools, recognizes the local authority of the specific activity, and identifies the interaction of the specific tools with State and higher-level authorities. These regulatory tools listed in Table 7-2 below aid the City's mitigation efforts by identifying the capabilities and resources that allow the implementation and support of the mitigation efforts highlighted in this Plan.

The administrative and regulatory capability of Paso Robles, as shown in Table 7-3, provides an identification of the staff, personnel, and department resources available to expedite the actions identified in the Mitigation Strategy. Specific resources reviewed include those involving technical personnel that apply planning and engineering, floodplain management, Geographic Information Systems (GIS), environmental scientists, management authority, and various other services needed to facilitate hazard mitigation in Paso Robles.

The fiscal capability of the City of Paso Robles to achieve the goals and objectives of the Mitigation Strategy is shown in Table 7-4. Specific financial and budgetary tools available to Paso Robles include federal entitlements, City

TABLE 7-2
LEGAL AND REGULATORY CAPABILITY

Regulatory Tools (ordinances, codes, plans)	Local Authority (Y/N)	Does State Prohibit? (Y/N)	Higher Level Jurisdiction Authority (Y/N)	Comments
A. Building code	Y	N	N	
B. Zoning ordinance	Y	N	N	
C. Subdivision ordinance or regulations	Y	N	N	
D. Special purpose ordinances (floodplain management, stormwater management, hillside or steep slope ordinances, wildland fire ordinances, hazard setback requirements)	Y	N	Y	Floodplain Management Ordinance (Municipal Code Chapter 21.14); Stormwater Management Plan (URS, Jan 2003); Hillside zoning regulations are focused on density reduction (as slope increases) and aesthetics; City has no wildfire or hazard setback ordinances.
E. Growth management ordinances (also called "smart growth" or anti-sprawl programs)	N	N	N	
F. Site plan review requirements	Y	N	N	
G. General or comprehensive plan	Y	N	N	
H. A capital improvements plan	Y	N	N	
I. An economic development plan	Y	N	N	
J. An emergency response plan	Y	N	N	
K. Real estate disclosure requirements	Y	N	N	As the situation warrants, the City adds conditions to development applications to require recorded notices

TABLE 7-3
ADMINISTRATIVE AND TECHNICAL CAPACITY

Staff/Personnel Resources	Y/N	Department/Agency and Position
A. Planner(s) or engineer(s) with knowledge of land development and land management practices	Y	Planners: Community Development Department: Director, City Planner, Housing Programs Manager, Associate Planner; Engineers: Community Development Department: City Engineer
B. Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Community Development Department: Building Official and 3 building inspectors Public Works Department: Capital Projects Engineer and Utilities Engineer (position presently vacant)
C. Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	Y	See responses to A and B, above.
D. Floodplain manager	Y	Community Development Department: City Planner
E. Surveyors	N	
F. Staff with education or expertise to assess the community's vulnerability to hazards	Y	Police Chief and Chief of Emergency Services
G. Personnel skilled in GIS and/or HAZUS	N	
H. Scientists familiar with the hazards of the community	N	
I. Emergency manager	Y	City Manager
J. Grant writers	Y	Community Development Department: Housing Programs Manager; Public Works Department: Capital Projects Engineer

TABLE 7-4
FISCAL CAPABILITY

Financial Resources	Accessible or Eligible to Use (Yes/No/Don't Know)
A. Community Development Block Grants (CDBG)	Yes
B. Capital improvements project funding	Yes
C. Authority to levy taxes for specific purposes	No
D. Fees for water, sewer, gas, or electric service	Yes – water & sewer
E. Impact fees for homebuyers or developers for new developments/homes	Yes
F. Incur debt through general obligation bonds	Yes
G. Incur debt through special tax and revenue bonds	Yes

general fund money, secondary sales and property taxes, user fees for infrastructure, impact fees applied to new development, and various unique debt service techniques including bonding indebtedness.

The local mitigation capability assessment describes the potential hazard mitigation activities that occur in the City of Paso Robles's many departments and divisions. Most importantly, the tables below detail the City's plans, policies, regulations, funding, and practices within these divisions that promote or facilitate hazard mitigation in Paso Robles, and provides contact information for each division in the City.

A specific example of a hazard mitigation activity that the City implements is the National Flood Insurance Program (NFIP). In 1968, Congress created the NFIP in response to the rising cost of taxpayer funded disaster relief for flood victims and the increasing amount of damage caused by floods. The program is based on an agreement between the community and the Federal government that if the community takes steps to reduce future flood losses through floodplain management, the Federal government will make affordable flood insurance available within the community cover flood losses that do occur.

The City of El Paso de Robles entered the NFIP on April 9, 1974. FEMA published a Flood Insurance Rate Map (FIRM) for the city on September 16, 1981. The city has implemented a floodplain management ordinance that complies with the minimum requirements of the NFIP. Among other requirements, this ordinance requires new or substantially improved structures located in the 100-year floodplain to be elevated so that the lowest floor is above the base flood elevation shown on the FIRM. FEMA conducted an evaluation of the city's compliance with the NFIP on June 15, 2001, and did not find any violations of the city's floodplain management ordinance.

Another example of the City's existing efforts to mitigate hazards is the existing county and city plans that address waste and emergency response procedures. Counties are required by state law to prepare hazardous waste management plans. San Luis Obispo County's Hazardous Waste Management Plan (HWMP) addresses the treatment, storage, and disposal of such materials. The primary goal of the plan is to protect public health by promoting the safe use and disposal of hazardous waste. To accomplish this, the plan provides for the reduction of hazardous waste through source reduction, recycling, and on-site handling and treatment methods. The HWMP is

based on the analysis of the current and projected hazardous generation rates within the County and the facilities available for hazardous waste storage, treatment, or disposal (General Plan, 2003).

The City has developed a Multi-Hazard Emergency Response Plan, which also addresses Hazardous Materials Response. The plan identifies potential HAZMAT risks and identifies methods to rapidly mobilize and take the necessary actions with resources available to save lives, reduce injuries, and minimize property/environmental damage from hazardous materials releases. The Plan addresses both transportation and fixed installation emergencies. The Plan identifies transport of hazardous materials on the rail line as posing a significant threat to the community.

7.2 GOALS, OBJECTIVES, AND ACTIONS

The following vision and mission statement were developed by the City of Paso Robles Hazard Mitigation Plan Team during the hazard mitigation plan preparation process and provided guidance to those involved in the preparation of *City of Paso Robles Hazard Mitigation Plan*:

Vision: Paso Robles will be disaster resistant, enabling our residents to enjoy an environment where the effects of disasters are greatly reduced or eliminated.

Mission: The mission of the Paso Robles Local Mitigation Plan is to encourage emergency managers to set goals according to public risk and identified need for protection of life, property, including the environment and to outline a strategy for implementation of mitigation projects.

In order to accomplish the above vision and mission, specific goals and objectives have been established. Below is a review of mitigation strategy terms, followed by the City's mitigation strategy.

7.2.1 Definitions

For the purpose of this Plan, the following definitions of Goals, Objectives, Actions and Implementation Strategy have been adopted from *Disaster Mitigation Act of 2000* guiding documents, and have been accepted as functional by all levels of government involved in hazard mitigation.

Goals: General guidelines that explain what you want to achieve. Goals are usually broad statements with long-term perspective.

Example: Goal 1: Protect subdivisions from flooding.

Objectives: Defined strategies or implementation steps intended to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined time horizon.

Examples: Objective 1.A: Reduce the number of structures in the 100-year floodplain.

Objective 1.B: Minimize future damage due to flooding of current structures in the 100-year floodplain.

Actions: Specific actions that help achieve goals and objectives. Multiple mitigation actions may be defined to feed into an evaluation of the alternative actions.

Examples: Action 1.A.1: Adopt zoning ordinances prohibiting new residential development in the 100-year floodplain.

Action 1.A.2: Relocate 5 residential structures on XYZ Street.

Action 1.B.1: Elevate 2 commercial structures on ABC Street.

Action 1.B.2: Retrofit 10 residential structures on XYZ Street with storm shutters, elevated utilities, and water back flow valves.

Implementation Strategy: A comprehensive strategy that describes how the mitigation actions will be implemented.

Questions: How will the mitigation actions be prioritized?

Who will implement them?

When will they be implemented?

How will they be implemented?

7.2.2 Goals, Objectives, and Potential Actions

In accordance with the *Disaster Mitigation Act of 2000*, the City of Paso Robles developed goals to reduce the City's vulnerability to natural and human-caused hazards, as shown in Table 7-5 and Table 7-6.

TABLE 7-5
DMA 2000 REQUIREMENTS – MITIGATION STRATEGY – LOCAL HAZARD MITIGATION GOALS

Local Hazard Mitigation Goals
Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy* **shall** *include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*
Element
A. Does the plan include a description of mitigation **goals** to reduce or avoid long-term vulnerabilities to the identified hazards? (GOALS are long-term; represent what the community wants to achieve, such as "eliminate flood damage"; and are based on the risk assessment findings.)

Source: FEMA, March 2004.

TABLE 7-6
DMA 2000 REQUIREMENTS – MITIGATION STRATEGY –
IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

Identification and Analysis of Mitigation Actions
Requirement §201.6(c)(3)(ii): [The mitigation strategy **shall** *include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*
Element
A. Does the plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?
B. Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?
C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?

Source: FEMA, March 2004.

Listed below are the City of Paso Robles' specific hazard mitigation goals and objectives as well as related potential actions. For each goal, one or more objectives have been identified that provide strategies to attain the goal. Where appropriate, the City has identified a range of specific actions to achieve the objective and goal.

The goals and objectives were originally derived from the preliminary draft *State of California Enhanced Hazard Mitigation Plan* that was developed parallel to the *City of Paso Robles Hazard Mitigation Plan* as well as those of other San Luis Obispo County jurisdictions. The City of Paso Robles Hazard Mitigation Plan Team modified the goals and objectives in order to account for historic or potential hazards that could threaten the health, safety and welfare of Paso Robles's residents, as well as the social, economic and physical fabric of the community. The Paso Robles Team met several times to consider potential goals, objectives, and actions. At these meetings, specific consideration was given to the City's hazard identification/profiles and the vulnerability assessment results.

Members of the Paso Robles Hazard Mitigation Plan Team included representatives of numerous City departments involved in hazard mitigation planning, including the City Manager, the City Police Department, the City Fire Department (Emergency Services), the City Public Works Department, the City Community Development Department and representatives of the City's schools. In addition, the draft *City of Paso Robles Hazard Mitigation Plan,* including draft goals, objectives and actions, was available for review and comment by the public at a public meeting. The Paso Robles City Council has reviewed and adopted the plan.

Goal 1. Promote disaster-resistant future development.

Objective 1.A Encourage and facilitate the development and updating of the General Plan and zoning ordinance to minimize or mitigate exposure to hazards and, if necessary, limit or condition development in the hazard areas defined by the maps in this Hazard Mitigation Plan.

Action 1.A.1 Establish periodic monitoring and review of the City's General Plan and Zoning Ordinance to determine effectiveness of the Goals and Objectives. Based on the results, amend as necessary.

Objective 1.B Encourage and facilitate the adoption of building codes that protect existing assets and minimize new development in hazard areas.

Action 1.B.1 Continue to implement and improve the City's Uniform Building Codes relative to fire safety (fire-retardant roof covering and sprinkler systems) and flood safety, and investigate, and implement if feasible, new measures to avoid impacts in landslide-prone areas (hillsides) and in potential subsidence areas.

Objective 1.C. Improve the City's hazard identification and mitigation capabilities.

Action 1.C.1 Support the acquisition and development of Geographic Information Systems (GIS) capabilities within the City.

Action 1.C.2 Investigate, and implement if feasible, preparation of a comprehensive and probability-based hazard risk assessment for City, including annualized loss estimates.

Goal 2. Promote public understanding, support and demand for hazard mitigation.

Objective 2.A Promote partnerships to identify, prioritize, and implement mitigation actions between the City and the Federal Emergency Management Agency (FEMA), the State of California, San Luis Obispo County, other local governments, as well as private industry, civic and non-profit groups.

Action 2.A.1 Continue to seek availability of Pre Disaster Mitigation (PDM) and Hazard Mitigation Grant Program funds (HMGP).

Action 2.A.2 Explore a variety of federal, state, and local funding sources for the implementation of hazard mitigation actions.

Action 2.A.3 Continue to maintain a relationship with the California Office of Emergency Services and the San Luis Obispo county Office of Emergency Services.

Objective 2.B Educate the public to increase awareness of hazards and opportunities for mitigation actions.

Action 2.B.1 Make available appropriate public information sheets produced by FEMA that include suggested hazard mitigation actions to the City's residents, businesses, and community organizations.

Action 2.B.2 Post the City's Hazard Mitigation Plan on the City website.

Action 2.B.3 Announce approval of Hazard Mitigation Plan with suggested mitigation actions through a variety of media outlets.

Action 2.B.4 Make available appropriate hazard mitigation brochure(s) produced by FEMA to the City's residents, businesses, and community organizations.

Action 2.B.5 Place links on the City's website to other relevant websites, including the Federal Emergency Management Agency (FEMA), California Office of Emergency Services (CalOES), and San Luis Obispo County Office of Emergency Services.

Goal 3. Build and support local capacity to warn the public about emergency situations and assist in their response.

Objective 3.A Improve upon existing capabilities to warn the public of emergency situations.

Action 3.A.1 Develop and implement a local Emergency Alert System (EAS) in order to eliminate the need to use the County's EAS.

Action 3.A.2 Support San Luis Obispo County Department of Emergency Management in the development of a reverse 9-1-1 system (enabling the City to inform residents of impending hazards).

Objective 3.B Ensure that City officials and emergency response personnel are informed of and familiar with the City's Emergency Response Plan (ERP) and their associated specific responsibilities and roles.

Action 3.B.1 Conduct an annual review of the City's recently updated (2004) Emergency Response Plan (ERP) and a minimum of one disaster drill each year as a refresher, to instruct new key staff, and to identify needed plan updates.

Goal 4. Reduce the possibility of damage and losses due to floods.

Objective 4.A Develop a comprehensive approach to reducing the possibility of damage and losses due to floods.

Action 4.A.1 The City will continue efforts toward water infrastructure improvement of channels, storm drains, diversions, and retention basins in the City for flood protection.

Action 4.A.2 Encourage bridge or culvert construction where roads are in locations susceptible to flooding.

Objective 4.B Coordinate with and support existing efforts to mitigate floods.

Action 4.B.1 The City will continue to participate in the Community Rating System (CRS) program and get credit for the various activities that assist property owners in receiving reduced insurance premiums.

Action 4.B.2 The City will continue to utilize the County's EAS (Emergency Alerting System) as a means of providing real-time weather information to City departments.

Action 4.B.3 Continue the production of an updated storm drain atlas for the City's Storm Drain Master Plan that identifies potential drainage hazards, solutions, budgets, and priorities.

Goal 5. Reduce the possibility of damage and losses due to wildland fires.

Objective 5.A Investigate and implement if feasible, developing methods to minimize damage to homes and other structures from wildland fires.

Action 5.A.1 Ensure that subdivision regulations for new subdivisions allow adequate access for fire apparatus.

Action 5.A.2. Ensure that building codes for all new homes prohibit the use of untreated wood shake roofs and encourage the installation of a spark arresting system on the chimneys of new homes with wood burning fireplaces.

Action 5.A.3 Investigate, and implement if feasible and appropriate, mandating the installation of fire-extinguishing sprinklers in new homes and substantial renovations.

Objective 5.B Educate the public about wildland fire dangers and the steps that can be taken to prevent or minimize their effects.

Action 5.B.1 Ensure that the City's web page provides sufficient guidance on wildland fire mitigation to the public and post the City's Major Fire Plan on the web page (Annex E to the Multi-Hazard Emergency Response Plan).

Action 5.B.2 Make available wildland fire mitigation information to persons applying for building permits in the City of Paso Robles.

Goal 6. Reduce the possibility of damage and losses due to extreme heat and drought.

Objective 6.A Support the State's comprehensive approach to reducing the possibility of damage and losses due to drought.

Action 6.A.1 Encourage, where appropriate, the use of heat and drought tolerant landscaping at City facilities and projects.

Objective 6.B Protect existing assets with the highest relative vulnerability to the effects of drought.

Action 6.B.1 Encourage the use of reclaimed (gray) water for appropriate applications.

Action 6.B.2 Encourage actions that will recharge aquifers in addition to the recharge of the Salinas River from the Wastewater Treatment Plant.

Objective 6.C Support State and local water conservation messages and programs through a variety of media.

Action 6.C.1 Post water conservation messages and newspaper articles relative to the City's water resources on the City's website.

Goal 7. Reduce the possibility of damage and losses due to geological hazards.

Objective 7.A Complete the retrofitting of Unreinforced Masonry (URM) buildings.

Action 7.A.1 Continue to enforce the provisions of Ordinance 878 N.S., which requires that all commercial unreinforced masonry buildings be retrofitted by January 2007.

Objective 7.B Take steps to ensure City preparedness for emergency response actions for an earthquake.

Action 7.B.1 Conduct inspections of City radio-equipped field vehicles every six months to ensure radios are functioning correctly and each vehicle has a copy of the Earthquake Emergency Response Plan, Standard Operating Procedures.

Goal 8. Prevent or minimize damage and losses due to hazardous materials (hazmat) incidents.

Objective 8.A Protect existing assets with the highest relative vulnerability to the effects of hazardous materials.

Action 8.A.1 Share current information on City-owned wells with the local Fire Department.

Action 8.A.2 Prepare and maintain emergency response plans for City-owned wells.

Objective 8.B Reduce the number of, and volume of, hazardous materials at City-owned facilities.

Action 8.B.1 Maintain on-hand minimum amount of chemicals required.

Action 8.B.2 Incorporate worker "right-to-know" training at facilities identified by the City as harboring a substantial amount of hazardous materials.

Objective 8.C Reduce the risk of injury or loss of life to first responders to hazardous materials incidents.

Action 8.C.1 Provide Department of Transportation (DOT) emergency response guidebooks to all fire and law enforcement vehicles.

Objective 8.D Increase government and public knowledge of safe handling and disposal of hazardous materials.

Action 8.D.1 Provide information regarding safe handling and disposal of household chemicals on the City's website.

Goal 9. Prevent or minimize damage and losses due to landslide incidents.

Objective 9.A Identify and attempt to reduce landslide hazards in the City.

Action 9.A.1 Evaluate and consider requiring the construction and maintenance of retaining structures that will help to control landslide risk in key residential and/or commercial areas. Mitigation measures should be consistent with the City's hillside development General Plan policies and zoning regulations.

Action 9.A.2 Evaluate and consider requiring retrofitting or implementing stabilizing measures for Paso Robles hillside developments that pre-date current best practices and codes and therefore remain vulnerable to the threat of landslides.

7.2.2.1 Potential Actions and Evaluation Process

As listed above, the City of Paso Robles Hazard Mitigation Plan Team identified 39 potential hazard mitigation actions that will assist the City in mitigating the impact of natural and human-caused hazards. The *Disaster Mitigation Act of 2000* requires the evaluation of the potential mitigation actions, as noted previously in Table 7-6.

In order to evaluate these potential actions, the City of Paso Robles Hazard Mitigation Plan Team used the STAPLEE criteria, which provides a systematic approach weighing the pros and cons of potential mitigation actions. STAPLEE stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. For each of these characteristics, a series of questions was posed that assisted in evaluating the appropriateness of each potential action to the community.

The City is mainly concerned that the set of actions be concise and effective and that the following types of actions that are identified as potential mitigating actions above, be disregarded from the "top priority actions" that compose the City's Action Plan (Section 7.2.2.2):

- Actions that would cost too much to implement or which have poor cost/benefit ratio;
- Actions that address hazards that the City does not have a history of experiencing to any significant degree (e.g., land subsidence, drought);
- Actions that would not have significant effects on reducing hazards (i.e. actions that may dilute the plan, which in turn draws attention away from the truly effective actions);
- Actions that do not serve to mitigate hazards, but do mitigate environmental impacts – there are CEQA and NEPA processes to address those.

A main concern of the City is the financial ability to implement the priority actions to mitigate hazards. Another concern is that the STAPLEE method is constructed in such a manner that all criteria have equal weighting. For example, a given action may have a significant cost/benefit deficit, but appear positive in all other respects and thus earn a high score. This underscores the need to conduct cost/benefit analysis in addition to a STAPLEE analysis.

Therefore, the City's Hazard Mitigation Plan Team assigned financial/cost impacts to the STAPLEE assessment, as follows:

- If the financial impact of an action would be borne by an individual, group of individuals (e.g. those living next to open land where there is a greater hazard of wildland fire), or a neighborhood, that was noted under the "Social" criterion.
- If the financial impact would be borne by the City (i.e., its budget), that was noted under the "Administrative" criterion.
- If the financial impact would affect the economy of the community as a whole, it was noted under the "Economic" criterion.

Members of the City's Hazard Mitigation Plan Team used the logic stated above, as well as the STAPLEE characteristics and respective questions to evaluate the potential mitigation actions, including the probable costs and benefits of the actions. This formed the basis of the hazard mitigation Action Plan described below.

7.2.2.2 Action Plan

The *Disaster Mitigation Action of 2000* requires the development of an action plan that includes prioritized actions and information on how the prioritized actions will be implemented, as shown in Table 7-7, below. Members of the City of Paso Robles's Hazard Mitigation Plan Team worked together and with appropriate City departments and organizations to prepare an implementation strategy for the top 12 prioritized mitigation actions.

TABLE 7-7
DMA 2000 REQUIREMENTS – MITIGATION STRATEGY – IMPLEMENTATION OF MITIGATION ACTIONS

Implementation of Mitigation Actions
Requirement: §201.6(c)(3)(iii): *[The mitigation strategy section* **shall** *include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization* **shall** *include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*
Element
A. Does the mitigation strategy include how the actions are **prioritized**? (For example, is there a discussion of the process and criteria used?)
B. Does the mitigation strategy address how the actions will be **implemented and administered**? (For example, does it identify the responsible department, existing and potential resources, and timeframe?)
C. Does the prioritization process include an emphasis on the use of a **cost-benefit review** (see page 3-36 of *Multi-Hazard Mitigation Planning Guidance*) to maximize benefits?

Source: FEMA, March 2004.

In order to focus on the City's hazard mitigation priorities and to comply with the *Disaster Mitigation Act of 2000*, the team members identified the City's top 12 priorities for hazard mitigation for the next five years (2005 through 2009; after which local jurisdiction hazard mitigation plans must be updated), as shown in Table 7-8. Note that additional actions may be considered if the prioritized actions are accomplished or events warrant consideration of additional actions. Information is provided for each of the actions listed in the Mitigation Action Plan on associated goals/objectives, category of benefit, implementation responsibility, and resources required.

TABLE 7-8
MITIGATION ACTION PLAN

Actions	Category of Benefit	Priority	Economic Justification	Implementation Responsibility	General Resources Required	Potential Funding Sources	Implementation Schedule
1.B.1 Continue to implement and improve the City's Uniform Building Codes relative to fire safety (fire-retardant roof covering and sprinkler systems) and flood safety, and investigate, and implement if feasible, new measures to avoid impacts in landslide-prone areas (hillsides) and in potential subsidence areas.	*Prevention* *Property Protection* *Structural Projects*	*High*	*Existing UBCs (wildland fire and flood) significantly reduce vulnerability, and new UBCs (landslide and subsidence) will do the same.*	*Community Development Dept.* *Emergency Services Dept.*	*Existing UBCs: ¼ FTE-month annually for enforcement annually; ½ FTE-month annually to review State code changes* *New UBCs: 1 FTE month every 3 years to develop new codes*	*Existing: General Fund* *New: General Fund*	*Every 3 years (or in conjunction with the State's schedule of adopting updated building and safety codes)*
2.A.1 Continue to seek Pre Disaster Mitigation (PDM) and Hazard Mitigation Grant Program funds (HMGP).	*Prevention* *Property Protection*	*Medium*	*Grant funds provide direct economic resources to the City for hazard mitigation activities that reduce the threat to life and property.*	*Community Development Dept. (Housing Programs Manager)* *Public Works Dept. (Capital Projects Engineer)*	*¼ FTE-month annually*	*General Fund*	*Ongoing*

TABLE 7-8 (CONTINUED)
MITIGATION ACTION PLAN

Actions	Category of Benefit	Priority	Economic Justification	Implementation Responsibility	General Resources Required	Potential Funding Sources	Implementation Schedule
2.A.3 Continue and maintain relationship with the California Office of Emergency Services and the San Luis Obispo County Office of Emergency Services.	*Prevention* *Property Protection* *Natural Resources Protection* *Emergency Services*	*Medium*	*Maintaining these relationships facilitates the exchange of information on hazard mitigation and may lead to collaborative hazard mitigation actions and cost-sharing.*	*Emergency Services Dept.* *City Manager*	*1/8 FTE-month annually*	*General Fund*	*Ongoing*
4.A.1 The City will continue efforts toward water infrastructure improvements of channels, storm drains, diversions, and retention basins in the City for flood protection.	*Prevention* *Property Protection* *Natural Resources Protection* *Structural Projects*	*Medium*	*Floods are a moderate threat to life and property in the City. This action reduces the probability and magnitude of floods.*	*Public Works Dept. (Capital Projects Engineer and Utilities Engineer)* *Community Development Dept (City Engineer)*	*1/4 FTE Annually*	*Capital Improvement Program; possibly FEMA PDM-C grant program; possibly FEMA FMA grant program.* *Conditions imposed by City on private development*	*Ongoing*

TABLE 7-8 (CONTINUED)
MITIGATION ACTION PLAN

Actions	Category of Benefit	Priority	Economic Justification	Implementation Responsibility	General Resources Required	Potential Funding Sources	Implementation Schedule
4.A.2 Encourage bridge or culvert construction where roads are in locations susceptible to flooding.	*Prevention* *Property Protection* *Structural Projects*	*Medium*	*Floods are a moderate threat to life and property in the City. This action reduces the probability and magnitude of floods.*	*Public Works Dept. (Capital Projects Engineer)*	*1/8 FTE annually*	*Capital Improvement Program*	*2006 - 2009*
4.B.3 Continue the production of an updated storm drain atlas for the City's Storm Drain Master Plan that identifies potential drainage hazards, solutions, budgets, and priorities.	*Prevention* *Property Protection* *Public Education and Awareness* *Natural Resources Protection*	*High*	*Floods are a moderate threat to life and property in the City. This action reduces the probability and magnitude of floods.*	*Public Works Dept. (Capital Projects Engineer)*	*1/8 FTE-month[1] annually*	*General Fund; possibly PDM-C planning grant* *Drainage Fees (condition of parcel maps and subdivision maps)*	*2006 - 2008*
5.A.1 Ensure that subdivision regulations for new subdivisions allow adequate access for fire apparatus.	*Prevention* *Property Protection* *Structural Projects*	*High*	*Wildland fires are a significant threat to life and property in the City. This action reduces the magnitude of fires.*	*Community Development Dept.* *Emergency Services Dept.*	*Negligible*	*General Fund*	*Ongoing*

TABLE 7-8 (CONTINUED)
MITIGATION ACTION PLAN

Actions	Category of Benefit	Priority	Economic Justification	Implementation Responsibility	General Resources Required	Potential Funding Sources	Implementation Schedule
5.A.2 Ensure that building codes for all new homes prohibit the use of untreated wood shake roofs and encourage the installation of a spark arresting system on the chimneys of new homes with wood burning fireplaces.	*Prevention* *Property Protection* *Emergency Services*	*High*	*Wildland fires are a significant threat to life and property in the City. This action reduces the probability of fires.*	*Community Development Dept.* *Emergency Services Dept.*	*Negligible*	*General Fund*	*Ongoing*
5.A.3 Investigate, and implement if feasible and appropriate, mandating the installation of fire extinguishing sprinklers in new homes and substantial renovations.	*Prevention* *Property Protection* *Emergency Services* *Structural Projects*	*High*	*Wildland fires are a significant threat to life and property in the City. This action reduces the magnitude of fires.*	*Community Development Dept.* *Emergency Services Dept.*	*Negligible*	*General Fund*	*Ongoing*

TABLE 7-8 (CONTINUED)
MITIGATION ACTION PLAN

Actions	Category of Benefit	Priority	Economic Justification	Implementation Responsibility	General Resources Required	Potential Funding Sources	Implementation Schedule
6.C.1 Post water conservation messages and newspaper articles relative to the City's water resources on the City's website.	*Prevention* *Public Education and Awareness*	*Low*	*Drought is cyclical threat to the region. This action reduces water usage.*	*Community Development Dept.*	*Negligible*	*General Fund*	*2005 - 2009*
7.A.1 Continue to enforce the provisions of Ordinance 878 N.S., which requires that all commercial unreinforced masonry buildings be retrofitted by January 2007.	*Prevention* *Property Protection* *Structural Projects*	*High*	*Earthquakes are a significant threat to life and property in the City. This action reduces earthquake vulnerability.*	*Community Development Dept. (Building Official and 3 building inspectors)* *Public Works Dept. (Capital Projects Engineer and Utilities Engineer)*	*¼ FTE-month[1] annually*	*General Fund*	*2005, 2006 (all URMs must be retrofitted by January 2007)*

TABLE 7-8 (CONTINUED)
MITIGATION ACTION PLAN

Actions	Category of Benefit	Priority	Economic Justification	Implementation Responsibility	General Resources Required	Potential Funding Sources	Implementation Schedule
9.A.1 Evaluate and consider requiring the construction and maintenance of retaining structures that will help to control landslide risk in key residential and/or commercial areas. Mitigation measures should be consistent with the City's hillside development General Plan policies and zoning regulations.	*Prevention* *Property Protection* *Structural Projects*	*Medium*	*Landslides are a moderate threat to life and property in the City. This actual reduces landslide probability and magnitude.*	*Community Development Dept. (Building Official and 3 building inspectors)* *Public Works Dept. (Capital Projects Engineer and Utilities Engineer)*	*¼ FTE-Month*[1]	*General Fund*	*2006, 2007, 2008*

[1] *FTE is the "Full –time equivalent" (City personnel), and FTE-Month is 1/12 of an FTE*

Source: City of Paso Robles, 2004/2005.

8.0 PLAN MAINTENANCE PROCEDURES

The *Disaster Mitigation Act of 2000* requires a formal plan maintenance process to take place to ensure that the *City of Paso Robles Hazard Mitigation Plan* remains an active and applicable document. The plan maintenance process adopted by the City should include a schedule for monitoring and evaluating the plan at least every five years, implementation of the plan through existing programs, and continued public participation throughout the plan maintenance process is required.

This section also includes an explanation of how the City of Paso Robles intends to organize their efforts to ensure that improvements and revisions to the City's Plan occur in a well-managed, efficient, and coordinated manner.

This section includes the following three subsections, which are addressed in turn below:

- Monitoring, Evaluating, and Updating the Plan
- Implementation Through Existing Programs
- Continued Public Involvement

8.1 MONITORING, EVALUATING, AND UPDATING THE PLAN

The task of monitoring, evaluating, and updating the Plan also falls largely on the shoulders of the City because local resources to accomplish this task are most affectively applied by those who are most influenced by the Plan's implementation. In compliance with the *Disaster Mitigation Act of 2000* (see Table 8-1), the City details below a method to ensure that the Plan is reviewed and updated regularly.

TABLE 8-1
DMA 2000 REQUIREMENTS – PLAN MAINTENANCE PROCESS –
MONITORING, EVALUATING, AND UPDATING THE PLAN

Monitoring, Evaluating and Updating the Plan
Requirement §201.6(c)(4)(i): *[The plan maintenance process* **shall** *include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*
Element
A. Does the plan describe the method and schedule for **monitoring** the plan? (For example, does it identify the party responsible for monitoring and include a schedule for reports, site visits, phone calls, and meetings?)
B. Does the plan describe the method and schedule for **evaluating** the plan? (For example, does it identify the party responsible for evaluating the plan and include the criteria used to evaluate the plan?)
C. Does the plan describe the method and schedule for **updating** the plan within the five-year cycle?

Source: FEMA, March 2004.

The *City of Paso Robles Hazard Mitigation Plan* was prepared as a collaborative effort between URS Corporation and the Paso Robles Hazard Mitigation Plan Team (HMPT). In order to maintain momentum and build upon previous hazard mitigation planning efforts and success, the City of Paso Robles will utilize the Paso Robles Hazard Mitigation Plan Team to monitor, evaluate, and update the Plan. In addition to the original members of the Paso Robles Hazard Mitigation Plan Team, members of the Team may come from the Paso Robles City Council, City of Paso Robles Planning Commission, the City Manager's Office, and any other department representative responsible for

implementing the City's Action Plan. This group will include a team leader (who will be the Paso Robles Housing Programs Manager), who will serve as the primary point of contact for County, State, and Federal Officials, and who will coordinate all local efforts to monitor, evaluate, and revise the Plan.

The City's Hazard Mitigation Plan Team will conduct an annual review of progress implementing the *City of Paso Robles Hazard Mitigation Plan*, particularly the Action Plan. The HMPT Leader will initiate the annual review one month prior to the date of adoption and the results will be presented o the City Council within the following eight weeks. The review will include an evaluation of the following:

- Notable changes in the City's risk to natural or human-caused hazards.
- Impacts of land development activities and related programs on hazard mitigation.
- Correspondence between the City's hazards and the Plan's goals, objectives, and actions.
- Progress on implementation of the Plan. If necessary, this will include identification of problems and suggested improvements.
- Actual progress implementing the Plan versus expectations.
- The adequacy of resources for implementation of the Plan.
- Participation of City agencies and others in the Plan's implementation versus expectations.

The findings from this review will be presented annually by the City of Paso Robles Hazard Mitigation Plan Team to the Paso Robles City Council and also submitted in memorandum format to the San Luis Obispo County Office of Emergency Services (OES) and the California OES. The annual review will provide the basis for possible changes in the Plan's implementation through refocusing on new or more threatening hazards, changes to or increases in resources allocations, and engaging additional support for the Plan's implementation.

The *Disaster Mitigation Act of 2000* requires the updating of hazard mitigation plan's every five years at the local level. To ensure that this occurs, in the fourth year following adoption of the Plan, the City of Paso Robles Hazard Mitigation Team will undertake the following activities:

- Work with OES to thoroughly analyze and update the City's risk to natural and man-made hazards (as was done to prepare the original Plan).
- Provide a new annual review (as noted above), plus a review of the three previous annual reports.
- Provide a detailed review and revision of the Mitigation Strategy, including each goal, objective, and potential action.
- Prepare a new Action Plan with prioritized actions, responsible parties, and resources.
- Prepare a new draft *City of Paso Robles Hazard Mitigation Plan* and submit to the Paso Robles City Council for adoption.
- Submit an updated Plan to the California OES for approval.

8.2 IMPLEMENTATION THROUGH EXISTING PROGRAMS

The many processes that allow Paso Robles to function as a community are also those that will ensure a viable outcome due to hazard event or natural disaster. Therefore, local-level experts are those expected to ensure that the Plan's goals, objectives, and actions are implemented. In compliance with the *Disaster Mitigation Act of 2000* (see Table 8-2), described below are procedures to implement the hazard mitigation plan through existing programs.

TABLE 8-2
DMA 2000 REQUIREMENTS – PLAN MAINTENANCE PROCESS –
INCORPORATION INTO EXISTING PLANNING MECHANISMS

Incorporation into Existing Planning Mechanisms
Requirement §201.6(c)(4)(ii): *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*
Element
A. Does the plan identify other local planning mechanisms available for incorporating the requirements of the mitigation plan?
B. Does the plan include a process by which the local government will incorporate the requirements in other plans, when appropriate?

Source: FEMA, March 2004.

Within two years of the formal adoption of the Plan, the City will strive to incorporate into the process of existing planning mechanisms any local policies recommended for revision by the City's Hazard Mitigation Plan Team. The City of Paso Robles utilizes comprehensive land use planning, development standards, capital improvements planning, building codes, and various other regulatory mechanisms to guide and control development in the community. Since the City has autonomy over these various tools, it is provided an excellent opportunity to augment them as necessary to address applicable hazard mitigation requirements. However, as a community that exists in a very active regional context, many of these processes may also affect neighboring communities and development. To ensure that altering these standards do not negatively affect adjacent communities, Paso Robles will seek consistency and collaboration with its counterpart regulatory documents from surrounding jurisdictions.

The City shall encourage its divisions and departments to be aware of the hazards that are affected by the planning and development decisions they may make and implement. The HMPT Leader will liaise with City staff and local agencies to inform them of the Plan's hazard mitigation strategies and to advocate incorporation of the mitigation strategy into other planning mechanisms. The City of Paso Robles Hazard Mitigation Team will conduct periodic reviews of the City's planning documents, development guidelines, and land use policies (see Action 1.A.1). The HMPT Leader will use these reviews to ensure that this Plan's Mitigation Action Plan (see Table 7-8) complies with any updates or amendments made to the City's General Plan. This Team will also analyze any specific amendments made annually to this Plan, and provide technical assistance to any division or department in implementing these requirements.

8.3 CONTINUED PUBLIC INVOLVEMENT

The City of Paso Robles is dedicated to involving the public directly in the continual reshaping and updating of the *Hazard Mitigation Plan*. Paso Robles's Hazard Mitigation Plan Team members are responsible for the review and update of the Plan. Although they represent the public to some extent, the public is entitled to directly comment on and provide feedback regarding updates and revisions to the Plan. In compliance with the *Disaster Mitigation Act of 2000* (see Table 8-3), public access to the Plan and to the various revision processes will be made through mechanisms described below.

TABLE 8-3
DMA 2000 REQUIREMENTS – PLAN MAINTENANCE PROCESS – CONTINUED PUBLIC INVOLVEMENT

Continued Public Involvement
Requirement §201.6(c)(4)(iii): [The plan maintenance process **shall** *include a] discussion on how the community will continue public participation in the plan maintenance process.*
Element
A. Does the plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)

Source: FEMA, March 2004.

Copies of the Plan will be provided to participating municipal Division Directors and kept on hand at the City Manager's Office and the Emergency Coordinator's Office. Upon approval, the existence and location of these documents will be made public through postings to be placed in visible locations in municipal facilities, and will be posted on the City's website. Contained in the hard copies of the Plan are the address and phone number of the City of Paso Robles Hazard Mitigation Plan Evaluation Team leader, who is responsible for monitoring public comments and accepting suggestions regarding Plan revisions.

In addition, a downloadable copy of the plan and any proposed changes will be posted on the City's website, with specific direction made to hazard mitigation materials. This site will also contain an email address and phone number to which people can direct their comments or concerns. A link to this site will also be provided on the San Luis Obispo County Department of Emergency Management website.

The City of Paso Robles Hazard Mitigation Team will also identify opportunities to raise awareness in the community about the Plan and the City's hazards. This could include attendance and provision of materials at major City sponsored events, such as festivals, chamber of commerce events, and neighborhood meetings. Any public comments received relative to the Plan will be collected by the Hazard Mitigation Plan Team Leader and will be included in the annual report to the City Council and also considered during future Plan updates.

9.0 DEFINITIONS

100-hundred year floodplain. Also referred to as the Base Flood Elevation (BFE) and Special Flood Hazard Area (SFHA). An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year.

Acquisition of hazard-prone structures. Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.

Actions. Specific actions that help achieve goals and objectives. Multiple mitigation actions may be defined to feed into an evaluation of the alternative actions.

Arson. The act of willfully and maliciously burning of property, especially with criminal or fraudulent intent.

Asset. Any natural or human-made feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Base Flood Elevation (BFE). Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as a standard for the National Flood Insurance Program.

Benefit-Cost Analysis (BCA). Benefit-cost analysis is a systematic, quantitative method of comparing the projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Best Management Practices (BMPs). Appropriate, site-specific management techniques that maximize the benefits of land and natural resource management actions, while minimizing impacts.

Biological Hazards. A hazard caused by the presence of any micro-organism, virus, infectious substance, or biological product that may be engineered as a result of biotechnology or any naturally occurring micro-organism, virus, infectious substance, or biological product, capable of causing death, disease, or other biological malfunction.

Bond. A debt obligation issued by states, cities, counties, and other governmental entities to raise money to pay for public projects, such as government facilities and infrastructure.

Building codes. Regulations that set forth standards and requirements for the construction, maintenance, operation, occupancy, use, or appearance of buildings, premises, and dwelling units. Building codes can include standards for structures to withstand natural hazards.

Building. A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Building/structure collapse. The failure and downfall of a structure. The collapse may result from a variety of natural causes such as hurricanes/typhoons, earthquakes, tornadoes, floods, or from manmade circumstances such as construction deficiencies, neglect, aging infrastructure, or acts of terrorism.

Capability assessment. An assessment that provides an inventory and analysis of a community or state's current capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats.

Channel maintenance. Ensuring that flood channels, storm sewers, retaining ponds, etc. do not become blocked by debris, sedimentation, overgrowth, or structural failure. Coastal zone. The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas with direct drainage to the ocean.

Civil disobedience. The refusal to obey civil laws or decrees, usually taking the form of passive resistance. People practicing civil disobedience break a law because they consider the law unjust, want to call attention to its justice, and hope to bring about its repeal or amendment. They are also willing to accept a penalty for breaking the law.

Civil disturbance. When individuals or segments of the population create a situation, often a result of civil unrest, requiring a response from the emergency response community to protect lives and property. The disturbance may be small and isolated to a small area or be of a larger scale and exceeding the response capabilities of a jurisdiction. Activities are normally active (demonstrations, looting, riots) rather than passive (public speeches, sit-downs, marches).

Civil unrest. When a segment of the civil population indicates its discontent or dissatisfaction with existing political, social, or religious issues. The unrest may materialize as a civil disturbance or civil disobedience. Activities may be passive (public speeches, sit-downs, marches) or active (demonstrations, looting, riots).

Coastal erosion. The process of erosion of coastal areas via wave action, particularly due to high surf and storm surge caused by tropical storms (e.g., hurricanes, typhoons). May include damage to barrier islands, estuaries, beaches, coastal wetlands, and land areas with direct drainage to the ocean.

Coastal zone management regulations. Regulations enacted to control growth and protect natural resources along coastlines. Under the federal Coastal Zone Management Act (CZMA) enacted in 1972, states and local governments adopt coastal zone management regulations designed to preserve, protect, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the wildlife dependent on those habitats.

Community Emergency Response Team (CERT). CERT is the mechanism to establish, train and maintain a local cadre of residents to act as first responders in the event of an emergency. A CERT team is especially critical in the first three days following a disaster when conditions may prevent access by emergency response personnel.

Community Rating System (CRS). CRS is a program that provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of the policyholders in those communities are reduced.

Comprehensive plan. A document, also known as a "general plan," covering the entire geographic area of a community and expressing community goals and objectives. The plan lays out the vision, policies, and strategies for the future of the community, including all of the physical elements that will determine the community's future development. This plan can discuss the community's desired physical development, desired rate and quantity of growth, community character, transportation services, location of growth, and siting of public facilities and transportation. In most states, the comprehensive plan has no authority in and of itself, but serves as a guide for community decision-making.

Consequences. The damage (full or partial), injuries, and losses of life, property, environment, and business that can be quantified by some unit of measure, often in economic or financial terms.

Construction of barriers around structures. Protective structures, such as berms and retaining walls, created by grading or filling areas with soil meant to keep flood waters from reaching buildings.

Cost-effectiveness. Cost-effectiveness is a key evaluation criterion for federal grant programs. Cost- effectiveness has several possible definitions, although for grant-making purposes FEMA defines a cost-effective project as one whose long-term benefits exceed its costs. That is, a project should prevent more expected damage than it costs initially to fund the effort. This is done to ensure that limited public funds are used in the most efficient manner possible. Benefit-cost analysis is one way to illustrate that a project is cost-effective.

Critical buildings, facilities, and infrastructure. Buildings, facilities and infrastructure vital to the health, safety, and welfare of the population and the functioning of the community. For the purpose of this plan the following are considered critical buildings, facilities and infrastructure:

- Essential Facilities are essential to the health and welfare of the whole population and are especially important following hazard events. Essential facilities include hospitals and other medical facilities, police and fire stations, emergency operations centers and evacuation shelters, and schools.
- Transportation Systems include airways – airports, heliports; highways – bridges, tunnels, roadbeds, overpasses, transfer centers; railways – trackage, tunnels, bridges, rail yards, depots; and waterways – canals, locks, seaports, ferries, harbors, dry docks, piers.
- Lifeline Utility Systems such as potable water, wastewater, oil, natural gas, electric power and communication systems.
- High Potential Loss Facilities are facilities that would have a high loss associated with them, such as nuclear power plants, dams, and military installations. Not included due to control of these facilities by the US military.
- Hazardous Material Facilities include facilities housing industrial/hazardous materials, such as corrosives, explosives, flammable materials, radioactive materials, and toxins. Not considered due to the control of most of these by the US military or by private entities.

Note that the Critical Infrastructure Assurance Office (CIAO) defines eight categories of critical infrastructure, as follows: telecommunications infrastructure, electrical power systems, gas and oil facilities, banking and finance institutions, transportation networks, water supply systems, government services, emergency services.

Dam/levee failure. Dam/levee failure can be caused by natural occurrences such as floods, rock slides, earthquakes, or the deterioration of the foundation or the materials used in construction. Usually the changes are slow and not readily discovered by visual examination. Such a failure presents a significant potential for a disaster in that significant loss of life and property would be expected in addition to the possible loss of power and water resources.

Dams. Dams are artificial barriers which impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water. For a more detailed definition, see the National Dam Safety Program Act (as amended through P.L. 106-580, December 29, 2000).

Debris. The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.

Density controls. Regulations that manage growth by limiting the density of development, often expressed in terms of the number of dwelling units per acre. Density controls allow the community to plan in an orderly way for infrastructure.

Department of Homeland Security (DHS). Following the September 11, 2001 terrorist attacks, President George W. Bush created a new federal government department in order to bring 22 previously separate domestic agencies together. The new department's first priority is protecting the nation against further terrorist attacks. Component agencies analyze threats and intelligence, guard borders and airports, protect critical infrastructure, and coordinate the response for future emergencies. The new department is organized into five major directorates: Border and Transportation Security (BTS); Emergency Preparedness and Response (EPR); Science and Technology (S&T); and Information Analysis and Infrastructure Protection (IAIP); Management. In addition, several other critical agencies have been folded into the new department or are newly created. The Federal Emergency Management Agency (FEMA) is the foundation of the Emergency Preparedness and Response (EPR) Directorate.

Design review standards. Guidelines enacted by local governments requiring new development to meet certain appearance and aesthetic standards and establishing a process by which local officials can examine site plans or structure blueprints to assess compliance with those standards. Design review standards can help ensure new development blends with existing buildings and the landscape or meet other priorities, including hazard loss reduction.

Design standards. A set of guidelines pertaining to the appearance and aesthetics of buildings or improvements that governs construction, alteration, demolition, or relocation of a building or improvement of land.

Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 (Public Law 106-390) is the latest legislation to improve the planning process. It was signed into law on October 30, 2000. This new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Drought. A drought occurs when water supplies cannot meet established demands. "Severe" to "extreme" drought conditions endanger livestock and crops, significantly reduce surface and ground water supplies, increase the potential risk for wildland fires, increase the potential for dust storms, and cause significant economic loss. Humid areas are more vulnerable than arid areas. Drought may not be constant or predictable and does not begin or end on any schedule.

Dune and beach restoration. Actions taken to re-establish dunes and beaches that serve as natural protection against coastal flooding and storm surge. Dune and beach restoration activities consist of replenishing sand, re-planting protective vegetation, controlling or restricting foot and vehicle traffic, and constructing sand traps or wind barriers.

Earthquake. An earthquake is a naturally-induced shaking of the ground, caused by the fracture and sliding of rock within the Earth's crust. The magnitude is determined by the dimensions of the rupturing fracture (fault) and the amount of displacement that takes place. The larger the fault surface and displacement, the greater the energy. In addition to deforming the rock near the fault, this energy produces the shaking and a variety of seismic waves that radiate throughout the Earth. Earthquake magnitude is measured using the Richter Scale and earthquake intensity is measured using the Modified Mercalli Intensity Scale.

Easements. Grant a right to use property, or restrict the landowner's right to use the property in a certain way.

Elevation of structures. Raising structures above the base flood elevation to protect structures

Emergency Preparedness and Response (EPR) Directorate. One of five major Department of Homeland Security Directorates which builds upon the formerly independent Federal Emergency Management Agency (FEMA). EPR is responsible for preparing for natural and man-made disasters through a comprehensive, risk-based emergency management program of preparedness, prevention, response, and recovery. This work incorporates the concept of disaster-resistant communities, including providing federal support for local governments that promote structures and communities that reduce the chances of being hit by disasters.

Emergency Response Plan. A document that contains information on the actions that may be taken by a governmental jurisdiction to protect people and property before, during, and after a disaster.

Emergency response services. The actions of first responders such as firefighters, police, and other emergency services personnel at the scene of a hazard event. The first responders take appropriate action to contain the hazard, protect property, conduct search and rescue operations, provide mass care, and ensure public safety.

Eminent domain. The right of a government to appropriate private property for public use, with adequate compensation to the owner.

Enemy attack. The use of aggressive action against an opponent in pursuit of an objective. An "enemy attack" is considered an attack of one sovereign government against another as either a declared or undeclared act of war.

Environmental review standards. Guidelines established to ensure new development adheres to certain construction and site design standards to minimize the impact on the environment.

Erosion. Wearing away of the land surface by detachment and movement of soil and rock fragments during a flood or storm over a period of years, through the action of wind, water, or other geologic processes.

Explosion/Fire. An explosion is the sudden loud release of energy and a rapidly expanding volume of gas that occurs when a gas explodes or a bomb detonates. Explosions result from the ignition of volatile products such as petroleum products, natural and other flammable gases, hazardous materials/chemicals, dust, and bombs. While an explosion surely may cause death, injury and property damage, a fire routinely follows which may cause further damage and inhibit emergency response.

Exposure. The number, types, qualities, or monetary values of various types of property or infrastructure and life that may be subject to an undesirable or injurious hazard event.

Extreme air pollution. Pollution is the contamination of the earth's environment with materials that interfere with human health, the quality of life, or the natural functioning of ecosystems. Air pollution is the addition of harmful substances to the atmosphere. It makes people sick, causing breathing problems and sometimes cancer, and it harms plants, animals, and the ecosystems in which they live. Some pollutants return to earth in the form of acid rain and snow that corrodes structures, damage vegetation, and makes streams and lakes unsuitable for life. "Extreme air pollution" exceeds established thresholds resulting in the need to take corrective actions and cause the public to take precautions.

Extreme heat. Extreme heat is defined as temperatures that hover ten degrees or more above the average high temperature for the region and last for several weeks. Humid conditions may also add to the discomfort of high temperatures.

Federal Emergency Management Agency (FEMA). Formerly independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery. As of March 2003, FEMA is a part of the Department of Homeland Security's Emergency Preparedness and Response (EPR) Directorate.

Fire-proofing. Actions taken on and around buildings to prevent the spread of fires.

Flood Hazard Area. The area on a map shown to be inundated by a flood of a given magnitude.

Flood Insurance Rate Map (FIRM). Map of a community, prepared by FEMA, that shows the special flood hazard areas and the risk premium zones applicable to the community.

Flood Mitigation Assistance (FMA) Program. A program created as part of the National Flood Insurance Reform Act of 1994. FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other NFIP insurable structures, with a focus on repetitive loss properties.

Flood zone. A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

Floodplain development regulations. Regulations requiring flood insurance and mandating certain design aspects of new or substantially improved structures that lie within regulated flood-prone areas. Current federal regulations

through the National Flood Insurance Program require that, at a minimum, new residential buildings in the Special Flood Hazard Area have their lowest floor at or above the base flood elevation.

Floodplain zoning. Zoning regulations that prescribe special uses for and serve to minimize development in floodplain areas.

Flood-proofing. Actions that prevent or minimize future flood damage. Making the areas below the anticipated flood level watertight or intentionally allowing floodwaters to enter the interior to equalize flood pressures are examples of flood proofing.

Floods. A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any sources, or (3) mudflows or the sudden collapse of shoreline land.

Forest and vegetation management. The management of forests and vegetation so they are resilient to landslides, high-winds, and other storm-related hazards.

Forest fire fuel reduction. Minimizing fuel loads in forested areas by clearing excess ground cover and thinning diseased or damaged woodland to create healthier forests and to decrease the vulnerability to the devastation of forest fire.

Frequency. A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered. Probability is a related term.

Fuel/Resource shortage. A fuel/resource shortage is defined as an actual or potential shortage of natural gas, crude and refined petroleum, petroleum-derived fuels, or other critical commodities that significantly impacts the ability to: render essential government and emergency services (medical, fire, safety); and threatens the health and safety of the public.

Fujita scale of tornado intensity. Rates tornadoes with numeric values from F0 to F5 based on tornado winds peed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while an F5 indicates severe damage sustained.

General obligation bond. A bond secured by the taxing and borrowing power of the municipality issuing it.

Geographic Information Systems (GIS). A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Goals. General guidelines that explain what you want to achieve. Goals are usually broad statements with long-term perspective.

Hazard event. A specific occurrence of a particular type of hazard.

Hazard identification. The process of identifying hazards that threaten an area.

Hazard information center. Information booths, publication kiosks, exhibits, etc. that display information to educate the public about hazards that affect the jurisdiction and hazard mitigation activities people can undertake.

Hazard Mitigation Grant Program (HMGP). Authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program

is to reduce the loss of life and property due to natural disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hazard mitigation. Cost effective measures taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard profile. A description of the physical characteristics of hazards and a determination of various descriptors, including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

Hazard threat recognition. The process of identifying possible hazards and estimating potential consequences.

Hazard warning systems. Systems or equipment such as community sirens and National Oceanic Atmospheric Administration (NOAA) weather radios designed to provide advanced warning of an impending hazard. Warning systems allow communities to take protective actions before a hazard event occurs, including taking cover, finding shelter, or moving furniture, cars, and people out of harm's way.

Hazard. A source of potential danger or adverse condition. Hazards include both natural and man-made events. A natural event is a hazard when it has the potential to harm people or property and may include events such as floods, earthquakes, , tsunami, typhoons, and wildfires that strike populated areas. Man-made hazard events originate from human activity and may include technological hazards and terrorism. Technological hazards arise from human activities and are assumed to be accidental and/or have unintended consequences (e.g., manufacture, storage and use of hazardous materials). While no single definition of terrorism exists, the Code of Federal Regulations defines terrorism as "…unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."

Hazardous materials incidents. A spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment of a hazardous material, but excludes: (1) any release which results in exposure to poisons solely within the workplace, with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

Hazardous surf. Coastal or lake surf that is unusually high that overpower persons and small watercraft near or in the water. Often associated with rip currents. Typically the result of regional weather systems, such as high winds or tropical storms.

HAZUS, HAZUS-MH. A GIS-based, nationally standardized, loss estimation tool developed by FEMA. HAZUS-MH is the new multi-hazard version that includes earthquake, wind, hurricane, and flood loss estimate components.

Health and safety maintenance. Sections of emergency response/operations plans that provide for the security of affected areas, including clean up and special precautions for each type of hazard (e.g., draining standing water after a flood, cautioning about aftershocks after an earthquake or successive tsunami waves, etc.).

Hillside development regulations. Site design and engineering techniques prescribed through regulations such as selective grading, drainage improvements, and vegetation clearance to eliminate, minimize, or control development on hillsides, thereby protecting the natural features of hillsides and reducing the likelihood of property damage from landslides.

Hostage situation. A situation in which people are held hostage and negotiations take place for their release. The situation may range from a simple domestic or isolated criminal act to an attempt to impose will on a national or international scale to intimidate or coerce a government to further a political, social, or religious objective.

Hurricane. An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74 miles per hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160ºE longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Hysteria (Mass). Also known as "mass psychogenic illness" and "hysterical contagion," mass hysteria is a situation in which a symptom or set of symptoms for which there is no physical explanation spreads quickly among a group. It may occur as a reaction to an incident of domestic terrorism.

Implementation strategy. A comprehensive strategy that describes how the mitigation actions will be implemented.

Infestations. An infestation consists of an invasion or spreading of a living organism (plant, animal, etc.) that has an adverse (unwanted) effect on the population or the environment. The effect may range from a simple nuisance to an infectious disease or destructive parasite or insect. Infestations may result from non-indigenous plants, rodents, weeds, parasites, insects, and fungi, and may adversely affect people, animals, agriculture, economy (e.g., tourism), and property.

Infrastructure. Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology, such as phone lines or Internet access; vital services, such as public water supplies and sewer treatment facilities; and an area's transportation system. airports, heliports, highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry docks, piers, and regional dams.

Landslides/mudslides/debris flows. Landslides, like avalanches are massive downward and outward movements of slope-forming materials. The term landslide is restricted to movement of rock and soil and includes a broad range of velocities. Slow movements, although rarely a threat to life, can destroy buildings or break buried utility lines. A landslide occurs when a portion of a hill slope becomes too weak to support its own weight. The weakness is generally initiated when rainfall or some other source of water increases the water content of the slope, reducing the shear strength of the materials. A mud slide is a type of landslide referred to as a flow. Flows are landslides that behave like fluids: mud flows involve wet mud and debris.

Levees and floodwalls. Flood barriers constructed of compacted soil or reinforced concrete walls.

Liquefaction. The phenomenon that occurs when ground shaking (earthquake) causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Loss estimation. Forecasts of human and economic impacts and property damage from future hazard events, based on current scientific and engineering knowledge.

Memorandum of Agreement (MOA). A non-binding statement that defines the duties, responsibilities, and commitment of the different parties or individuals; provides a clear statement of values, principles, and goals; and establishes an organizational structure to assist in measuring and evaluating progress.

Mitigate. To cause to become less harsh or hostile; to make less severe or painful. Mitigation activities are actions taken to eliminate or reduce the probability of the event, or reduce its severity of consequences, either prior to or following a disaster/emergency.

Mitigation actions. Activities, measures, or projects that help achieve the goals and objectives of a mitigation plan.

Mitigation plan. A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in a defined geographic area, including a description of actions to minimize future vulnerability to hazards.

Modified Mercalli Intensity Scale. The Modified Mercalli Intensity Scale is commonly used in the United States by seismologists seeking information on the severity of earthquake effects. Intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end. The Intensity Scale differs from the Richter Magnitude Scale in that the effects of any one earthquake vary greatly from place to place, so there may be many Intensity values (e.g.: IV, VII) measured from one earthquake. Each earthquake, on the other hand, should have just one Magnitude, although the several methods of estimating it will yield slightly different values (e.g.: 6.1, 6.3).

National Flood Insurance Program (NFIP). Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations as indicated in 44 CFR §60.3.

Objectives. Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable.

Open space preservation. Preserving undeveloped areas from development through any number of methods, including low-density zoning, open space zoning, easements, or public or private acquisition. Open space preservation is a technique that can be used to prevent flood damage in flood-prone areas, land failures on steep slopes or liquefaction-prone soils, and can enhance the natural and beneficial functions of floodplains.

Ordinance. A term for a law or regulation adopted by a local government.

Performance standards. Standards setting the allowable effects or levels of impact of development. Often used in conjunction with traditional zoning, the standards typically address specific environmental conditions, traffic, or stormwater runoff. Can also be imposed on structures in hazard areas to ensure they withstand the effect of hazards.

Planning team. A group composed of government, private sector, and individuals with a variety of skills and areas of expertise, usually appointed by a city or town manager, or chief elected official. The group finds solutions to community mitigation needs and seeks community acceptance of those solutions.

Planning. The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

Policy. A course of action or specific rule of conduct to be followed in achieving goals and objectives.

Post-disaster mitigation. Mitigation actions taken after a disaster has occurred, usually during recovery and reconstruction.

Post-disaster recovery ordinance. An ordinance authorizing certain governmental actions to be taken during the immediate aftermath of a hazard event to expedite implementation of recovery and reconstruction actions identified in a pre-event plan.

Post-disaster recovery planning. The process of planning those steps the jurisdiction will take to implement long-term reconstruction with a primary goal of mitigating its exposure to future hazards. The post-disaster recovery planning process can also involve coordination with other types of plans and agencies, but it is distinct from planning for emergency operations.

Power/utility failure. A power/utility failure is defined as an actual or potential shortage of electric power or the interruption of electrical power that significantly threatens health and safety. Many communities are vulnerable to many localized, short and long-term energy emergencies. Power shortages or failures do occur and may be brought on by severe weather conditions, such as blizzards, ice storms, extreme heat, thunderstorms, or events such as war, or civil disturbance.

Private activity bond. A bond whose interest may or may not be federally taxable. Under the Internal Revenue Code, private activity bonds are described generally as any bond. (1) of which more than 10% of the proceeds is to be used in a trade or business of any person or persons other than a governmental unit, and which is to be directly or indirectly repaid, or secured by revenues from, a private trade or business; and (2) in which an amount exceeding the lesser of 5% or $5 million of the proceeds is to be used for loans to any person or persons other than a governmental unit. Certain private activity bonds are tax exempt when used to finance private water, wastewater, and multifamily housing projects.

Probability. A measure of how often events of a particular magnitude are expected to occur. Probability describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered. May also be measured in terms of the chance that an event will be exceeded (or not exceeded) over a specified period of time. Frequency is a related term.

Public education and outreach programs. Any campaign to make the public more aware of hazard mitigation and mitigation programs, including hazard information centers, mailings, public meetings, etc.

Q3 data. The Q3 Flood Data product is a digital representation of certain features of FEMA's Flood Insurance Rate(FIRM) product, intended for use with desktop mapping and Geographic Information Systems technology. The digital Q3 Flood Data are created by scanning the effective Flood Insurance Rate(FIRM) paper maps and digitizing selected features and lines. The digital Q3 Flood Data are designed to serve FEMA's needs for disaster response activities, National Flood Insurance Program activities, risk assessment, and floodplain management.

Radiological accident. A radiological accident is a release of radioactive materials. It can occur where radioactive materials are used, stored, or transported. Potentially nuclear power plants (fixed nuclear facilities), hospitals, universities, research laboratories, industries, major highways, railroads, or shipping yards could be the site of a radiological accident.

Radon. Radon is a naturally occurring radioactive gas that is odorless and tasteless. It is formed from the radioactive decay of uranium. Uranium is found in small amounts in most rocks and soil. It slowly breaks down to other products such as radium, which breaks down to radon. Radon also undergoes radioactive decay. Radon enters the environment from the soil, from uranium and phosphate mines, and from coal combustion. Radon has a radioactive half-life and about 4 days; this means the one-half of a given amount of radon will decay to other products every 4 days. Some of the radon produced in the soil will move to the surface and enter the air. Radon also moves from the soil and enters the groundwater.

Real estate disclosure. Laws requiring the buyer and lender to be notified if a property is located in a hazard-prone area.

Regulation. Most states have granted local jurisdictions broad regulatory powers to enable the enactment and enforcement of ordinances that deal with public health, safety, and welfare. These include building codes, building inspections, zoning, floodplain and subdivision ordinances, and growth management initiatives.

Relocation out of hazard areas. A mitigation technique that features the process of demolishing or moving a building to a new location outside the hazard area.

Repetitive loss property. A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.

Reservoirs. Large water storage facilities that can be used to hold water during peak runoff periods for controlled release during off-peak periods.

Resolutions. Expressions of a governing body's opinion, will, or intention that can be executive or administrative in nature. Most planning documents must undergo a council resolution, which must be supported in an official vote by a majority of representatives to be adopted. Other methods of making a statement or announcement about a particular issue or topic include proclamations and declarations.

Resources. Resources include the people, materials, technologies, money, etc., required to implement strategies or processes. The costs of these resources are often included in a budget. See definition for structural retrofitting.

Richter Magnitude Scale. A logarithmic scale devised by seismologist C. F. Richter in 1935 to express the total amount of energy released by an earthquake. While the scale has no upper limit, values are typically between 1 and 9, and each increase of 1 represents a 32-fold increase in released energy.

Rip current. A rip current is a shallow river or channel of water on the surface of the ocean. Special weather conditions can cause rip currents to form, particularly strong winds blowing toward the shore which causes water pressure to build up on sandbars, reefs, or rocks.

Risk assessment. A process or method for evaluating risk associated with a specific hazard and defined in terms of probability and frequency of occurrence, magnitude and severity, exposure, and consequences.

Risk. The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Sabotage. Sabotage is the deliberate destruction of property, dismantling of technology or other interference or obstruction of normal operations. "Sabotage" is normally considered an act related to war; similar acts during "non-war" conditions would be considered a terrorist act.

Safe room/shelter. A small interior room constructed above grade and used to provide protection from tornadoes and other severe storm events. Bathrooms and large closets often double as safe rooms.

Seawalls/bulkheads. Vertical coastal walls that are built and designed to protect buildings against shoreline erosion. May also protect against storm surge.

Sediment and erosion control regulations. Regulations that stipulate the amount of sediment and erosion that is acceptable for land undergoing development.

Shoreline setback regulations. Regulations that establish a minimum distance between the existing shoreline and buildable areas.

Special events. An event of such a magnitude, media visibility, or importance that may require extraordinary preparations by government and possible response by emergency response agencies. Such events may be considered an opportunity or target for activist or terrorist activities.

Special tax bond. A bond secured by the pledge of a specific special tax.

Special use permits. Permits granted by local governments for land uses that have the potential for creating conflicts with uses on adjacent properties.

Stafford Act. The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Stakeholder. Individual or group that will be affected in any way by an action or policy. Stakeholders include businesses, private organizations, and citizens.

State Hazard Mitigation Officer (SHMO). The representative of state government who is the primary point of contact with FEMA, other state and federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

Storm surge. Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.

Storm water management regulations. Regulations governing the maintenance and improvement of urban storm water systems and the implementation of land treatment actions to minimize the effects of surface water runoff. Land treatment actions include maintenance of vegetative cover, terracing, and slope stabilization.

Strategy. Collection of actions to achieve goals and objectives.

Stream corridor restoration. The restoration of the areas bordering creeks, including the stream bank and vegetation.

Stream dumping regulations. Regulations prohibiting dumping in the community's drainage system, thereby maintaining stream carrying capacities and reducing the possibility of localized flooding.

Strike. A strike is an organized work stoppage carried out by a group of employees for the purpose either of enforcing demands relating to employment conditions on their employer or of protesting unfair labor practices. A strike may be engaged to obtain improvement in work conditions, higher wages or shorter hours, to forestall an adverse change in conditions of employment, or to prevent the employer from carrying out actions viewed by workers as detrimental to their interests.

Structural retrofitting. Modifying existing buildings and infrastructure to protect them from hazards.

Subdivision and development regulations. Regulations and standards governing the division of land for development or sale. Subdivision regulations can control the configuration of parcels, set standards for developer-built infrastructure, and set standards for minimizing runoff, impervious surfaces, and sediment during development. They can be used to minimize exposure of buildings and infrastructure to hazards.

Subdivision. The division of a tract of land into two or more lots for sale or development.

Subsidence. Land subsidence occurs when large amounts of ground water have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rocks falls in on itself.

Substantial damage. Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.

Taxation. Taxes and special assessments can be an important source of revenue for governments to help pay for mitigation activities. The power of taxation can also have a profound impact on the pattern of development in local communities. Special tax districts, for example, can be used to discourage intensive development in hazard-prone areas.

Terrorism (economic, cyber, nuclear, biological, and chemical). "Terrorism is the unlawful use of force or violence, or threatened use of force or violence, against persons and places for the purpose of intimidation and/or coercing a government, its citizens, or any segment thereof for political or social goals." (Department of Justice, Federal Bureau of Investigation). Terrorism can include computer-based (cyber) attacks and the use of weapons of mass destruction (WMD) to include chemical, biological, radiological, nuclear, or explosive (CBRNE) agents.

Thunderstorms/high winds. Thunderstorms are characterized as violent storms that typically are associated with high winds, dust storms, heavy rainfall, hail, lightning strikes, and/or tornadoes. The unpredictability of thunderstorms, particularly their formation and the rapid movement to new locations heightens the possibility of floods.

Tornadoes/dust devils. A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds in excess of 250 mph. Damage paths can exceed a mile wide and 50 miles long. Tornadoes are one of nature's most violent storms. In an average year, 800 tornadoes are reported across the United States, resulting in 80 deaths and over 1,500 injuries. The damage from tornadoes is due to high winds. The Fujita Scale of Tornado Intensity measures tornado/high wind intensity and damage. A dust devil is a small but rapidly rotating column of wind made visible by the dust, sand, and debris it picks up from the surface. They typically develop best on clear, dry, hot afternoons.

Transfer of development rights (TDR). A growth management technique through which development rights are transferred from a designated "sending" area to a designated "receiving" area. The sending area is generally prohibited from development and the receiving area is a targeted development area that can be built at a higher density.

Transportation accident. A transportation accident is an incident related to a mode of transportation (highway, air, rail, waterway, port, harbor) where an emergency response is necessary to protect life and property.

Tropical storm. A tropical system in which the maximum sustained surface wind ranges from 34 to 63 knots (39 to 73 mph). Tropical storms are associated with heavy rain, high wind, and thunderstorms. High intensity rainfall in short periods is typical. A tropical storm is classified as a hurricane/typhoon when its sustained winds reach or exceed 74 mph (64 knots). These storms are medium to large in size and are capable of producing dangerous winds, torrential rains, and flooding, all of which may result in tremendous property damage and loss of life, primarily in coastal populated areas. The effects are typically most dangerous before a hurricane/typhoon makes landfall, when most damage occurs.

Tsunami. Great sea wave produced by submarine earth movement or volcanic eruption.

Urban forestry and landscape management. Forestry management techniques that promote the conservation of forests and related natural resources in urbanized areas, with a focus on obtaining the highest social, environmental, and economic benefits.

Volcanoes. A volcano is a vent in the Earth from which molten rock (magma) and gas erupt. The molten rock that erupts from the volcano (lava) forms a hill or mountain around the vent. The lava may flow out as a viscous liquid, or it may explode from the vent as solid or liquid particles. Volcanic eruptions can be placed into two general categories: those that are explosive and those that are effusive resulting in gently flowing lava flows, spatter cones, and lava fountains. Many eruptions are highly explosive in nature. They produce fragmental rocks from erupting lava and surrounding area rock and may produce fine volcanic ash that rises many kilometers into the atmosphere in enormous eruption columns. Explosive activity can also cause widespread ash fall, pyroclastic flows, debris avalanches, landslides, pyroclastic surges, and lahars.

Vulnerability assessment/analysis. The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability analysis should address impacts of hazard events on the existing and future built environment.

Vulnerability. Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions.

Vulnerable populations. Any segment of the population that is more vulnerable to the effects of hazards because of things such as lack of mobility, sensitivity to environmental factors, or physical abilities. These populations can include, but are not limited to, senior citizens and school children.

Wave run-up. The height that the wave extends up to on steep shorelines, measured above a reference level (the normal height of the sea, corrected to the state of the tide at the time of wave arrival).

Wetlands development regulations. Regulations designed to preserve and/or minimize the impact of development on wetlands.

Wildfires. Wildfire is a rapid, persistent chemical reaction that releases heat and light, especially the exothermic combination of a combustible substance with oxygen. Combine severe burning conditions with people or lightning and the stage is set for the occurrence of large, destructive wildfires.

Wind-proofing. Modification of design and construction of buildings to withstand wind damage.

Zoning. The division of land within a local jurisdiction by local legislative regulation into zones of allowable types and intensities of land uses.

Zoning or land use map. A map that identifies the various zoning district boundaries and the uses permitted by a zoning ordinance within those boundaries.

Zoning ordinance. Designation of allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components. a zoning text and a zoning map.

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FIGURES

APPENDIX A

SIGN IN SHEETS (TEAM MEETINGS)

APPENDIX B

NOTIFICATION LETTERS AND LIST OF RECIPIENTS

APPENDIX C

PRESS RELEASES

APPENDIX D

PLAN ADOPTION – RESOLUTION

APPENDIX E

FEMA – OES LOCAL PLAN REVIEW CROSSWALK

APPENDIX F

LIST OF COMMERCIAL UNREINFORCED MASONRY BUILDINGS IN PASO ROBLES (MARCH 1, 2005)