City of Pismo Beach
Local Hazard Mitigation Plan

JANUARY 2007

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TABLE OF CONTENTS

Section 1 Official Record of Adoption 1-1

1.1 Disaster Mitigation Act of 2000 1-1
1.2 Adoption By the Local Governing Body and Supporting Documentation 1-1

Section 2 Plan Description 2-1

Section 3 Community Description 3-1

3.1 History, Location, and Geography 3-1
3.2 Government 3-1
3.3 Demographics 3-1
3.4 Land Use and Development Trends 3-2

Section 4 Planning Process 4-1

4.1 Overview of Planning Process 4-1
4.2 Hazard Mitigation Planning Team 4-2
4.2.1 Formation of the Planning Team 4-2
4.2.2 Planning Team Meetings and Tasks 4-3
4.3 Public Involvement 4-3
4.3.1 Public Notices/Press Releases 4-3
4.3.2 Public Workshops 4-4
4.4 Incorporation of Existing Plans and Other Relevant Information 4-4

Section 5 Risk Assessment 5-1

5.1 Overview of a Risk Assessment 5-1
5.2 Hazard Identification and Screening 5-2
5.3 Hazard Profile 5-3
5.3.1 Bluff Erosion 5-4
5.3.2 Dam Failures 5-5
5.3.3 Earthquakes 5-6
5.3.4 Floods 5-8
5.3.5 Hazardous Material Events 5-11
5.3.6 Landslides 5-13
5.3.7 Tsunamis 5-14
5.3.8 Wildland Fires 5-16
5.4 Asset Inventory 5-17
5.4.1 Population and Building Stock 5-18
5.4.2 Critical Facilities and Infrastructure 5-18
5.5 Vulnerability Assessment 5-20
5.5.1 Overview of a Vulnerability Assessment 5-20
5.5.2 Methodology 5-21
5.5.3 Data Limitations 5-22

5.5.4 Exposure Analysis 5-22

Section 6 Capability Assessment 6-1

6.1 Legal and Regulatory Capabilities 6-1
6.2 Administrative and Technical Capabilities 6-4
6.3 Financial Capabilities 6-4

Section 7 Mitigation Strategy 7-1

7.1 Mitigation Goals 7-1
7.2 Identification of Mitigation Actions 7-2
7.3 Evaluation of Mitigation Actions 7-5
7.4 Mitigation Action Plan 7-8

Section 8 Plan Maintenance 8-1

8.1 Monitoring, Evaluating, and Updating the LHMP 8-1
8.2 Implementation Through Existing Planning Mechanisms 8-2
8.3 Continued Public Involvement 8-3

Section 9 References 9-1

Tables

4-1 City of Pismo Beach Hazard Mitigation Planning Team
5-1 Identification and Screening of Hazards
5-2 Potential Seismic Hazards
5-3 Oil and Chemical Spills, 1991–2006
5-4 Historic Pismo Beach Tsunami Events, 1806–1992
5-5 Significant Wildland Fires in San Luis Obispo County, 1985–2005
5-6 Estimated Population and Building Inventory
5-7 Critical Facilities and Infrastructure
5-8 Potential Hazard Vulnerability Assessment – Population and Buildings
5-9 Potential Hazard Vulnerability Assessment – Critical Facilities
5-10 Potential Hazard Vulnerability Assessment – Critical Infrastructure
6-1 Legal and Regulatory Resources Available for Hazard Mitigation
6-2 Administrative and Technical Resources for Hazard Mitigation
6-3 Financial Resources for Hazard Mitigation
7-1 Mitigation Goals
7-2 Mitigation Goals and Potential Actions

7-3 Evaluation Criteria for Mitigation Actions
7-4 Mitigation Goals and Potential Actions
7-5 Mitigation Action Plan Matrix

Figures

B-1 Location
B-2 Land Use
B-3 Bluff Erosion Hazard Areas
B-4 Dam Failure Hazard Areas
B-5 Historic Earthquake Map
B-6 Earthquake Hazard Areas
B-7 Flood Hazard Areas
B-8 Hazardous Materials Hazard Areas
B-9 Landslide Hazard Areas
B-10 Tsunami Hazard Areas
B-11 Significant Wildland Fires
B-12 Wildland Fire Hazard Areas
B-13 Population Density
B-14 Critical Facilities and Infrastructure
B-15 Future Development Areas

Appendices

A Adoption Resolution
B Figures
C Planning Team Meetings
D Public Outreach
E Plan Maintenance Documents
F Crosswalk

TABLE OF CONTENTS

Acronyms

CFR	Code of Federal Regulations
City	City of Pismo Beach
DMA	Disaster Mitigation Act of 2000
DSOD	California Division of Safety of Dams
EHS	Extremely Hazardous Substance
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HAZUS-MH	FEMA's natural hazard loss estimation model
HMGP	Hazard Mitigation Grant Program
LHMP	Local Hazard Mitigation Plan
M	Magnitude
NFIP	National Flood Insurance Program
PDM	Pre-Disaster Mitigation
Planning Team	Hazard Mitigation Planning Team
SFHA	Special Flood Hazard Area
URS	URS Corporation
US 101	U.S. Highway 101
USFA	U.S. Fire Administration

This section provides an overview of the Disaster Mitigation Act of 2000 (DMA 2000; Public Law 106-390), the adoption of this Local Hazard Mitigation Plan (LHMP) by the local governing body, and supporting documentation for the adoption.

1.1 DISASTER MITIGATION ACT OF 2000

The DMA 2000 was passed by Congress to emphasize the need for mitigation planning to reduce vulnerability to natural and human-caused hazards. The DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 United States Code 5121 et seq.) by repealing the act's previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322).

To implement the DMA 2000 planning requirements, the Federal Emergency Management Agency (FEMA) published an Interim Final Rule in the Federal Register on February 26, 2002 (FEMA 2002a). This rule (44 Code of Federal Regulations [CFR] Part 201) established the mitigation planning requirements for states, tribes, and local communities. The planning requirements are described in detail in Section 2 and identified in their appropriate sections throughout the Plan. In addition, a crosswalk documenting compliance with 44 CFR is included as Appendix F.

1.2 ADOPTION BY THE LOCAL GOVERNING BODY AND SUPPORTING DOCUMENTATION

The requirements for the adoption of an LHMP by the local governing body, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- Has the local governing body adopted the plan?
- Is supporting documentation, such as a resolution, included?

Source: FEMA, March 2004.

The City of Pismo Beach (the City) LHMP meets the requirements of Section 409 of the Stafford Disaster Relief and Emergency Assistance Act and Section 322 of the DMA 2000. This LHMP has been prepared by the City's Hazard Mitigation Planning Team (Planning Team) and adopted by the City Council via resolution, which is presented in Appendix A.

The remainder of this LHMP consists of the following sections.

Community Description

Section 3 provides a general history and background of the community and historical trends for population, demographic, and economic conditions that have shaped the area. Trends in land use and development are also discussed.

Planning Process

Section 4 describes the planning process, identifies Planning Team members, URS Corporation (URS) consultants, and the key stakeholders within the community and surrounding region. In addition, this section documents public outreach activities and the review and incorporation of relevant plans, reports, and other appropriate information.

Risk Assessment

Section 5 describes the process through which the Planning Team identified and compiled relevant data on all potential natural hazards that threaten the City 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.

The descriptions of natural hazards that could affect the City are based on historical occurrences and best available data from agencies such as FEMA, the U.S. Geological Survey, the California Geologic Survey, and the National Weather Service. Detailed hazard profiles include information on the frequency, magnitude, location, and impact of each hazard as well as probabilities for future hazard events. Figures (attached as Appendix B) are included to identify known hazard areas and locations of previous hazard occurrences.

In addition, Section 5 identifies potentially vulnerable assets such as people, residential dwelling units, critical facilities, infrastructure and lifelines, hazardous materials facilities, and commercial facilities. These data were compiled by assessing the potential impacts from each hazard using a Geographic Information System (GIS) and FEMA's natural hazards loss estimation model, HAZUS-MH. The resulting information identifies the full range of hazards that the City could face and potential social impacts, damages, and economic losses.

Capability Assessment

Although not required by the DMA 2000, Section 6 provides an overview of the City's resources in the following areas for addressing hazard mitigation activities:

- **Legal and regulatory:** Existing ordinances, plans, and codes that affect the physical or built environment in a community
- **Administrative and technical:** The staff, personnel, and department resources available to expedite the actions identified in the mitigation strategy
- **Fiscal:** The financial resources to implement the mitigation strategy

Mitigation Strategy

As Section 7 describes, the Planning Team developed a list of mitigation goals and actions based upon the findings of the risk assessment and the capability assessment. Based upon these goals and objectives, the Planning Team, supported by URS, reviewed and prioritized a comprehensive range of appropriate mitigation actions 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.

Plan Maintenance Process

Section 8 describes the Planning Team's formal plan maintenance process to ensure that the LHMP remains an active and applicable document. The process includes monitoring, evaluating, and updating the LHMP; implementation through existing planning mechanisms; and continued public involvement.

References

Section 9 lists the reference materials used to prepare this LHMP.

Appendices

The appendices include the Adoption Resolution, maps and figures, Planning Team meetings and minutes, public outreach efforts, and a crosswalk for compliance with the DMA 2000.

This section describes the history, location, and geography of the City as well as its government, demographic information, and current land use and development trends.

3.1 HISTORY, LOCATION, AND GEOGRAPHY

Pismo Beach is located on the central coast of California. It lies 188 miles from Los Angeles and 243 miles from San Francisco on U.S. Highway 101 (US 101). The City is one of seven incorporated communities in San Luis Obispo County (Appendix B, Figure B-1) and is considered to be part of the county's South County subregion, which includes the incorporated cities of Pismo Beach, Grover City, and Arroyo Grande, and the unincorporated communities of Avila Beach, Oceano, and Nipomo.

Pismo Beach consists of 3.38 square miles of the original 13.81 square miles of the historic Rancho Pismo. Rancho Pismo was founded in 1840 by Jose Ortega and purchased by John Price in the mid-1850s. Over the next 30 years, John Price helped orchestrate the opening of a wharf, warehouse, school district, post office, and beach hotel, thereby helping establish the town as a tourist destination. In addition, Price hired a surveyor to map out and draw a plan for a town to be called "El Pismo." Over 120 years later, the original El Pismo townsite is still the downtown section of the City.

The current City limits stretch approximately 7 miles long by 1,000 feet to up to 1 mile wide. The City is bounded to the south and west by the Pacific Ocean and the east and north by the Freeway Foothills.

3.2 GOVERNMENT

Pismo Beach, which was incorporated in 1946, is a General Law city operating within rules established by the California Legislature. The organizational structure of the local government is of the City Council–City Manager form. The City Manager, appointed by the City Council, is responsible for planning, organizing, and directing all administrative activities such as enforcing municipal laws, directing the daily operations of the City, and preparing and observing the municipal budget. The City Council is composed of four members and a mayor elected at large. The City Council acts upon all legislative matters concerning Pismo Beach, approving and adopting all ordinances, resolutions, contracts, and other matters requiring overall policy decisions and leadership.

Additional information regarding City-owned buildings and facilities, urban services, infrastructure, and general building stock is provided in Section 5.

3.3 DEMOGRAPHICS

According to the U.S. Census Bureau, the City's population was 8,551 in 2000. Approximately 4.0 percent of the total population was under 5 years, 11.3 percent was between 5 and 17 years, 60.2 percent was between 18 and 64 years, and 24.5 percent was 65 years and over. The City's General Plan projects the annual growth rate to continue to average 3 percent a year with a complete build-out population of about 13,000. However, the City's growth rate over the past 2 years has been 1.0 percent.

Pismo Beach's current labor force includes 4,181 persons, which is approximately 56.8 percent of the City's total population. The economic base of the City has been oriented toward tourism. In 2000, the per capita income was $30,835, and the median family income was $61,036.

3.4 LAND USE AND DEVELOPMENT TRENDS

The Pismo Beach Planning Commission adopted its first general plan in 1983. This plan addressed the seven State mandatory planning elements, including Circulation, Conservation, Housing, Land Use, Noise, Open Space, and Safety, as well as additional voluntary elements, including Design, Facilities, Growth Management and Parks, and Recreation and Access. The 1992 General Plan is the current long-range planning device for the City. In addition to the General Plan, the City regulates land use through the City's Municipal Code.

The majority of the City's 4,674 residential dwelling units are located in the south from Toucan Terrace to Pismo Heights and in the north from Shell Beach to Sunset Palisades. The City's Motel District and Commercial Core areas are located in the south and south-central portion of the City. Many motels and hotels are located along Price, Pomeroy, and Dolliver streets and the oceanfront, while the majority of nonresidential uses are located among Dolliver, Main, and Stimson streets (Appendix B, Figure B-2).

Residential growth is managed so that the amount of new development annually is proportionate with the availability of public services and infrastructure. Therefore, the issuance of building permits does not exceed 3 percent a year, based on the number of unites estimated to exist within the City as of the preceding year.

In addition, Pismo Beach monitors development in the City's Extended Planning Area (Appendix B, Figure B-1). It is the City's policy to review all proposals in these boundaries, as changes in this area will most likely have an impact on the City.

This section provides an overview of the planning process; identifies Planning Team members, and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used in the development of this LHMP. Additional information regarding the Planning Team and public outreach efforts is provided in Appendices C and D.

The requirements for the planning process, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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:

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- 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 nonprofit interests to be involved in the planning process; and
- 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

- Does the plan provide a narrative description of the process followed to prepare the plan?
- 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.?)
- 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?)
- Was there an opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?

Source: FEMA, March 2004.

4.1 OVERVIEW OF PLANNING PROCESS

The City hired URS to assist with the development of this LHMP. The first step in the planning process was to establish a Planning Team composed of City, county, and other interested local agencies. Judy Lautner and Carolyn Johnson served as the primary points of contact for the City.

Once the Planning Team was formed, the following five-step planning process took place during the 8-month period from March to November 2006:

- **Organize resources:** The Planning Team identified resources, including City staff, agencies, and local community members, which could provide technical expertise and historical information needed in the development of the LHMP.

- **Assess risks:** The Planning Team identified the hazards specific to the City, and URS developed the risk assessment for the eight identified hazards. The Planning Team reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of the mitigation strategy.
- **Assess capabilities:** The Planning Team reviewed current administrative and technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards.
- **Develop a mitigation strategy:** After reviewing the risks posed by each hazard, the Planning Team developed a comprehensive range of potential mitigation goals and actions. Subsequently, the Planning Team evaluated and prioritized the actions to be implemented.
- **Monitor progress:** The Planning Team developed an implementation process to ensure the success of an ongoing program to minimize hazard impacts to the community.

4.2 HAZARD MITIGATION PLANNING TEAM

4.2.1 Formation of the Planning Team

As previously noted, the planning process began in March 2005. Judy Lautner formed the advisory body, known as the Planning Team, utilizing staff from relevant agencies. In July, Carolyn Johnson became the point-of-contact for the LHMP and Planning Team. The Planning Team members are listed in Table 4-1. The Planning Team meetings are described below. Meeting handouts are provided in Appendix C.

Table 4-1
City of Pismo Beach Hazard Mitigation Planning Team

Name	Organization	Department/Division
Judy Lautner	Pismo Beach	Planning
Carolyn Johnson	Pismo Beach	Planning Manager
Kevin Rice	Pismo Beach	City Manager
Larry Boyd	Pismo Beach	Building
Brian Henson	Pismo Beach	Public Works
Scott Smith	Pismo Beach	Police Department
Suzen Brasile	Pismo Beach	Conference and Visitors Bureau
Shelly Higginbotham	Pismo Beach	City Council
Bill Rabenaldt	Pismo Beach	City Council
Robert Lewin	California Department of Forestry/San Luis Obispo County	Fire
David Albert	Amtrak	Emergency Services
Kevin Baker	Lucia Mar Unified School District	Maintenance & Operations
Todd Fawly	California Polytechnic State University, San Luis Obispo	Student

4.2.2 Planning Team Meetings and Tasks

4.2.2.1 March 8, 2006

During the kick-off meeting, URS discussed the objectives of the DMA 2000, the hazard mitigation planning process, the public outreach process, and the steps involved in developing the LHMP and achieving the City's goals. The presentation included a review of GIS technology as a tool for identifying and mapping known hazards in the City. Also discussed was the need for the Planning Team to network with other people in the City, other agencies, and other professionals who might have specialized knowledge about hazards that may affect the City.

A hazard risk identification exercise was conducted to familiarize the Planning Team with the approach and concepts that would be used in the risk identification phase of the LHMP development. The exercise identified the specific hazards that the Planning Team wanted to address in the LHMP. Among the 21 potential hazards initially discussed (as shown in Section 5.2), eight hazards were determined to pose the greatest potential risk to the City: bluff erosion, dam failures, earthquakes, floods, hazardous materials events, landslides, tsunamis, and wildland fires.

4.2.2.2 July 18, 2006

During the second meeting, URS presented the Planning Team with the initial analysis of the risk assessment, describing which assets were analyzed and how values were estimated. In addition, the Planning Team reviewed and revised draft mitigation goals and actions. Then, the team members evaluated the potential mitigation actions and selected and prioritized recommended mitigation actions.

4.2.2.3 September 1-15, 2006

Over a 2-week period during September, the Planning Team was asked to review the Public Review Draft Pismo Beach LHMP. The Planning Team sent comments and concerns regarding the draft version to URS to incorporate changes before the release of the Public Comment Draft.

4.3 PUBLIC INVOLVEMENT

4.3.1 Public Notices/Press Releases

In April 2006, shortly after the first Planning Team meeting, the City issued a press release regarding the preparation of the LHMP. The press release, which was posted on the City's Web site, included links to materials presented at the first Planning Team meeting. Additionally, a phone number and an email address were provided for comments during the drafting stage.

In late June, a second press release was posted to the City's Web site to announce the availability of the hazard maps created for the LHMP. Web-site users could download each map to review and provide feedback to the Planning Team leader.

In October, a Public Comment Draft of the LHMP was posted to the City's Web site for review and comments. A snapshot of information posted the Web site is included in Appendix D.

4.3.2 Public Workshops

On May 11, 2006, the City held a public workshop for the LHMP. An article announcing the workshop was written in the *Times Press Recorder*. URS made a presentation on the overall planning process and described in detail each of the hazards profiled in the LHMP. Hazard map handouts were available for the public. The meeting, which lasted nearly 2 ½-hours concluded with a question and answer session.

The meeting announcement for the public workshop as well as the workshop attendance list is included in Appendix D.

4.4 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

During the planning process, URS and the Planning Team reviewed and incorporated information from existing plans (see Table 6-1), studies, reports, and technical reports into the LHMP. A synopsis of the sources follows.

- *City of Pismo Beach General Plan and Local Coastal Plan*: The Land Use Element provides information on existing land use and future development trends. The Safety Element provides information for the initial hazard identification process and development of the mitigation strategy.
- *City of Pismo Beach Municipal Code:* Land use and development regulation tools that were evaluated in the LHMP's capability assessment.
- *2002 Bluff Erosion Study Update:* This study help characterize the geotechnical and coastal processes that influence bluff erosion.
- *San Luis Obispo County Local Hazard Mitigation Plan* (2005): This plan was used to examine what hazards were addressed at the county-level.
- *State of California Multi-Hazard Mitigation Plan:* This plan, prepared by the California Office of Emergency Services, was used to ensure that the City's LHMP was consistent with the State's Plan.

The following FEMA guides were also consulted for general information on the LHMP process:

- *How-To Guide #1: Getting Started: Building Support For Mitigation Planning* (FEMA 2002c)
- *How-To Guide #2: Understanding Your Risks – Identifying Hazards and Estimating Loss Potential* (FEMA 2001)
- *How-To Guide #3: Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies* (FEMA 2003a)
- *How-To Guide #4: Bringing the Plan to Life: Implementing the Hazard Mitigation Plan* (FEMA 2003b)

A complete list of the sources consulted is provided in Section 9.

This section identifies and profiles the hazards that could affect Pismo Beach, assesses the risk of such hazards, describes the City's vulnerability, and estimates potential losses from the hazards. Each of these tasks is described in detail below.

In compliance with the DMA 2000, the requirements for the risk assessment are described below.

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.

5.1 OVERVIEW OF A RISK ASSESSMENT

A risk assessment requires the collection and analysis of hazard-related data to enable local communities to identify and prioritize appropriate mitigation actions that will reduce losses from potential hazards. The hazard mitigation planning process has five risk assessment steps, as outlined below and described in detail throughout the remainder of Section 5.

Step 1: Identify and Screen Hazards

Hazard identification is the process of recognizing natural and human-caused events that threaten an area. Natural hazards result from unexpected or uncontrollable natural events of sufficient magnitude. Human-caused hazards result from human activity and include technological hazards and terrorism. Technological hazards are generally accidental or result from events with unintended consequences (for example, an accidental hazardous materials release). Terrorism is defined as the calculated use of violence (or threat of violence) to attain goals that are political, religious, or ideological in nature. Even though a particular hazard may not have occurred in recent history in the study area, all hazards that may potentially affect the study area are considered; hazards that are unlikely to occur, or for which the risk of damage is accepted as very low, are then eliminated from consideration.

Step 2: Profile Hazards

Hazard profiling is accomplished by describing hazards in terms of their nature, history, magnitude, frequency, location, and probability. Hazards are identified through the collection of historical and anecdotal information, review of existing plans and studies, and preparation of hazard maps of the study area. Hazard maps are used to determine the geographic extent of the hazards and define the approximate boundaries of areas at risk.

Step 3: Identify Assets

Assets are defined as the population, buildings, and critical facilities and infrastructure that may be affected by hazard events. Asset information may be obtained from the participating

community, the U.S. Census Bureau, and FEMA's HAZUS-MH software. Asset information is organized and categorized for analysis using GIS.

Step 4: Assess Vulnerabilities

A vulnerability analysis predicts the extent of exposure that may result from a hazard event of a given intensity in a given area. The assessment provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage.

Step 5: Analyze Future Development Trends

The final stage of the risk assessment process provides a general overview of development and population growth that is forecasted to occur within the study area. This information provides the groundwork for decisions about mitigation strategies in developing areas and locations in which these strategies should be applied.

5.2 HAZARD IDENTIFICATION AND SCREENING

The requirements for hazard identification, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- 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.

For the first step of the risk assessment, the Planning Team identified 21 possible hazards that could affect Pismo Beach. The Planning Team evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected availability of information on the hazard (See Table 5-1). The Planning Team determined that eight hazards pose the greatest threat to Pismo Beach: bluff erosion, dam failures, earthquakes, floods (including coastal storms), hazardous materials events, landslides, tsunamis, and wildland fires. The remaining 13 hazards excluded through the screening process were considered to pose a lower threat to life and property in Pismo Beach due to the low likelihood of occurrence or the low probability that life and property would be significantly affected. Should the risk from these hazards increase in the future, the LHMP can be updated to incorporate vulnerability analyses for these hazards.

Table 5-1
Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Avalanche	No	City is not located in area prone to frequent or significant snowfall.
Bluff Erosion	Yes	City is located along the coast.
Coastal Storm	Yes	City is located along the coast. This hazard will be addressed in the flood hazard profile.
Dam Failure	Yes	City is located northwest of Lopez Dam and Terminal Dam.
Drought	No	Existing infrastructure for water storage and delivery within the City diminish the effects of this hazard.
Earthquake	Yes	City has experienced recent (2003 San Simeon) and historic earthquakes and is in the proximity of San Andreas fault as well as several other regional faults.
Expansive Soils	No	No historic events have occurred in the City.
Extreme Heat	No	While extreme temperatures are known to occur, prolonged heat waves are rare.
Flood	Yes	History of flooding is associated with coastal storms and heavy rainfall.
Hailstorm	No	No significant historic events have occurred in the City.
Hurricane	No	No significant historic events have occurred in the City.
Land Subsidence	No	No historic events have occurred in the City.
Landslide	Yes	City is vulnerable to slope instability, especially after prolonged rainfalls.
Severe Winter Storm	No	No significant historic events have occurred in the City.
Tornado	No	No significant historic events have occurred in the City.
Tsunami	Yes	City is located along the coast.
Volcano	No	No significant historic events have occurred in the City.
Wildland Fires	Yes	The terrain, vegetation, and weather conditions in the region are favorable for the ignition and rapid spread of wildland fires.
Windstorm	No	No significant historic events have occurred in the City.
Other: Hazardous Materials	Yes	Hazardous material facilities are located within and near the City. Major hazardous material transportation routes transect the City.
Diablo Canyon Power Plant	No	Mitigation concerns handled by Diablo Canyon Power Plant. No local jurisdictional authority.

5.3 HAZARD PROFILE

The requirements for hazard profile, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- Does the risk assessment identify the **location** (i.e., geographic area affected) of each natural hazard addressed in the plan?
- Does the risk assessment identify the **extent** (i.e., magnitude or severity) of each hazard addressed in the plan?
- Does the plan provide information on **previous occurrences** of each hazard addressed in the plan?
- 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 specific hazards selected by the Planning Team for profiling have been examined in a methodical manner based on the following factors:

- Nature
- History
- Location
- Extent
- Probability of Future Events

The hazards profiled for Pismo Beach are presented in Section 5.3 in alphabetical order. The order of presentation does not signify the level of importance or risk.

5.3.1 Bluff Erosion

5.3.1.1 Nature

Coastal bluffs are the seaward edges of marine terraces that are shaped by ocean waves and currents and uplifted from the ocean floor. Coastal bluffs are composed mainly of sedimentary rocks, such as sandstones and shales, which are particularly prone to erosion. Erosion mechanisms often include:

- Sheetwash: material loosened and carried down bluff
- Gullying and filling: Organization of water flowing over bluff into distinct drainage systems or gullies, increasing its erosive capacity
- Creep: On shallow slopes consisting of poorly consolidated material, sediment may move downslope slowly as a coherent mass
- Sudden bluff collapse: Translational slides, rotational slides, and vertical (or nearly so) falls

Bluffs erode in episodic periods, usually during a single storm event or season. The main factors that affect bluff erosion are surface runoff, groundwater, marine erosion (wave attack), and wind erosion. However, material strength (rock type, cementation, fracture, orientation, weak plans, and clay content), bluff beach geometry, wave energy (aspect and exposure, local effects, protective beach, and offshore bars), surface runoff, and presence/absence of groundwater can affect the mechanisms and rate of bluff erosion.

5.3.1.2 History

Historical (1949) aerial photos of the Pismo Bluffs show bluff erosion has typically occurred episodically with several feet to several tens of feet of the bluff top eroding during a single storm event or single storm season. In 1978, bluff erosion due to severe storms caused damage to eight homes. Twenty years later, in February 1998, five coastal bluff failures affected city roads. Increased sea-wave erosion, surface-water erosion, and urban irrigation were sited as factors that contributed to these most recent failures.

5.3.1.3 Location, Extent, and Probability of Future Events

The Pismo Bluffs, ranging in height from 10 to 100 feet, are located along 5 miles of the northwestern portion of the City's shoreline. On average, these bluffs erode approximately 4 inches per year. Average retreat rates of only 2 inches per year have been observed in places where the bluffs are comprised of relatively resistant volcanic bedrock or are south-facing. These areas include Park Place, South Point, and Price Street. Higher average retreat rates of 6 to 12 inches per year have been noted in areas where bedrock exposure is limited at the base of the bluff or where a bluff collapse has occurred, such as southern Indio Drive (See Appendix B, Figure B-3).

Bluff retreat rates are expressed as a historical average rate of retreats for the unprotected Pismo Bluffs. However, the reported retreat rates can be influenced by changes in land use, bluff stabilization measures, wave energy, rising sea levels, and tectonic movements along the coastline. Therefore, while the City can expect the bluffs to retreat on average 4 inches per year, other episodic factors could cause several feet of bluff erosion annually.

5.3.2 Dam Failures

5.3.2.1 Nature

A dam failure is the structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. The sudden release of water has the potential to cause human casualties, economic loss, and environmental damage. This type of disaster is dangerous because it can occur rapidly, providing little warning and evacuation time for people living downstream. The flows resulting from dam failure generally are much larger than the capacity of downstream channels and can, therefore, lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment-laden water, flooding over the channel banks, and impact of debris carried by the flow.

5.3.2.2 History

Lopez Dam, which was constructed in 1969, is the only major dam in the vicinity of Pismo Beach. Lopez Dam has never failed or been subject to significant damage. A smaller county dam, known as Terminal Dam, has also never failed. While no dam failures have occurred in the Pismo Beach area, the regulation of dams in California was initiated after the catastrophic failure of the St. Francis Dam in Los Angeles County in 1928.

5.3.2.3 Location, Extent, and Probability of Future Events

As shown in Appendix B, Figure B-4, Lopez and Terminal dams pose a risk of inundation within the City. Lopez Dam is located approximately 10 miles east of the City of Arroyo Grande. It has a storage capacity of 49,200 acre-feet, which is considered to be State-size. State-size dams, which are regulated by the California Division of Safety of Dams (DSOD), are more than 25 feet in height and hold back more than 15 acre-feet of water, or are more than 6 feet in height and hold back more than 50 acre-feet of water.

Terminal Dam belongs to Terminal Reservoir, which is the water supply for the county. The water is piped 3 miles from Lake Lopez and the dam is located on a tributary to the City of Arroyo Grande. Terminal Dam has a capacity of 844 acre-feet. Terminal Dam does have a small inundation area within the inundation area for Lopez Dam.

The DSOD dam-breach maps for Lopez and Terminal dams show an inundation area within the southern portion of the City limits. In addition, the 100-year flood is expected to flow out of Lopez Dam over its ungated spillway after periods of prolonged or intense rainfall.

Although Lopez Dam is inspected annually by the DSOD to ensure that it is in good operating condition, a dam failure could occur due to structural damage as a result of an earthquake. The West Huasna fault, which runs directly beneath the dam, is geologically significant in that a potential for fault activity exists. Additionally, an unnamed fault runs directly northeast of Terminal Dam.

5.3.3 Earthquakes

5.3.3.1 Nature

An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake.

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. Two kinds of seismic waves exist: 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), and S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side to side (horizontal

motion). Also two kinds of surface waves exist: Raleigh waves and Love waves. These waves travel more slowly and typically are significantly less damaging than seismic waves.

In addition to ground motion, several secondary hazards can occur from earthquakes, such as surface faulting. Surface faulting is the differential movement of two sides of a fault at the earth's surface. 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). Surface faulting can cause severe damage to linear structures, including railways, highways, pipelines, and tunnels.

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. Porewater pressure may also increase sufficiently to cause the soil to behave like a fluid for a brief period and cause deformations. Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 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). Liquefaction can cause severe damage to property.

5.3.3.2 History

Historically, most of the earthquakes that have occurred near Pismo Beach have originated from movement along the San Andreas Fault, which lies approximately 42 miles northeast of the City. Historical records show that a Magnitude (M) 5.0 earthquake struck the San Luis Obispo area in 1830 and a M 5.1 earthquake occurred in Avila Beach in 1916 (See Appendix B, Figure B-5). However, until recently, the largest historical earthquake in the vicinity of the City was the M 6.2 Bryson earthquake of November 1952. While the exact location of this earthquake is unknown, no deaths or injuries were reported as a result of this event. However, Pismo Beach did sustain damage to some of its older, brick masonry buildings. In 2003, an earthquake of a M 6.5 struck in San Luis Obispo County at 11:15:56 a.m. Pacific Standard Time on Monday, December 22. The epicenter was approximately 7 miles northeast of San Simeon at a depth of 4.7 miles (35.706N 121.102W), 60 miles from Pismo Beach. Two people were killed in the City of Paso Robles. Countywide, 47 people were reported injured and 290 homes and 190 commercial structures were damaged.

5.3.3.3 Location, Extent, and Probability of Future Events

The Pismo Beach area is exposed to seismic hazards from movement along several regional faults. The major active fault or fault segments, as well as their distance from the City, maximum moment magnitude, length, and slip rate, are listed in Table 5-2 and shown in Appendix B, Figure B-6.

Table 5-2
Potential Seismic Hazards

Fault	Distance From Pismo Beach (miles)	Maximum Moment Magnitude	Fault Length (miles)	Potential Annual Slip Rate (millimeters)
San Luis Range (South Margin)	.1	7.0	40	0.2
Los Osos	4	6.8	27	0.5
Hosgri	10	7.3	107	2.5
Rinconada	14	7.3	117	1.0
Casmalia (Orcutt Frontal Fault)	15	6.5	18	0.25
Lions Head	20	6.6	25	.02
San Juan	32	7.0	42	1.0
Los Alamos	34	6.8	17	0.7
San Andreas (Cholame)	42	6.9	39	34
San Andreas (1857 Rupture)	42	7.8	214	34
San Andreas (Parkfield Segment)	46	6.7	23	34
North Channel Slope	50	7.1	37	2.0

Source: Southern California Earthquake Data Center 2006; Fugro West, Inc. and Nichols Engineers 2002

The seismic shaking hazard map, as shown in Appendix B, Figure B-6, shows the level of ground motion that has an annual probability of 1 in 475 of being exceeded each year, which is equal to a 10 percent probability of being exceeded in 50 years. As such, the entire City falls within the moderate range (0.25 and 0.35 percent of acceleration of gravity) of shaking.

5.3.4 Floods

5.3.4.1 Nature

Flooding is the accumulation of water where usually none occurs or the overflow of excess water from a stream, river, lake, reservoir, or coastal body of water onto adjacent floodplains. 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.

Nationwide, floods result in more deaths than any other natural hazard. Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents
- Erosion or scouring of streambanks, roadway embankments, foundations, footings for bridge piers, and other features

- Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters, which may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects
- Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands
- Release of sewage and hazardous or toxic materials as wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed

Floods also result in economic losses through closure of businesses and government facilities, disrupt communications, disrupt the provision of utilities such as water and sewer service, result in excessive expenditures for emergency response, and generally disrupt the normal function of a community.

In Pismo Beach, two types of flooding occur: riverine flooding, also known as overbank flooding, and coastal 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. Larger rivers typically have longer, more predictable flooding sequences and broad floodplains.

Localized flooding may occur outside of recognized drainage channels or delineated floodplains due to a combination of locally heavy precipitation, increased surface runoff, and inadequate facilities for drainage and stormwater conveyance. Such events frequently occur in flat areas and in urbanized areas with large impermeable surfaces. Local drainage may result in “nuisance flooding,” in which streets or parking lots are temporarily closed, and minor property damage.

Coastal flooding in Pismo Beach is generally caused by wave run-up. Pacific Ocean storms through the months of November through February in conjunction with high tides and strong winds can cause significant wave run-up. In addition to intense offshore storms, coastal flooding from the Pacific Ocean can also be attributed to seismic sea-waves or tsunamis, which can occur during any time of the year. As such, coastal flooding can be exacerbated by the physical characteristics of the continental shelf and shoreline.

5.3.4.2 History

The most recent serious flood events on record in Pismo Beach occurred during storms in the early months of 1969, 1971, 1977-1978, 1995, 2001, and 2004.

The January 1969 storm delivered the most rainfall totals ranging from 12 to 21 inches in the region. Only 1 month later, another series of storms delivered an additional 6 inches of rain to the area. These floods inundated the City’s sewage treatment plant. Two years later, Pismo and Meadow creeks overflowed damaging private and City property. In 1977-1978 wave run-up caused by winter storms resulted in significant damage to City property. Over the past 10 years, heavy rains produced by slow-moving coastal storms have caused Pismo Creek to overflow and flood nearby homes.

5.3.4.3 Location, Extent, and Probability of 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 streamflow 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 following factors contribute to the frequency and severity of riverine flooding:

- Rainfall intensity and duration
- Antecedent moisture conditions
- Watershed conditions, including steepness of terrain, soil types, amount, and type of vegetation, and density of development
- The existence of attenuating features in the watershed, including natural features such as swamps and lakes and human-built features such as dams
- The existence of flood control features, such as levees and flood control channels
- Velocity of flow
- Availability of sediment for transport, and the erodibility of the bed and banks of the watercourse

Additionally, the following factors contribute to the frequency and severity of coastal flooding:

- Astronomical tides
- Storm surge, which is the rise in water from wind stress and low atmospheric pressure
- Waves
- Peak stillwater elevation

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a probability of occurrence of 1 percent in any given year, also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the National Flood Insurance Program (NFIP). The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements. The FIRMs also show floodplain boundaries for the 500-year flood, which is the flood having a 0.2 percent chance of occurrence in any given year. FEMA has prepared a FIRM for the City of Pismo Beach, dated January 1984. FEMA is currently in the process of preparing a countywide digital FIRM for San Luis Obispo County, which will incorporate the flood hazard information currently shown separately on the City of Pismo Beach FIRM.

Rivers and streams where FEMA has prepared detailed engineering studies may also have designated floodways. The floodway is the channel of a watercourse and portion of the adjacent floodplain that is needed to convey the base or 100-year flood event without increasing flood levels by more than 1 foot and without significantly increasing flood velocities. The floodway

must be kept free of development or other encroachments. FEMA has not designated floodways within the City of Pismo Beach.

The FIRM for the City of Pismo Beach shows identified SFHAs for the following flooding sources:

- Pismo Creek, which originates in Price Canyon, extending from the southern portion of the City to the mouth of the Pacific Ocean (total drainage area of 40 square miles)
- Meadow Creek, which also flows from the southern portion of the City, extending approximately 5 miles from its origin in the City of Arroyo Grande to its confluence with Arroyo Grande Creek (total drainage area of 6.5 square miles)
- Pismo Lake Tributary Creek, which flows southwesterly for approximately 2 miles from its headwaters in the foothill to its confluence with Meadow Creek

Appendix B, Figure B-7 shows the extent of the 100-year and 500-year floodplains, as well as known localized flooding, within Pismo Beach. An area totaling 0.66 square mile within the City is within the 100-year floodplain and 0.08 square mile is within the 500-year floodplain. The City is prone to shallow flooding (1 to 3 feet) along the City's Commercial Core and Pismo Creek planning areas. In addition, flooding can occur along the beach, where it is not uncommon to see winter storms produce 15-foot breakers. Flooding in these areas generally occurs during the rainy season from October to April.

Based on previous occurrences, Pismo Beach can expect a serious flood event to occur every 4 to 6 years.

5.3.5 Hazardous Material Events

5.3.5.1 Nature

Hazardous materials may include hundreds of substances that pose a significant risk to humans. These substances may be highly toxic, reactive, corrosive, flammable, radioactive, or infectious. Hazardous materials are regulated by numerous Federal, State, and local agencies including the U.S. Environmental Protection Agency (EPA), U.S. Department of Transportation, National Fire Protection Association, FEMA, U.S. Army, and International Maritime Organization.

Hazardous material releases may occur from any of the following:

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

Unless exempted, facilities that use, manufacture, or store hazardous materials in the United States fall under the regulatory requirements of the Emergency Planning and Community Right to Know Act (EPCRA) of 1986, enacted as Title III of the Federal Superfund Amendments and Reauthorization Act (42 United States Code 11001–11050; 1988). Under EPCRA regulations,

hazardous materials that pose the greatest risk for causing catastrophic emergencies are identified as Extremely Hazardous Substances (EHSs). These chemicals are identified 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* (USEPA 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.

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 serious due to the impairment or failure of the physical integrity 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 antiterrorism security at these facilities.

5.3.5.2 History

The National Response Center, which serves as the Federal point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment, Web-based query system shows that since 1991, six oil and chemical spills have occurred within the City. These spills are described in Table 5-3.

Table 5-3
Oil and Chemical Spills, 1991–2006

Incident Date	Type of Incident	Medium Affected	Material Name
March 20, 1991	Unknown sheen	Water	Unknown oil
September 4, 1992	Pipeline	Land	Water with possible oil contamination
April 19, 1994	Pipeline	Water	Crude oil
June 6, 1996	Mobile	Air	Liquefied nitrogen
May 26, 2004	Fixed	Land	Automotive unleaded gasoline
November 2, 2005	Mobile	Water	Unknown oil

Source: National Response Center 2006

5.3.5.3 Location, Extent, and Probability of Future Events

The EPA's regulated facilities within City limits include one facility that is permitted to discharge to water and nine facilities that are hazardous waste handlers. Generally, the small, fixed facilities (drycleaners, auto body shops, etc.) have varying uses of hazardous chemicals, but in general do not pose a significant risk to the City.

In addition to fixed facilities, hazardous material events have the potential to occur along US 101, State Route 1, and the railroad tracks. The trucks and trains that use these transportation arteries commonly carry a variety of hazardous materials including gasoline, other crude oil derivatives, and other chemicals known to cause human health problems.

Based on previous occurrences, the likelihood of a small oil or chemical spill occurring within in Pismo Beach is every 2.5 years. However, more comprehensive information on the probability and magnitude of hazardous material events from all types of sources (such as fixed facilities or transport vehicles) is not available. Wide variations among the characteristics of hazardous material sources and among the materials themselves make such an evaluation difficult. While it is beyond the scope of this LHMP to evaluate the probability and magnitude of hazardous material events in the City 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 EPA Tier II Material Inventory Report because of the presence of hazardous materials, one was identified as being an EHS site.

Appendix B, Figure B-8, shows areas at risk for a hazardous material event, including an area within a 1-mile radius of US 101, State Route 1, the EHS facility, and the railroad tracks.

5.3.6 Landslides

5.3.6.1 Nature

Landslide is a general term for the dislodgment and fall of a mass of soil or rocks along a sloped surface or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rockfalls, rockslides, debris avalanches, debris slides, and slump-earth flows. Landslides may result from a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also occur due to indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions.

Additionally, landslides often occur together with other natural hazards, thereby exacerbating conditions, as described below:

- Shaking due to earthquakes can trigger events ranging from rockfalls and topples to massive slides.
- Intense or prolonged precipitation that causes flooding can also saturate slopes and cause failures leading to landslides.
- Landslides into a reservoir can indirectly compromise dam safety, and a landslide can even affect the dam itself.
- Wildfires can remove vegetation from hillsides, significantly increasing runoff and landslide potential.

5.3.6.2 History

Most recently, county geologists observed earthquake-induced landslides in the foothills of Pismo Beach after the December 22, 2003, San Simeon earthquake. Landsliding was also observed along the bluffs in February 1998 as a result of sea-wave erosion, surface-water erosion, and urban irrigation.

5.3.6.3 Location, Extent, and Probability of Future Events

Similar to much of San Luis Obispo County, Pismo Beach has several areas that are considered to have a high risk of landslides. Slope instability in the City generally increases with steepness and distance from the Pacific Ocean, with areas of steep terrain that consist of fractured soil or thin layers of clay that are susceptible to erosion and landslide. The foothills in the northern City limits and east of US 101 are highly vulnerable to landsliding (see Appendix B, Figure B-9).

The likelihood of sliding increases during or after a period of heavy rain, when saturated soil fractures or weak spots give way. Therefore, while slides generally occur during the rainy season, after very wet winters, deep-seated landslides can continue to become active for many months, extending well into the summer. These landslides range in size from less than an acre to several that extend over a mile of hillside. Geologists consider Pismo Beach to be prone to deep-seated, slow-moving landslides. However, even where slides are recognized, it is often hard to accurately predict the frequency or magnitude of potential future movement. Therefore, based on previous occurrences, Pismo Beach can expect a landsliding event every 4 to 5 years.

5.3.7 Tsunamis

5.3.7.1 Nature

A tsunami is a series of waves generated in a body of water by an impulsive disturbance along the seafloor that vertically displaces the water. Tsunamis are most frequently caused by subduction earthquakes at plate boundaries. However, tsunamis can be generated by submarine landslides as well as from the collapses of volcanic edifices and violent submarine volcanic eruptions.

A single tsunami event may involve a series of waves, known as a train, of varying heights. In open water, tsunamis have extremely long periods of time (from minutes to hours) for the next wave top to pass a point after the previous one. In addition, a tsunami wavelength can extend up to several hundred miles, very different from typical wind-generated swells on the ocean, which might have a period of about 10 seconds and a wavelength of 300 feet.

The actual height of a tsunami wave in open water is generally only 1 to 3 feet, often practically unnoticeable to people on ships. The energy of a tsunami passes through the entire water column to the seabed, unlike surface waves, which typically reach only down to a depth of 30 feet or so. The tsunami wave travels across the ocean at speeds up to 700 miles per hour. As the wave approaches land, the sea shallows and the wave no longer travels as quickly, so the wave begins to ‘pile up’ as the wave-front becomes steeper and taller, and distance between crests is less. Therefore, the wave can increase to a height of 90 feet or more as it approaches the coastline and compresses. This steepening process is often compared to the sound of a cracking whip.

A tsunami not only affects beaches that are open to the ocean, but also bay mouths, tidal flats, and shores of large coastal rivers. In addition, tsunami waves can diffract around land masses. And since tsunamis are not symmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source and the surrounding geography. However, tsunamis do propagate outward from their source, so coasts in the shadow of affected landmasses are usually fairly safe.

5.3.7.2 History

As shown in Table 5-4, five observed tsunamis have impacted Pismo Beach over the last 125 years. Three of the five tsunamis resulted in little to no wave run-up. However, Pismo Beach experienced wave run-ups of almost 6 feet in 1927 and over 4 feet in 1960.

Table 5-4
Historic Pismo Beach Tsunami Events, 1806–1992

Date	Origin	Run-Up (Feet)
November 22, 1878	Southern California	Observed
November 4, 1927	Central California	5.9
April 1, 1946	E. Aleutian Island	Observed
May 22, 1960	South Central Chile	4.5
October 13, 1963	Kuril Island, Russia	Observed

Source: Humboldt State University 2006

5.3.7.3 Location, Extent, and Probability of Future Events

Although Pismo Beach is located along the Pacific coast, much of Pismo Beach is protected from tsunamis by the Pismo Bluffs. Areas that are most vulnerable to tsunamis include those located near the mouths of coastal streams that drain into the Pacific Ocean, including Pismo Creek, and areas that are located below the estimated elevations for the 100- to 500-year events. The 100- to 500-year events have been calculated to have an average run-up of 9.5 to 24.2 feet with a worst-case (high astronomical tides) scenario of 50 feet. However, the severity of the exposure to tsunamis will vary locally depending on specific natural and artificial coastal conditions.

As shown in Appendix B, Figure B-10, the following areas are at highest risk to tsunamis:

- Development located near the mouth of Pismo Creek
- State Parks North Beach Campground
- State Route 1 to the Pacific Ocean from Franklin to Hinds
- US 101 to the Pacific Ocean from Hinds to Price Canyon
- James Way to the Pacific Ocean from Price Canyon to 4th Street

Large tsunamis have not been common along the Central Coast of California. Few incidents have been recorded over a limited historical record to develop accurate recurrence predictions.

However, based on observed previous occurrences, Pismo Beach can expect tsunami wave run-up every 25 years.

5.3.8 Wildland Fires

5.3.8.1 Nature

A wildland fire is a type of wildfire that spreads through consumption of vegetation. It often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. Wildland fires can be caused by human activities (such as arson or campfires) or by natural events such as lightning. Wildland fires often occur in forests or other areas with ample vegetation. In addition to wildland fires, wildfires can be classified as urban fires, interface or intermix fires, and prescribed fires.

The following three factors contribute significantly to wildland fire behavior and 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 more 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:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the “fuel load”). The ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel’s continuity, both horizontally and vertically, is also an important factor.
- **Weather:** The most variable factor affecting wildland fire behavior is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildland fire activity. By contrast, cooling and higher humidity often signals reduced wildland fire occurrence and easier containment.

The frequency and severity of wildland fires is also dependent upon other hazards, such as lightning, drought, and infestations (such as the recent damage to Southern California alpine forests by the pine bark beetle). If not promptly controlled, wildland fires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildland fires may severely affect livestock and pets. Such events may require emergency watering/feeding, evacuation, and shelter.

The indirect effects of wildland fires can 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 debris flow hazards, as described above.

5.3.8.2 Disaster History

As shown in Table 5-5 and Appendix B, Figure B-11, wildland fires are common occurrences in San Luis Obispo County. The most significant wildland fires within the county have been located in the Los Padres National Forest, approximately 22 miles to the east of the City limits. Over a 10-year period (1986-1996), Pismo Beach experienced only two small wildland fires.

Table 5-5
Significant Wildland Fires in San Luis Obispo County, 1985–2005

Name	Year	Acres Burned	Homes Lost	Dollar Damage
Las Pilitas	1985	75,000	12	$1,200,000
Chispa	1989	10,000	4	$250,000
Highway 41	1994	49,000	42	$10,000,000
Highway 58	1996	106,000	13	$1,000,000
Logan	1997	50,000	NA	NA

Source: California Department of Forestry, San Luis Obispo County Fire Department 2006
NA = Not available

5.3.8.3 Location, Extent, and Probability of Future Events

Appendix B, Figure B-12 displays both the location and extent of wildland fire hazard areas for Pismo Beach. This map is based on the California Fire and Resource Assessment Program fuel rank model. This model ranks the fuel model, slope, and ladder and/or crown fuel present to determine potential exposure to high and very high wildfire hazard areas. Accordingly, the northern portion (Bluffs Drive) of the City is considered to be at greatest risk as this area is part of a wildland/urban interface zone, where development meets rural areas of combustible vegetation. In addition, the central coast of the City limits (Spyglass Planning Area) is at great risk, as this area has been heavily landscaped, thereby replacing low-fuel and low-crown coastal sage scrub.

Generally, fire susceptibility throughout California dramatically increases in the late summer and early autumn as vegetation dries out, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. However, other various factors, including humidity, wind speed and direction, fuel load and fuel type, and topography, can contribute to the intensity and spread of wildland fires. In addition, common causes of wildland fires in California include arson and negligence. Based on previous occurrences, Pismo Beach can expect a small wildland fire to occur every 5 years.

5.4 ASSET INVENTORY

This section describes the third step in the risk assessment process, which is the identification of assets that may be affected by hazard events. Assets identified for the risk assessment include population, buildings, and critical facilities and infrastructure that may be affected by hazard events. The assets identified are discussed in detail below. Sections 5.4.1 and 5.4.2 provide a complete list of assets and insurance or replacement values where applicable.

5.4.1 Population and Building Stock

Population data were obtained from the 2000 U.S. Census. Data were collected at the census block level for the City. The City's total population for 2000 was 8,551. Population density throughout the City is shown in Appendix B, Figure B-13.

Estimated numbers of residential and nonresidential buildings and replacement values for those structures, as shown in Table 5-6, were obtained from the City and HAZUS-MH by census block. A total of 4,674 residential buildings were considered in this analysis, including single-family dwellings, mobile homes, multifamily dwellings, temporary lodgings, institutional dormitory facilities, and nursing homes. A total of 66 nonresidential buildings were also analyzed, including industry, retail trade, wholesale trade, personal and repair services, professional and technical services, banks, medical offices, religious centers, entertainment and recreational facilities, theaters, and parking facilities.

Table 5-6
Estimated Population and Building Inventory

Population	Residential Buildings		Nonresidential Buildings	
2000 Census Population Count*	**Total Building Count**	**Total Value of Buildings (x1000)****	**Total Building Count**	**Total Value of Buildings (x1000)**
8,551	4,674	771,756	66	97,844

Source: FEMA HAZUS-MH (residential and commercial buildings) and U.S. Census 2000 population data.
*Population count using census blocks within the city limits.

**Average residential building value (including single-family dwelling, mobile homes, etc., is $191,000 per structure).

5.4.2 Critical Facilities and Infrastructure

A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, such as preserving the quality of life in the City and fulfilling important public safety, emergency response, and disaster recovery functions. The critical facilities within the City are listed in Table 5-7 and shown in Appendix B, Figure B-14. Critical facilities include:

- Two administrative buildings
- Two fire stations, two police stations, and one Emergency Operations Center
- Eight schools and three district buildings
- One wastewater treatment facility and 14 lift stations
- One water treatment plant, three wells, eight reservoirs, and five water-pressure booster stations
- Five community and recreational facilities
- Three schools

Similar to critical facilities, critical infrastructure is essential to preserving the quality of life and safety in the City. Critical infrastructure identified within the City is shown in Table 5-7 and Appendix B, Figure B-14**.** Critical infrastructure includes:

- 14.15 miles of State and Federal highways
- 1.46 miles of railroad tracks
- 18 bridges

Table 5-7
Critical Facilities and Infrastructure

Category	Facility	Address	Estimated Insured Structural Value / Value Per Mile
Administrative Buildings	City Hall	760 Mattie Road	$2,527,125
	Corporate Yard (Storage, Maintenance Storage, Building Equipment Storage, and Belt Press Buildings)	550 Frady Lane	$688,630
Police and Fire Facilities	Police Station/Emergency Operations Center	1000 Bello St.	$961,007
	Police Annex	Dolliver and Hinds Sts.	$88,150
	Main Fire Department	990 Bello St.	$243,989
	Fire Station #63	2555 Shell Beach Road	$237,179
Wastewater Treatment Facilities	Wastewater Treatment Facility	550 Frady Lane	$10,455,331
	Lift stations	Addie Street Commercial Core at Cypress Street Five Cities Drive Pismo Oaks Freeway Foothills Harloe at Cypress Mattie Road Sphere #1 Mattie Road Sphere #2 Sunset Palisades South Palisades Spyglass North Spyglass Vista del Mar St. Andrews at Seacliff Drive	$2,855,301
Potable Water Facilities	Water Treatment Plant	Seaview Circle	$2,613,832
	Wells	El Camino Real Fourth Street Frady Lane	$196,877

Table 5-7
Critical Facilities and Infrastructure

Category	Facility	Address	Estimated Insured Structural Value / Value Per Mile
	Reservoirs	Bello Street Pacific Estates Pismo Oaks Pismo Heights Pismo Heights #3 Shell Beach #1 Shell Beach #2 Ridge Road	$6,778,414
	Water Pressure Booster Stations	Pismo Oaks Pacific Estates Bello Street Bay Street Pismo Heights	$892,103
Community and Recreational Facilities	Pismo Veterans' Hall	780 Bello Street	$1,087,978
	Shell Beach Veterans' Hall	230 Leeward	$336,543
	Pier	End of Pomeroy	$3,892,610
	Chamber of Commerce	581 Dolliver	$91,022
	Price Anniversary House	Price Historic Park	$93,440
Schools	Shell Beach Elementary (Lucia Mar School District)	2100 Shell Beach Road	$590,000
	Judkins Middle School (Lucia Mar School District)	680 Wadsworth	$590,000
	Happy Time Cooperative Preschool	1091 Bello	$153,254
Infrastructure	Bridges	18	$1,432,468/average cost per $25,784,426/total
	State and Federal Highways	14.15 miles	$5,198,255/mile $73,553,125/total
	Railroad Tracks	1.46 miles	$1,385,304/mile $2,023,250/total

Source: City of Pismo Beach (insured structural value, parcel improvement value) and FEMA HAZUS-MH (estimated values)

5.5 VULNERABILITY ASSESSMENT

The fourth step of the risk assessment and its primary intent is the vulnerability assessment. This section includes an overview of the vulnerability assessment, methodology, data limitations, and exposure analysis.

5.5.1 Overview of a Vulnerability Assessment

The requirements for a risk assessment, as stipulated in the DMA 2000 and its implementing regulations, are described below.

- A summary of the community's vulnerability to each hazard that addresses the impact of each hazard on the community

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

- Does the plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?
- Does the plan address the **impact** of each hazard on the jurisdiction?

Source: FEMA, March 2004.

- An identification of the types and numbers of existing vulnerable buildings, infrastructure, and critical facilities and, *if possible*, the types and numbers of vulnerable future development

DMA 2000 Recommendations: 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

- 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?
- 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.

- An estimate of potential dollar losses to vulnerable structures and the methodology used to prepare the estimate

DMA 2000 Recommendations: 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

- Does the plan estimate **potential dollar losses** to vulnerable structures?
- Does the plan describe the **methodology** used to prepare the estimate?

Source: FEMA, March 2004.

5.5.2 Methodology

The methodology used to prepare the dollar estimates for vulnerability is described below. Potential dollar losses are summarized in Tables 5-8, 5-9, and 5-10 in Section 5.5.4.

A conservative exposure-level analysis was conducted to assess the risks of the identified hazards. This analysis is a simplified assessment of the potential effects of the hazard on values at risk without consideration of probability or level of damage.

Using GIS, the building footprints of critical facilities were compared to locations where hazards are likely to occur. If any portion of the critical facility fell within a hazard area, it was counted as impacted. Using census-block-level information, a spatial proportion was used to determine the percentage of the population and residential and nonresidential structures located where hazards are likely to occur. Census blocks that are completely within the boundary of the hazard area were determined to be vulnerable and were totaled by count. A spatial proportion was also used to determine the amount of linear assets, such as highways and pipelines, within a hazard area. The exposure analysis for linear assets was measured in miles.

Replacement values or insurance coverage were developed for physical assets. These values were obtained from HAZUS-MH or from the City. For facilities that didn't have specific values per building in a multibuilding scenario (e.g., schools), the buildings were grouped together and assigned one value. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

5.5.3 Data Limitations

The vulnerability 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 and 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 hazard. It was beyond the scope of this LHMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the LHMP.

5.5.4 Exposure Analysis

The results of the exposure analysis are summarized in Tables 5-8, 5-9, and 5-10 and in the discussion below.

Table 5-8
Potential Hazard Vulnerability Assessment – Population and Buildings

		Population	Buildings			
			Residential		Nonresidential	
Hazard	**Methodology**	**Number**	**Number**	**Value ($)***	**Number**	**Value ($)***
Bluff Erosion	100-year bluff line	155	95	24,516	2	1,406
Dam Failures	Inundation areas	997	711	36,761	2	4,485
Earthquakes	Moderate	8,551	4,674	771,756	66	97,844
Floods	100-year flood zone	1,165	801	64,074	4	6,644
Hazardous Materials Events	1-mile radius EHS facilities	3,477	2,017	310,223	37	56,414
	1-mile buffer transport corridors	8,437	4,609	760,228	66	97,448
Landslides	High	477	311	55,816	1	1,495
	Moderate	434	244	44,377	1	1,036
Tsunamis	Extreme run-up areas	2,405	1,453	189,260	23	36,465
	Maximum average run-up areas	1,189	825	67,200	4	7,248
Wildland Fires	Extreme	2,123	1,126	200,758	13	15,671
	High	1,905	1,050	160,531	10	15,589
	Moderate	2,358	1,242	222,635	30	45,798

* Value = Estimated average structural value (x1000)

Table 5-9
Potential Hazard Vulnerability Assessment – Critical Facilities

		Administrative Buildings		Police and Fire Stations		Waste Water Treatment Facilities		Potable Water Facilities		Community and Recreational Facilities		Schools		Total	
Hazard	**Methodology**	**No.**	**Value ($)***	**No.**	**Value ($)***	**No.**	**Value ($)***	**No.**	**Value ($)***	**No.**	**Value ($)***	**No.**	**Value ($)***	**No.**	**Value ($)***
Bluff Erosion	100-year bluff line	0	0	0	0	5	14,276.50	0	0	1	3,892.61	0	0	6	18,169.11
Dam Failures	Inundation areas	0	0	0	0	3	8,565.90	2	2,810.71	0	0	0	0	5	11,376.61
Earthquakes	Moderate	2	3,215.75	4	1,530.33	15	50,429.54	17	61,892.29	5	5,501.59	3	1,333.25	46	123,902.75
Floods	100-year flood zone	1	688.63	0	0	5	21,876.53	4	16,367.54	2	3,986.05	0	0	12	42,918.75
Hazardous Materials Events	1-mile radius EHS facilities	1	688.63	3	1,293.15	5	21,876.53	10	33,492.78	4	5,165.05	2	743.25	25	63,259.39
	1-mile buffer transport corridors	2	3,215.75	4	1,530.33	15	50,429.54	15	54,916.99	5	5,501.59	3	1,333.25	44	116,927.45
Landslides	High	0	0	0	0	1	2,855.30	3	20,335.24	0	0	1	590.0	5	23,780.54
	Moderate	1	2,527.13	0	0	1	2,855.30	1	6,778.41	0	0	0	0	3	12,160.84
Tsunamis	Extreme run-up areas	1	688.63	0	0	10	36,153.04	6	17,456.52	3	4,077.07	0	0	20	58,375.26
Wildland Fires	Extreme	0	0	1	237.18	6	17,131.81	3	8,562.62	1	336.54	1	590.0	12	26,858.15
	High	2	3,215.76	0	0	5	21,876.54	10	43,543.67	2	1,181.42	1	590.0	20	70,407.39
	Moderate	0	0	3	1,293.15	1	2,855.30	4	9,786.0	2	3,983.63	1	153.25	11	18,071.33

*Value = Estimated insured structural value (x1000)

Table 5-10
Potential Hazard Vulnerability Assessment – Critical Infrastructure

		Highways		Railroads		Bridges	
Hazard	**Methodology**	**Miles**	**Value ($)***	**Miles**	**Value ($)***	**Number**	**Value ($)***
Bluff Erosion	100-year bluff line	0	0	0	0	0	0
Dam Failures	Inundation area	.802	4,170.329	.544	753.016	2	1,470.020
Earthquakes	Moderate	14.15	73,553.125	1.46	2,023.250	18	25,784.426
Floods	100-year flood zone	1.072	5,570.489	.687	951.073	8	10,731.149
Hazardous Materials Events	1-mile radius EHS facilities	5.625	29,239.671	1.296	1,795.954	14	17,675.992
	1-mile buffer transport corridors	14.15	73,553.125	1.46	2,023.250	18	25,784.426
Landslides	High	0	0	0	0	0	0
	Moderate	0.618	3,211.957	0	0	0	0
Tsunamis	Extreme run-up areas	3.144	16,345.193	1.461	2,023.250	9	12,093.929
Wildland Fires	Extreme	3.04	15,804.171	0.347	480.225	5	3,933.308
	High	2.399	12,469.391	0.741	1,026.623	8	11,650.819
	Moderate	7.707	40,061.308	0.264	365.422	5	10,200.298

*Value = Estimated value (x1000)

5.5.4.1 Bluff Erosion

On average, the Pismo Bluffs erode approximately 4 inches per year. Therefore, using a 100-year projection to determine areas at risk to bluff erosion, approximately 155 people, 95 residential buildings (worth $24.5 million), 2 nonresidential buildings (worth $1.5 million), and 6 critical facilities (worth $18.2 million) reside in the bluff erosion hazard area. No highways or railroad tracks are located in this hazard area.

5.5.4.2 Dam Failures

The risk posed by the failure of Lopez and Terminal dams is minimal to moderate, with approximately 12 percent of the total population residing in this inundation zone. Exposed within the inundation zone are 997 people, 711 residential buildings (worth $36.8 million), 2 nonresidential buildings (worth $4.5 million), and 5 critical facilities (worth $11.3 million). Less than 1 mile of highways and railroad tracks are located in the dam failure hazard area.

5.5.4.3 Earthquakes

Of all the hazards assessed in this LHMP, an earthquake poses the greatest exposure and potential loss for the City. As shown in Appendix B, Figure B-6, the entire City is at risk to earthquakes. All of the city's population, residential and nonresidential structures, and critical buildings, facilities, and infrastructure are exposed in moderate ground shaking zones.

5.5.4.4 Floods

The risk posed by the 100-year flood to Pismo Beach is minimal to moderate, with approximately 15 percent of the total population residing in the SFHA. Exposed within the 100-year flood zone are 1,165 people, 801 residential buildings (worth $64.1 million), 4 nonresidential buildings (worth $6.6 million), and 12 critical facilities (worth $42.9 million). Approximately 1 mile of highways and two-thirds mile of railroad tracks are located in the 100-year floodplain.

5.5.4.5 Hazardous Material Events

Within the 1-mile buffer around the one EHS site, 3,477 people, 2,017 residential buildings (worth $310.2 million), 37 nonresidential buildings (worth $56.4 million), and 25 critical facilities (worth $63.3 million) are exposed.

Within the 1-mile buffer around the transportation facilities, nearly 99 percent of the City's population is exposed to a hazardous material transport event, including 8,437 people, 4,609 residential buildings (worth $760.2 million), 66 nonresidential buildings (worth $97,448 million), and 44 critical facilities (worth $116.9 million). As above, these figures are for the entirety of the transportation corridors and, therefore, overstate the exposure since a hazardous material event along the corridors is unlikely to affect all of the area within the 1-mile buffer.

5.5.4.6 Landslides

Approximately 11 percent of the City's total population is exposed to high and moderate landslides. The high landslide hazard area includes 477 people, 311 residential buildings (worth $55.8 million), 1 nonresidential building (worth $1.5 million), and 5 critical facilities (worth $23.8 million). 434 people, 244 residential buildings (worth $44,377 million), 1 nonresidential building (worth $1.0 million), and 3 critical facilities (worth $12.2) are located in the moderate landslide hazard area. No critical infrastructure is located in the high landslide hazard area and only ½ mile of highways is located in the moderate landslide hazard area.

5.5.4.7 Tsunamis

Using the worst-case (high astronomical tides) scenario of 50-foot run-up, approximately 28 percent of the population is vulnerable to a tsunami, including 2,405 people, 1,453 residential buildings (worth $189.3 million), 23 nonresidential buildings (worth $36.5 million), and 20 critical facilities (worth $58.4 million). Approximately 3 miles of highways and 1.5 miles of railroad tracks are located in this hazard area. In addition, approximately, 1,189 people, 825 residential buildings (worth $67.2 million), and 4 nonresidential buildings (worth $7.2 million) are located in maximum average run-up areas of 24 feet. Critical facilities and critical infrastructure were not considered in the maximum average run-up areas due to double-counting.

5.5.4.8 Wildland Fires

Using the California Fire and Resource Assessment Program model, moderate to extreme wildland fire risk areas are located throughout the City (see Figure B-12). Within the area of extreme wildland fire exposure are 2,123 people, 1,126 residential buildings (worth $200.8 million), 13 nonresidential buildings (worth $15.7 million), and 12 critical facilities (worth $26.9 million).

High wildland fire risk areas include 1,905 people, 1,050 residential buildings (worth $160.5 million), 10 nonresidential buildings (worth $15.6 million), and 20 critical facilities (worth $70.4 million).

Moderate wildfire risk areas include 2,358 people, 1,242 residential buildings (worth $222.6 million), 30 nonresidential buildings (worth $45.8 million), and 11 critical facilities (worth $18.1 million).

5.5.4.9 Future Development

Potential future acquisition areas, referred to as "sphere of influence" areas, include the unincorporated county land to the east of the southern city limits (See Appendix B, Map B-1). Like much of the City, the sphere of influence area will be vulnerable to moderate earthquakes and hazardous material events. In addition, the western portion of the sphere of influence area will be vulnerable to flood and tsunami hazards.

While not required by the DMA 2000, an important component of a hazard mitigation plan is a review of the City's resources to identify, evaluate, and enhance the capacity of those resources to mitigate the effects of hazards. This section evaluates City resources in three areas–legal and regulatory, administrative and technical, and financial–and assesses capabilities to implement current and future hazard mitigation actions.

6.1 LEGAL AND REGULATORY CAPABILITIES

The City currently supports hazard mitigation through its regulations, plans, and programs. The Pismo Beach Municipal Code outlines hazard mitigation-related ordinances in three of its 17 titles. Additionally, pursuant to State planning laws, the *General Plan and Local Coastal Plan* include a safety element with policies and programs to protect the community from risks associated with bluff, flood, seismic and fire hazards.

In addition to policies and regulations, the City participates in several hazard mitigation programs including the NFIP and Fire Safe Council Fuel Management Projects.

Table 6-1 summarizes the City's hazard mitigation legal and regulatory capabilities.

Table 6-1
Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Chapter or Section		Effect on Hazard Mitigation
Plans	General Plan & Local Coastal Plan Safety Element		Establishes policies that will minimize the potential of human injury and property damage to the following natural hazards: bluff erosion, flood, earthquakes, and wildland fires.
Programs	National Flood Insurance Program (NFIP)		Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods. Pismo Beach joined the NFIP in 1984.
	Fire Safe Council Fuel Management Projects		The California Department of Forestry and Fire Protection, which provides fire protection for the County of San Luis Obispo, including Pismo Beach, conducts annual control burns, chipping, and fuel reduction projects.
Policies (Municipal Code)	Title 8 Health and Safety	Chapter 8.04 Fire Control Regulations	Adopts and enforces the Uniform Fire Code Standards, 2000 Edition.
		Chapter 8.24 Radioactive Materials	Prohibits the storage and/or transportation of certain types of radioactive material.
		Chapter 8.32 Weeds and Rubbish	Enforces weed and rubbish abatement on both public and private property.
		Chapter 8.37 Liability Costs of Response to Hazardous Waste or Substance Spills, Releases, and Other Incidents	Enables the City to take any corrective action to remedy or prevent an imminent substantial danger to the public, wildlife, or the environment as a result of any unauthorized disposal or release of any hazardous waste or substance. Enables the City to hold responsible party liable from costs incurred.
	Title 15 Building and Construction	Chapter 15.10 Development Impact Fees	Requires fees to be paid for the purpose of protecting public health, safety, general welfare, and implementing the policies of the general plan.
		Chapter 15.20 Unreinforced Masonry Buildings Safety Code	Requires minimum standards for structural seismic resistance established primarily to reduce the risk of life loss or injury.
		Chapter 15.24 Uniform Housing Code	Adopts and enforces the Uniform Housing Code, 1997 Edition.

Table 6-1
Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Chapter or Section		Effect on Hazard Mitigation
		Chapter 15.44 Flood Hazard Area Use Control	Identifies areas where terrain characteristics would present new developments and their users with potential hazards to life and property from potential inundation by a 100-year frequency flood or other known flood hazards. These standards are also intended to minimize the effects of development on drainage ways and watercourses.
	Title 17 Zoning	Chapter 17.28 Hillside Development Code	Establishes requirements for development proposed on property with slopes of 15 percent or greater. In addition, prohibits grading on slopes of 30 percent or greater.
		Chapter 17.32 Ocean Fronting Development	Provides standards for development that is proposed on parcels adjacent to the ocean.

6.2 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

The administrative and technical capability assessment identifies the staff and personnel resources available within the City to engage in mitigation planning and carry out mitigation projects. The City government consists of the following departments: City Manager, City Clerk, Conference and Visitor's Bureau, Finance, Engineering, Community Development (including the Planning, Building, Recreation, and Parks and Halls divisions), Fire, and Police. The City may increase its technical resources by drawing upon San Luis Obispo County staff. The administrative and technical capabilities of the City are listed in Table 6-2.

Table 6-2
Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department/Division Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	Planning, Engineering
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Building, Engineering
Planner(s) or engineer(s) with an understanding of human-made or natural hazards	Engineering, Building
Floodplain manager	Engineering, Building
Personnel skilled in GIS and/or HAZUS-MH	Engineering, Planning
Director of Emergency Services	Fire
Finance (grant writers, purchasing)	Planning, Finance
Public Information Officers	City Administrative Officer, City Clerk

6.3 FINANCIAL CAPABILITIES

The fiscal capability assessment lists the specific financial and budgetary tools that are available to the City for hazard mitigation activities. These capabilities, which are listed in Table 6-3, include both local and Federal entitlements.

Table 6-3
Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	If funding available, can be used for hazard mitigation activity, including debt service for bonds.
Authority to levy taxes for specific purposes	Can be used for any hazard mitigation activity, but only eligible for use with voter approval.
Development Impact Fee	Can be used for both on-site and off-site capital improvements, including seismic hazard repair and maintenance, drainage, and critical facilities. Impact fees must be used only for the purpose for which they were created. At this time, the City does not have any impact fees associated with hazard mitigation.

Table 6-3
Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
Incur debt through general obligation bonds	Can be used for any hazard mitigation activity but only eligible for use with voter approval.
Incur debt through special tax and revenue bonds	Revenue Bonds can be issued through the City of Pismo Beach Public Financing Authority without voter approval, to raise funds for hazard mitigation activities. However, a specific revenue source must be identified and generated to pay back the Revenue Bonds or a portion of the General Fund must be committed to the bonds.
Incur debt through private activity bonds	Can be used for any hazard mitigation activity but only eligible for use with voter approval.
FEMA HMGP and PDM grants	HMGP grant funding is available to local communities after a Presidentially declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects. PDM funding is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only.
USFA Grants	The purpose of these grants is to assist state, regional, national, or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors, and firefighters.

HMGP = Hazard Mitigation Grant Program
PDM = Pre-Disaster Mitigation
USFA = U. S. Fire Administration

The following provides an overview of the four-step process for preparing a mitigation strategy: developing mitigation goals, identifying potential mitigation actions, evaluating mitigation actions, and implementing a Mitigation Action Plan.

7.1 MITIGATION GOALS

The requirements for the local hazard mitigation goals, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- 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.

During the second Planning Team meeting in July 2006, the team members reviewed the initial risk assessment results as a basis for developing mitigation goals and actions. Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide visions. As such, the Planning Team developed 10 goals to reduce or avoid long-term vulnerabilities to the identified hazards (Table 7-1).

Table 7-1
Mitigation Goals

Goal Number	Goal Description
1	Promote disaster-resistant development.
2	Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.
3	Reduce the possibility of damage and losses due to bluff erosion.
4	Reduce the possibility of damage and losses due to dam failures.
5	Reduce the possibility of damage and losses due to hazardous earthquakes.
6	Reduce the possibility of damage and losses due to floods.
7	Reduce the possibility of damage and losses due to hazardous materials events.
8	Reduce the possibility of damage and losses due to landslides.
9	Reduce the possibility of damage and losses due to tsunamis.
10	Reduce the possibility of damage and losses due to wildland fires.

7.2 IDENTIFICATION OF MITIGATION ACTIONS

The requirements for the identification and analysis of mitigation actions, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- Does the plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?

Source: FEMA, March 2004.

In addition to developing goals, the Planning Team reviewed and revised a list of potential mitigation actions. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects.

The Planning Team reviewed the City's hazard mitigation capabilities and risk assessment as a basis for developing potential mitigation actions. In addition, particular emphasis was placed on new actions that reduced the effects of hazards on both new and existing buildings and infrastructure. Current mitigation actions that the City supports (as shown in Table 6-1) are not included. Therefore, as shown in Table 7-2, the Planning Team developed 20 potential mitigation actions.

Table 7-2
Mitigation Goals and Potential Actions

Goals		Potential Actions		
Number	**Description**	**Number**	**Rank**	**Description**
1	Promote disaster-resistant development.	1.A		Create incentives (e.g., rebates) to promote homeowner/business owner disaster-resistant development (e.g., Class A roofing material).
		1.B		Identify hazard-prone critical facilities and infrastructure and carry out structural and nonstructural retrofitting measures as necessary.
		1.C		Update land acquisition criteria (Sphere of Influence) to include a hazard analysis component.
		1.D		Rehabilitate Bello Bridge to withstand flooding and tsunami hazards.
2	Build and support local capacity to enable community members to prepare for, respond to, and recover from disasters.	2.A		Create a mitigation outreach program, including newsletters, flyers, Public Service Announcements, and videos, that helps community members and local businesses prepare for disasters.
		2.B		Participate in a program or an annual event / fair for community members that includes the sale of National Oceanic and Atmospheric Administration weather radios, dissemination of information brochures about disasters and building retrofits, and demonstration of “defensible-space” concept and fire-resistant construction materials.
		2.C		Develop a community emergency response team program that also includes a mitigation component.
3	Reduce the possibility of damage and losses due to bluff erosion.	3.A		Examine alternative shore protection methods, effects of hard shore protection structures, near-shore circulation processes and sediment budgets, seacliff erosion processes, and other hazard processes.
4	Reduce the possibility of damage and losses due to dam failure.	4.A		Include dam safety map and county emergency response plan updates into local planning documents, as needed.
5	Reduce the possibility of damage and losses due to earthquakes.	5.A		Develop an unreinforced masonry grant program that helps correct earthquake-risk nonmasonry building problems, including chimney bracing and anchoring water heaters.
6	Reduce the possibility of damage and losses due to floods	6.A		Explore mitigation opportunities for repetitively flooded properties, and if necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties.
		6.B		Enlarge human-made bottlenecks and reduce the debris in channels to reduce the effects of nuisance flooding.

Table 7-2
Mitigation Goals and Potential Actions

Goals		Potential Actions		
Number	**Description**	**Number**	**Rank**	**Description**
7	Reduce the possibility of damage and losses due to hazardous materials events.	7.A		Use the City's Web site to post information regarding the safe handling and disposal of household chemicals.
		7.B		Examine critical infrastructure that has been identified as currently being too narrow to ensure the safe transportation of truckloads within the City limits.
8	Reduce the possibility of damage and losses due to landslides.	8.A		Develop a vegetation management plan. Proper vegetation can supply slope-stabilizing root strength, and facilitate in intercepting precipitation.
9	Reduce the possibility of damage and losses due to tsunamis.	9.A		Display standardized and easy to read signs alerting community members of tsunami hazard zones, evacuation routes, and evacuation sites.
		9.B		Participate in the Tsunami Ready Program. This new program, sponsored by the National Weather Service, is designed to provide communities with incentives to reduce their tsunami risks.
10	Reduce the possibility of damage and losses due to wildland fire.	10.A		Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.
		10.B		Create defensible space guidelines for buildings that are in very high and extreme fire hazard areas.
		10.C		Develop and provide funding and/or incentives for defensible space measures (e.g., free chipping day, free collection day for tree limbs).

7.3 EVALUATION OF MITIGATION ACTIONS

Once the Planning Team members had identified a list of 20 mitigation actions, the members evaluated each of the mitigation actions to determine which actions would best help the City fulfill its mitigation goals, thereby reducing or avoiding long-term vulnerabilities to the identified hazards. To complete this task, the Planning Team applied simplified Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) evaluation criteria (shown in Table 7-3) to consider the opportunities and constraints of implementing a particular mitigation action. The Planning Team members assigned a ranking of "positive" or "neutral" to each mitigation action. A ranking of "positive" represents an action that best fulfills the LHMP's goals and is appropriate and easily feasible for the City to implement, while a ranking of "neutral" represents an action that is useful, but may not be the best approach to reduce a hazard and may not be very feasible for the City to implement. The results of this evaluation process are shown in Table 7-4.

Table 7-3
Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the City has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What City and community members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the City has the legal authority to implement the action, or whether the City Council must pass new regulations.	Local, state, and Federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, state, and Federal laws

Table 7-4
Mitigation Goals and Potential Actions

Goals		Potential Actions		
Number	**Description**	**Number**	**Rank***	**Description**
1	Promote disaster-resistant development.	1.A	N	Create incentives (e.g., rebates) to promote homeowner/business owner disaster-resistant development (e.g., Class A roofing material).
		1.B	N	Identify hazard-prone critical facilities and infrastructure and carry out structural and nonstructural retrofitting measures as necessary.
		1.C	P	Update land acquisition criteria (Sphere of Influence) to include a hazard analysis component.
		1.D	P	Rehabilitate Bello Bridge to withstand flooding and tsunami hazards.
2	Build and support local capacity to enable community members to prepare for, respond to, and recover from disasters.	2.A	P	Create a mitigation outreach program, including newsletters, flyers, Public Service Announcements, and videos, that helps community members and local businesses prepare for disasters.
		2.B	N	Participate in a program or an annual event / fair for community members that includes the sale of National Oceanic and Atmospheric Administration weather radios, dissemination of information brochures about disasters and building retrofits, and demonstration of “defensible-space” concept and fire resistant construction materials.
		2.C	N	Develop a community emergency response team program that also includes a mitigation component.
3	Reduce the possibility of damage and losses due to bluff erosion.	3.A	N	Examine alternative shore protection methods, effects of hard shore protection structures, near-shore circulation processes and sediment budgets, sea cliff erosion processes, and other hazard processes.
4	Reduce the possibility of damage and losses due to dam failure.	4.A	N	Include dam safety map and county emergency response plan updates into local planning documents, as needed.
5	Reduce the possibility of damage and losses due to earthquakes.	5.A	P	Develop an unreinforced masonry grant program that helps correct earthquake-risk nonmasonry building problems, including chimney bracing and anchoring water heaters.
6	Reduce the possibility of damage and losses due to floods	6.A	N	Explore mitigation opportunities for repetitively flooded properties, and if necessary, carry-out acquisition, relocation, elevation, and flood-proofing measures to protect these properties.
		6.B	N	Enlarge human-made bottlenecks and reduce the debris in channels to reduce the effects of nuisance flooding.

Table 7-4
Mitigation Goals and Potential Actions

Goals		Potential Actions		
Number	**Description**	**Number**	**Rank***	**Description**
7	Reduce the possibility of damage and losses due to hazardous materials events.	7.A	N	Use the City's Web site to post information regarding the safe handling and disposal of household chemicals.
		7.B	N	Examine critical infrastructure that has been identified as currently being too narrow to ensure the safe transportation of truck loads within the City limits.
8	Reduce the possibility of damage and losses due to landslides.	8.A	N	Develop a vegetation management plan. Proper vegetation can supply slope-stabilizing root strength, and facilitate in intercepting precipitation.
9	Reduce the possibility of damage and losses due to tsunamis.	9.A	P	Display standardized and easy to read signs alerting community members of tsunami hazard zones, evacuation routes, and evacuation sites.
		9.B	N	Participate in the Tsunami Ready Program. This new program, sponsored by the National Weather Service, is designed to provide communities with incentives to reduce their tsunami risks.
10	Reduce the possibility of damage and losses due to wildland fire.	10.A	P	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.
		10.B	N	Create defensible space guidelines for buildings that are in very high and extreme fire hazard areas.
		10.C	P	Develop and provide funding and/or incentives for defensible space measures (e.g., free chipping day, free collection day for tree limbs).

* N = Neutral, P = Positive

7.4 MITIGATION ACTION PLAN

The DMA 2000 requires the prioritization, implementation, administration, and an emphasis on cost-benefit review of the potential mitigation actions, as described below.

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

- Does the mitigation strategy include how the actions are **prioritized**? (For example, is there a discussion of the process and criteria used?)
- 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?)
- 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.

As noted above, the Planning Team ranked each action "positive" or "neutral." "Positive" rankings represent an action that best fulfills the LHMP's goals and is appropriate and feasible for the City to implement while a ranking of "neutral" represents an action that is useful, but may not be the best approach to reduce a hazard and may not be very feasible for the City to implement. The Planning Team determined that any mitigation actions ranked "positive" would be considered a high priority and included in the Mitigation Action Plan. Any mitigation action ranked "neutral" would be considered a medium priority and not included in this version of the LHMP's Mitigation Action Plan. Table 7-5 includes a Mitigation Action Plan that describes how the mitigation actions were ranked and prioritized, how the overall benefit-costs were taken into consideration, and how each mitigation action will be implemented and administered by the City.

Table 7-5
Mitigation Action Plan Matrix

Action Number	Description	Rank / Prioritization	Administering Department	Potential Funding	Timeframe	Overall Benefit-Costs
1.C	Update land acquisition criteria (Sphere of Influence) to include a hazard analysis component.	P / High	Planning	General	0-1 year	This effort will help reduce the possibility of future damage and losses by limiting or regulating development in hazardous areas.
1.D	Rehabilitate Bello Bridge to withstand flooding and tsunami hazards.	P / High	Engineering	Development Impact Fees, HMGP and PDM grants	2-4 years	This effort will ensure that this heavily used critical infrastructure will withstand future flooding and tsunami hazards.
2.A	Create a mitigation outreach program, including newsletters, flyers, Public Service Announcements, and videos, that helps community members and local businesses prepare for disasters.	P / High	Fire / Police	HMGP and PDM grants	0-1 year, Ongoing	A mitigation outreach program will help build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.
5.A	Develop an unreinforced masonry grant program that helps correct earthquake-risk nonmasonry building problems, including chimney bracing and anchoring water heaters.	P / High	Building	HMGP and PDM grants	1-5 years	The identification and mitigation of unreinforced nonmasonry buildings will reduce potential losses due to earthquakes.
9.A	Display standardized and easy to read signs alerting community members of tsunami hazard zones, evacuation routes, and evacuation sites.	P / High	Planning, Fire	HMGP and PDM grants	1-2 years	This effort is both a mitigation outreach effort and an emergency preparedness effort. This action will help reduce the possibility of future damage and losses by educating the public about local tsunami inundation areas. In addition, it will also educate the public on where and how to evacuate, if necessary.

Table 7-5
Mitigation Action Plan Matrix

Action Number	Description	Rank / Prioritization	Administering Department	Potential Funding	Timeframe	Overall Benefit-Costs
10.A	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.	P / High	Fire	USFA Grants, HMGP and PDM grants	0-1 year, Ongoing	The probability of future damage from wildland fires could be high if this mitigation action is not implemented. Additionally, this mitigation action addresses a natural hazard risk with an “extreme” hazard ranking.
10.C	Develop and provide funding and/or incentives for defensible space measures (e.g., free chipping day, free collection day for tree limbs).	P / High	Fire	USFA Grants, HMGP and PDM grants	0-1 year, Ongoing	The potential cost of this mitigation action seems reasonable for the size of the problem and its likely benefits. Additionally, this mitigation action addresses a natural hazard risk with an “extreme” hazard ranking.

This section describes a formal plan maintenance process to ensure that the LHMP remains an active and applicable document. It includes an explanation of how the City and the Planning Team intend to organize their efforts to ensure that improvements and revisions to the LHMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail below:

- Monitoring, evaluating, and updating the LHMP
- Implementation through existing planning mechanisms
- Continued public involvement

8.1 MONITORING, EVALUATING, AND UPDATING THE LHMP

The requirements for monitoring, evaluating, and updating the LHMP, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- 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?)
- 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?)
- Does the plan describe the method and schedule for **updating** the plan within the five-year cycle?

Source: FEMA, March 2004.

The LHMP was prepared as a collaborative effort between the Planning Team and URS. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the City will use the Planning Team to monitor, evaluate, and update the LHMP. In addition to the original members of the Planning Team, other interested parties, including members of the City Council, Planning Commission, and any other department representative, can be responsible for implementing the LHMP's Mitigation Action Plan. Carolyn Johnson, the Planning Team leader, will serve as the primary point of contact and will coordinate all local efforts to monitor, evaluate, and revise the LHMP.

The Planning Team will conduct an annual review to monitor the progress in implementing the LHMP, particularly the Mitigation Action Plan. As shown in Appendix E, the annual review will provide the basis for possible changes in the LHMP's Mitigation Action Plan by refocusing on new or more threatening hazards, adjusting to changes to or increases in resource allocations, and engaging additional support for the HMP implementation. The Planning Team leader will initiate the annual review 1 month prior to the date of adoption.

The findings from this review will be presented annually to the City Council. The review will include an evaluation of the following:

- Participation of City agencies and others in the LHMP implementation
- Notable changes in the City's risk of natural or human-caused hazards
- Impacts of land development activities and related programs on hazard mitigation
- Progress made with the LHMP Mitigation Action Plan (identify problems and suggest improvements as necessary)
- The adequacy of resources for implementation of the LHMP

A system of reviewing progress on achieving goals and implementing activities and projects of the Mitigation Action Plan will also be accomplished during the annual review process. During each annual review, the department and/or agency currently administering a mitigation project will submit a progress report to the Planning Team. As shown in Appendix E, the report will include the current status of the mitigation project, including any changes made to the project, the identification of implementation problems and appropriate strategies to overcome them, and whether or not the project has helped achieved the appropriate goals identified in the plan.

In addition to the annual review, the Planning Team will update the LHMP every 5 years. To ensure that this update occurs, in the 4th year following adoption of the LHMP, the Planning Team will undertake the following activities:

- Thoroughly analyze and update the City's risk of natural and human-made hazards.
- 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.
- Prepare a new Mitigation Action Plan with prioritized actions, responsible parties, and resources.
- Prepare a new draft LHMP and submit it to the Pismo Beach City Council for adoption.
- Submit an updated LHMP to the California Office of Emergency Services for approval.

8.2 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

The requirements for implementation through existing planning mechanisms, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- Does the plan identify other local planning mechanisms available for incorporating the requirements of the mitigation plan?
- Does the plan include a process by which the local government will incorporate the requirements in other plans, when appropriate?

Source: FEMA, March 2004.

After the adoption of the LHMP, the Planning Team will ensure that the LHMP, in particular the Mitigation Action Plan, is incorporated into existing planning mechanisms. The Planning Team will achieve this incorporation by undertaking the following activities:

- Conduct a review of the regulatory tools to assess the integration of the mitigation strategy. These regulatory tools are identified in Section 6 and include:
  - *Pismo Beach General Plan and Local Coastal Plan*, particularly the Safety Element
  - Pismo Beach 1998 and 1993 Zoning Codes
- Work with pertinent departments to increase awareness of the LHMP and provide assistance in integrating the mitigation strategy (including the Mitigation Action Plan) into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms.

8.3 CONTINUED PUBLIC INVOLVEMENT

The requirements for continued public involvement, as stipulated in the DMA 2000 and its implementing regulations, are described below.

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

- Does the plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an ongoing mitigation plan committee, or annual review meetings with stakeholders?)

Source: FEMA, March 2004.

The City is dedicated to involving the public directly in the continual reshaping and updating of the LHMP. Hard copies of the LHMP will be provided to each department as well as the Shell Beach Library. In addition, a downloadable copy of the LHMP and any proposed changes will be

posted on the City's Web site. This site will also contain an e-mail address and phone number to which people can direct their comments or concerns.

The Planning Team will also identify opportunities to raise community awareness about the LHMP and the City's hazards, which could include attendance and provision of materials at City-sponsored events. Any public comments received regarding the LHMP will be collected by the Planning Team leader, included in the annual report to the City Council, and considered during future LHMP updates.

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