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LOCAL MULTIHAZARD MITIGATION PLAN

April 28, 2008

(EXHIBIT A)

CITY OF PALMDALE
LOCAL MULTIHAZARD MITIGATION PLAN

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Note: Full size scalable maps are available for viewing by appointment at the City of Palmdale Public Works Department.

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Note: Care was taken in the creation of the maps utilized in this plan, and they are provided "as is." The City cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties that accompany these maps). Although information from City sources may have been used in their preparation, in no way do these maps represent or constitute a land survey. Users are cautioned to field verify information before making any decisions.

Consulting Services

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EXECUTIVE SUMMARY

The City of Palmdale's Local Multihazard Mitigation Plan (LMHMP) recognizes that natural and man-made disasters can result in the loss of life and property, economic and social societal setbacks, and the degradation of the environment. It also recognizes that local governments are charged with the responsibility of protecting their residents from danger and harm. In keeping with this responsibility, the City of Palmdale (City) has established a number of plans, policies, programs, and ordinances. They are intended to provide protection to its citizens by reducing the levels of risks people, property and the environment are subject to from natural and technological/man-made hazards within the City (and its neighboring communities).

As recognized in the Palmdale General Plan, "(S)ome degree of risk is inevitable since natural disasters cannot be predicted with certainty and because the knowledge and technology to control man-made risks is constantly evolving. Since the total elimination of risk is not possible, public safety is relative to the degree of risk that people find tolerable. The value of life and property and the environment becomes a yardstick for tolerance and the need for governmental action." The protection of these community values is reflected in the goals and objectives adopted by this Plan.

The purpose of this Local Multihazard Mitigation Plan is to provide the platform for the integration of hazard mitigation strategies into the day-to-day policies, practices, and programs of the City of Palmdale. Secondly, the plan will include a local and regional appraisal of the risk and vulnerability from natural hazards to the city's assets, critical facilities, infrastructure, economy, and population. Thirdly, the plan will evaluate local capabilities to respond to and recover from major disasters. Fourth, this plan will ensure Palmdale's Mitigation Plan goals and objectives are compatible with existing hazard mitigation elements within Palmdale's General Plan and Emergency Operations Plan. Fifth, the hazard mitigation plan will result in the identification of prioritized, cost effective mitigation actions and projects to address identified vulnerabilities. Lastly, the Palmdale Local Multihazard Mitigation Plan will conform to all guidance from the Federal government's Office of Homeland Security – Federal Emergency Management Agency (FEMA) and the State of California's Governor's Office of Emergency Services (OES), thereby qualifying the City of Palmdale for all manner of federal mitigation grant programs.

The "Local Multihazard Mitigation Planning Process" ensures that once the plan is developed, it will become a living document that is consistent with the goals and objectives expressed in the City of Palmdale's General Plan and Emergency Operations Plan. The City of Palmdale has also reached out to neighboring jurisdictions, inviting their participation in the planning process. The City has established a Hazard Mitigation Steering Committee and Hazard Mitigation Planning Task Force whose members understand that their role is ongoing and not limited to preparing the Plan. These groups are the City's insurance that the annual and 5 year reviews of the Plan will capture any new initiatives, accomplishments or significant mitigation actions taken by the City.

SECTION ONE

BACKGROUND

&

COMMUNITY PROFILE

SECTION ONE – BACKGROUND & COMMUNITY PROFILE

1.1 Definition of Hazard Mitigation

Hazard mitigation is defined as "…any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." Section 323 of Disaster Mitigation Act 2000 amended the Stafford Act (Public Law 93-288) to give more responsibility to local government for pre-disaster mitigation actions that will reduce or eliminate damage to lives and property in future disasters. The law reiterates its emphasis on minimum standards, and requires, as a condition of receiving federal disaster assistance,

> ***"that any repair and reconstruction shall be done in accordance with the minimum standards of safety, decency and sanitation, and in accordance with applicable codes, specifications, and standards".***

Federal law requires that local jurisdictions have an approved Local Hazard Mitigation Plan as a condition for receiving both pre-disaster and post-disaster hazard mitigation grants. It also requires that the state or local government recipients of federal assistance evaluate the natural hazards of the area in which the assistance is to be used and take action to mitigate them, including safe land use and construction practices.

To be effective, hazard mitigation actions must be taken in advance of a disaster. After disaster strikes, mitigation opportunities exist only during recovery and even those opportunities can be limited by the absence of advance planning. Nevertheless, the immediate post-disaster period does present special opportunities for mitigation.

Hazard mitigation includes such activities as:

- Hardening structures and facilities at risk using structural and non-structural means;
- Identifying hazard-prone areas and developing standards for prohibited or restricted use and development;
- Adoption of disaster resistant ordinances and regulations;
- Fuel reduction in forests:
- Habitat restoration in streams; and
- Storage of excess runoff.

Hazard Mitigation may occur during any phase of a threat, emergency, or disaster. Mitigation can and may take place during the *preparedness* (before), *response* (during), and *recovery* (after) phases.

For example, in locations with active earthquake faults, it is known that older "soft story" apartment buildings do not meet the today's minimum codes intended to provide life safety for all concerned. By pre-identifying the locations of these buildings (Preparedness) it provides opportunity for local first responders (Response) to familiarize themselves with these high risk facilities. It also provides the opportunity to retrofit the building (Mitigation) to comply with minimum standards for life safety. Improved building performance at the time of disaster will improve the ability of the residents, owners, and community to address other immediate needs (Response) and facilitate an orderly recovery (Recovery).

1.2 Why Develop a Local Multihazard Mitigation Plan?

The Disaster Mitigation Act – 2000 (DMA2K) regulations establish a process for producing a community based LMHMP that considers all natural hazards. The Palmdale Plan emphasizes natural hazards and also includes man-made and technological hazards to the extent that these are deemed critical. The LMHMP will demonstrate that proposed mitigation actions are based on a sound planning process that accounts for the inherent risks to, and capabilities of, the community. Per DMA2K requirements, the plan will at a minimum address or include the following general items:

- Initial Coordination and Capability Assessment
- Public Involvement
- Planning, Research, and Documentation
- Agency Coordination
- Hazard Identification
- Risk Assessment
- Goals and Objectives
- Mitigation Strategy
- Plan Adoption
- Submittal to State OES and FEMA
- Plan Implementation and Maintenance

The City of Palmdale's Hazard Mitigation Plan will be evaluated annually to determine progress and/or effectiveness of mitigation projects and programs. Updates will document the success of mitigation actions in reducing damage to lives, property, and the environment. Model projects that can be replicated by other jurisdictions will be encouraged. Documentation of losses avoided is critical if policy decision makers are expected to understand the cost effectiveness of mitigation actions.

The progress of the City's mitigation strategy will be monitored and goals and objectives reviewed to address current conditions and anticipate future changes. The Committee will hold quarterly meetings, establish protocols, make recommendations, review, and approve draft plans, coordinate with department heads and monitor progress on grants.

The overall effectiveness of the locally based hazard mitigation programs can be seen in the results of disasters over the years. California is arguably the most disaster-prone state in the nation with a combination of significant hazards and the nation's largest population. Contrasting the results of like events nationwide and worldwide demonstrates the state's effectiveness in minimizing losses.

The City of Palmdale Plan recognizes the risk from natural hazards on people, property, and the environment and prescribes prioritized mitigation actions that can reduce or eliminate the threat to lives and property in the future. Mitigation of the impacts from disasters will yield savings to individuals and both the public and private sectors in the form avoided losses in the future.

Implementation of the City of Palmdale's hazard mitigation actions will break the repetition of Preparedness – Response – Recovery disaster cycle.

The plan provides a set of action items to reduce risk from natural hazards through education and outreach programs and to foster the development of partnerships, and implementation of preventative activities such as post disaster repair and reconstruction standards, pre-established - post disaster sheltering facilities, commercial business post-disaster start-up location and land use programs that restrict and control development in areas subject to damage from natural hazards.

Natural Hazard Land Use Policy in California

Planning for impacts from natural hazards has historically been a requirement to survive in California. Fires, floods, earthquakes, landslides, volcanoes, freezes, severe storms, and tsunamis ravage parts of the California landscape on a regular basis, and always have. In addition, people in California live in a park; cultural and environmental resources abound and are directly linked to the economic well being of California. Planning to protect these assets should be an integral element of any governmental agency's land use planning program. All California cities and counties have General Plans and the implementing ordinances that are required to comply with the statewide planning regulations.

The continuing challenge faced by local officials and state government is to keep the network of local plans effective in responding to the changing conditions and needs of California's diverse communities, particularly in light of the very active seismic region in which we live.

This is particularly true in the case of planning for natural hazards where communities must balance development pressures with the nature and extent of hazards.

Planning for natural hazards means that local plans must include inventories, policies, and ordinances to guide development in hazard areas. These inventories should include the compendium of hazards facing the community, the built environment at risk, the personal property that may be damaged by hazard events and most of all, the people who live in the shadow of these hazards.

Support for Natural Hazard Mitigation

All mitigation is local, and the primary responsibility for development and implementation of risk reduction strategies and policies lies with local jurisdictions. Local jurisdictions, however, are not alone. Partners and resources exist at the regional, state, and federal levels of government. Numerous California state agencies have a role in natural hazards and natural hazard mitigation.

Federal Law

Federal legislation has historically provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest federal legislation (Public Law 106-390). This new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. DMA 2000 establishes a pre-disaster hazard mitigation program and includes new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

Section 322 of DMA 2000 specifically addresses mitigation planning at the state and local levels. It identifies new requirements that allow HMGP funds to be used for planning activities, and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States and communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds or permanent repair monies under Public Assistance. Local and tribal mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities.

State Law

Several statutes and executive orders are relevant to disaster mitigation planning in California. Among the most important are:

- California Earthquake Hazards Reduction Act of 1986
- Health & Safety Code Sec. 19211
- Health & Safety Code Sec. 19181
- Executive Order W-18-19
- Executive Order W-9-91
- Public Resources Code Sec. 2621, et seq. (Alquist-Priolo Earthquake Fault Zoning Act)

In addition, the state has instituted a number of programs related to disaster mitigation. These include:

- Caltrans Seismic Retrofit Program
- California Fire Alliance
- California Earthquake Authority Seismic Retrofit Program
- National Flood Plain Insurance Program (administered by the Department of Water Resources)
- Residential Retrofit Program
- Office of Planning and Research general plan guidelines documents

State Agencies

There are several state agencies with responsibility for hazard mitigation activities, all participate as core agencies on the State Hazard Mitigation Team (SHMT).

The core membership of the SHMT includes state agencies that deal with fire, water resources, forestry, emergency services, transportation, conservation, and more. The SHMT assisted in the promulgation of the first State of California multi-hazard mitigation plan, approves updates to the current plan, and recommends mitigation actions for implementation by state and local government.

The *Governor's Office of Emergency Services (OES)* is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration; is the caretaker for the State Multihazard Mitigation Plan; and Chairs the State Hazard Mitigation Team.

The Southern *California Earthquake Center (SCEC)* gathers information about earthquakes, integrates this information on earthquake phenomena, and communicates it to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives.

The *California Division of Forestry (CDF)* is responsible for all aspects of wildland fire protection on private, state land, and administers forest practices regulations, including landslide mitigation, on non-federal lands.

The *California Geologic Society (CGS)* is responsible for geologic hazard characterization, public education, the development of partnerships aimed at reducing risk, and exceptions (based on science-based refinement of tsunami inundation zone delineation) to state mandated tsunami zone restrictions.

The *California Division of Water Resources (DWR)* plans, designs, constructs, operates, and maintains the State Water Project; regulates dams, provides flood protection and assists in emergency management. It also educates the public, and serves local water needs by providing technical assistance

Relationship of the Plan to State and County Hazard Mitigation Plans

The State of California has a solid record of legislation, commissions, executive orders, regulations, codes and standards, task forces, programs, policies and planning requirements that provide the underpinning for the State Multihazard Mitigation Plan and local hazard mitigation plans.

Those state agencies responsible for managing the response to and recovery from the impacts of fires, floods, landslides, and earthquakes, have participated for 15 years with the Governor's Office of Emergency Services in the development of single disaster hazard mitigation plans in response to federal requirements for disaster assistance. The hazard profiles established by these agencies and expressed in the State Hazard Mitigation Plan provide the underpinning for both the LA County All Hazards Plan and the Palmdale Local Multihazard Mitigation Plan.

The Local Multihazard Mitigation Plan mirrors the State Plan. The task force and steering committee will review all the goals and objectives adopted by the state, review priorities chosen,

identify mitigation actions recommended by the state plan, identify items addressed in the table of contents, and reference state sources of information as needed.

1.3 Purpose of the Hazard Mitigation Plan

The purpose of this plan is to integrate Hazard Mitigation strategies into the day-to-day activities and programs of the City of Palmdale.

As the costs of damage from natural disasters have continued to increase, the community and the body politic realizes the importance of identifying effective ways to reduce vulnerability to, and losses from, disasters. A Local Multihazard Mitigation Plan assists a community in reducing impacts from hazards by recognizing its vulnerability in relation to its risk, identifying resources, creating an orderly data collection process, and developing strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the community involved.

The resources and information within the Mitigation Plan:

(1) Establish a basis for coordination and collaboration among agencies and the public;
(2) Assist in the integration of mitigation goals and objectives with other City Plans;
(3) Identify existing, and prioritize future, mitigation projects;
(4) Assist in meeting the requirements of federal mitigation programs; and
(5) Lay the foundation for future Plan updates and Plan maintenance.

In addition, the Plan is designed to ensure that in the course of preparing for, responding to, or recovering from natural and man-made hazards, the long term values of the community are not compromised.

If there is damage to lives and/or property, from ANY event that is catastrophic to the City or surrounding community, this Plan is intended to provide the City with a framework by which the impacts of the event may be mitigated against in the most cost and resource-effective manner possible.

1.4 General Planning Requirements in California

All California cities and counties have General Plans and implementing ordinances that are required to comply with the statewide planning regulations. State law requires each city and county to adopt a General Plan. The General Plan is the master document that governs land use and development within a community. State law gives cities and counties wide latitude in formatting a General Plan. However, every General Plan must satisfy fundamental content requirements. These requirements or mandatory elements include: land use, transportation, housing, open space, conservation, noise, and safety. No one element of the General Plan has greater legal status or importance over any other. Rather, when complete, it should serve as an integrated, internally consistent and compatible statement of local policies. In recognition of

local differences, State law empowers counties to tailor the General Plan to locally relevant issues. Optional elements may also be adopted to more fully reflect local conditions and interests.

The planning for natural hazards calls for local plans to include inventories, policies, and ordinances to guide development in hazard areas. These inventories should include the compendium of hazards facing the community, the built environment at risk, the personal property that is vulnerable to damage, and most of all the people who live with these hazards.

California is a "home rule" state. That is, local government (City's and County's) have the authority to dictate public policy. They must meet certain minimum codes and standards, or general planning laws, but they have options that include the adoption of standards that are more rigorous than those of the state or federal government.

Specific Plans

A specific plan is a tool for the systematic implementation of the general plan. It effectively establishes a link between implementing policies of the general plan and the individual development proposals in a defined area. A specific plan may be as general as setting forth broad policy concepts, or as detailed as providing direction to every facet of development from the type, location and intensity of uses to the design and capacity of infrastructure; from the resources used to finance public improvements to the design guidelines of a subdivision.

A specific plan may encompass a large development (such as Ritter Ranch, over 10,000 acres in the City of Palmdale) or an area as small as 160 acres.

The adoption of a specific plan is a legislative act similar to adoption of a general plan or zoning ordinance. Therefore, specific plans may be subjected to voter initiative and referenda.

1.5 Community Profile

Palmdale is located in the southern region of the Antelope Valley, in the western portion of the Mojave Desert. It is approximately 60 miles northeast of Downtown Los Angeles, off State Highway 14 (commonly known as the Antelope Valley Freeway). Over 100 years ago, when land in the Antelope Valley sold for fifty cents an acre, a group of Swiss and German families migrated from the Midwest and named their new community "Palmenthal".

The climate is characteristic of this region of the Mojave Desert. The mountain ranges block cool, moist coastal air and create hot, dry summers, and cold winters. Seasonal rains (thunderstorms) are common but creeks are dry during much of the year. Mean temperatures range from 18 degrees (F) in January to 108 degrees (F) in July, with a daily average range of 46 to 77 degrees (F). Annual rainfall ranges from 5 to 11 inches and occasional snow can be expected during winter.

Today Palmdale is one of the fastest growing cities in California. Affordable housing, excellent schools, and over 300 days a year of smog-free blue sky contribute to Palmdale's "A place to call home" lifestyle. Palmdale is an upper-middle class community, with a median household income of $73,027 in 2002. Despite its growth, Palmdale continues to cherish the values of a family-oriented community while enjoying all of the conveniences provided by its rapidly expanding commercial sector. Palmdale residents enjoy a comfortable hometown feel with a strong family orientation, excellent educational system, and abundant recreational opportunities in a safe environment.

Palmdale was the Antelope Valley's first city, incorporated August 24, 1962. Palmdale is a general law City governed under the council/manager form of local government. The mayor is elected every two years for a two-year term. Also every two years, two of the four council members are elected to serve four-year terms. City Council meetings are held on the second and fourth Wednesdays of each month. Meetings begin at 6 pm in the City Council Chamber, 38300 Sierra Highway, Suite B, Palmdale, California.

The City's borders lie just north of Soledad Canyon, north of the San Gabriel Mountains, with sections of the Sierra Pelona Range bordering on the southwest. The Planning Area ranges in altitude from 2,450 feet to 2,700 feet with the surrounding mountains rising up to 4,000 feet above sea level. The topography varies from almost flat with occasional drainages and sand dunes on the valley floor to steep foothill and mountain areas on the south.

The San Andreas Fault traverses the Planning Area parallel to and just north of the mountains. Junipers, Joshua trees, and desert chaparral are found in scattered areas throughout the City. Natural drainage channels, including Amargosa and Anaverde Creeks and Little Rock and Big Rock Washes run generally north and northeast across the Planning Area toward the Rosamond and Rogers dry lakes. The City is bounded on the north by the City of Lancaster. Rural unincorporated county areas, characterized by a number of desert buttes, extend eastward from the Planning Area.

The City's Office of Public Safety provides services that help keep Palmdale's residents and businesses safe. The Office of Public Safety is responsible for coordinating the City's emergency operations planning, preparedness, and implementation. In addition, the office oversees the student drug education program, Neighborhood and Business Watch programs, crime prevention and community-based policing efforts, graffiti abatement, and parking enforcement programs. Law enforcement services are provided by contract with the Los Angeles County Sheriff's Department. Fire and emergency response are provided by the Los Angeles County Fire Department.

The Antelope Valley communities, principally Palmdale and Lancaster, are isolated geographically. A significantly large number of commuters leave the Antelope Valley for employment centers in Los Angeles and the San Fernando Valley. The risk of a significant disaster interrupting transportation, communication and utility assets and services makes it incumbent for these communities to prepare locally for the possibility of both local and regional impacts from disaster.

Palmdale with 105.10 square miles is the second largest city in Los Angeles County. The largest city, the City of Los Angeles, is 498.29 square miles and lies approximately 60 miles south of Palmdale, along with 88 other cities and 13+ million people in the San Fernando Valley and Los Angeles Basin. Its closest neighbor is the City of Lancaster which lies along Palmdale's Northern border. Like Palmdale, Lancaster is large – 94.18 square miles – and is primarily residential and rural in nature. Many Antelope Valley residents commute approximately 40-60 miles via automobile and rail to work in the San Fernando Valley and Los Angeles basin. The largest local employer in the City is the defense industry consisting of Lockheed-Martin, Northrop, and U. S. Air Force Plant 42. There is general consensus that these facilities constitute the areas most significant terrorist target.

Palmdale will be impacted by a significant regional earthquake event; the event would either inflict severe damage locally or inflict widespread damage to portions of the San Fernando Valley and Los Angeles Basin. Palmdale should be prepared to house and shelter significant portions of its own population or significant portions of those regional victims who may be trying to find a safe place to stay. These actions are consistent with the "Safe" community theme, being a good neighbor, and working toward a safe and resilient community that is prepared for disaster.

This becomes an important planning consideration in light of the potential disruption or damage to highways, metro-rail, and other infrastructure in the event of a serious earthquake, flood, fire, or terrorist attack. Palmdale has a robust disaster history and participated in Major Federal Flood and Earthquake Disaster Declarations in 1992, 1993, 1994, 1995, 1998, and 2005. Historically, the 7.9 Fort Tejon Earthquake in 1857 and the Owens Valley Earthquake in 1872 established a benchmark for the Antelope Valley and are evidence of the tremendously damaging potential of earthquakes in this region.

Recent population growth has been spurred by the availability of affordable housing, Palmdale's proximity to major employment centers, and by annexation as well. Palmdale had 68,917 people according to the 1990 census. This number had increased to 116,670 in the 2000 census. In addition, Palmdale's population increase of 69% was the highest growth rate in LA County. Currently it has a residential population of 131,295, demonstrating that its growth continues. The following Growth Chart outlines the growth rates for Los Angeles County. In every category; the Antelope Valley communities (Palmdale, Lancaster, and Hwy 14 corridor communities of Santa Clarita and Acton) are in rank 1. These exceptional growth rates are tied economically to the ribbons of Highways 14 and 138 – portions of which are vulnerable to potential damage from Earthquake induced ground shaking, flooding, and fires.

Fastest Growing Cities in Los Angeles County
(Population of 50,000 or more)

City	2000 Census	1990 Census	Increase	Percent

Palmdale	116,670	68,917	47,753	69.29%
Santa Clarita	151,088	110,642	40,446	36.56%
Lancaster	118,718	97,291	21,427	22.02%

Source: United States Census

Figure 1.1

1.6 Public Services and Infrastructure

In the following sections, existing public services in Palmdale are described and analyzed with respect to present conditions, mitigation actions taken in the past, and anticipated needs for future mitigation actions, based on vulnerabilities and potential losses. The City's infrastructure system includes the following components:

1. Water treatment and distribution
   a. Water Supply
   b. Water Quality
2. Sewer service
3. Storm drainage and flood control
4. Law Enforcement
5. Fire protection and prevention
6. Electric power
7. Natural gas
8. Solid waste disposal
9. Schools
10. Hospitals and medical facilities
11. The California State Water Project

Water Treatment and Distribution Service

Water Supply. Groundwater is the primary source of water supply in the Palmdale Planning Area (called "area"), with supplemental water supplied from the State Water Project (California Aqueduct). Three groundwater sub-units are located within the area. Groundwater movement is generally in a northwesterly direction, from the foothills of the San Gabriel Mountains towards the pumping depression in Lancaster.

The California State Water Project conveys water from the Feather River and the Lake Oroville Reservoir in Northern California to areas in Southern California that do not have adequate local sources. Water is conveyed via closed and open aqueducts throughout the state. The California Aqueduct traverses the area from the northwest to the southeast.
The reliance on groundwater, which predominates among Palmdale water purveyors, may result in continued lowering of the water table. Water from the state project is intended to be supplemental to groundwater sources; the use of imported water to help recharge groundwater has been encouraged. However, since imported water is more expensive, most water companies

have been reluctant to use it for either recharge or sale to customers. Groundwater wells continue to be the main source (50+ percent) of water supply in Palmdale.

If long-term availability of imported water from the State is reduced, Palmdale will become more reliant on local groundwater sources. Continued overdrafting of groundwater resources could escalate extraction costs for groundwater. Ensuring an adequate supply of water, given projected growth rates and the potential for drought conditions, may require the City to adopt and enforce water conservation measures.

Water Quality. Government regulations deal with the provision of safe drinking water, as well as an adequate supply. The Lahontan Region of the State Water Quality Board regulates water quality within the Palmdale area. Presently, groundwater generally meets federal and state standards. A few wells in the rural communities adjacent to Palmdale have been found to contain high amounts of nitrates due to septic tank leakage. The potential for local groundwater contamination has long been a concern of residents and may increase as more development utilizing septic systems occurs.

Sewer Service

The Los Angeles County Sanitation District Nos. 14 and 20 provide sewer service in the City. District 20 serves the City's urban core and the northeastern portion of the Planning Area, while District 14 serves the northwestern portion of the Planning Area, Quartz Hill, Lancaster, and private sewage haulers. The USAF Plant 42 sewer system drains to District No. 14.

Storm Drainage and Flood Control

The major existing drainage courses in the City's Planning Area are Amargosa Creek, Anaverde Creek, Little Rock Wash, and Big Rock Wash. Most drainage courses in Palmdale are unimproved, which allows storm water to overflow into adjacent flat areas, contributing to sheet flow. The Rosamond and Rogers dry lakes serve as final destinations of water runoff in the Antelope Valley. Although disastrous floods have not occurred in Palmdale, localized flooding has occurred when rainfall is heavy and prolonged.

The City's Master Drainage Plan was adopted in 1989 to provide a long term solution to localized flooding. Retention and detention basins, pipes, and channels are being, and have been constructed throughout the City to protect existing and future development from flooding. Approximately $225 million worth of City improvements are proposed under the Master Drainage Plan. Funding for construction of Master Drainage Plan facilities will come from a variety of sources as specified by the City's Capital Improvements Program, including special assessment districts and drainage impact fees collected from new developments. Depending on the future rate of development, it could take 10 to 20 years to fully implement the Master Drainage Plan.

New development increases impervious surface area and decreases the rate at which runoff percolates into the ground, thus increasing storm runoff to low-lying areas. As an interim flood control measure, the City requires individual development projects to provide flood control lots within their projects that serve as detention basins for storm runoff.

During the past several years, the City has required interim flood control basins for all new developments throughout the City. Culverts that carry surface runoff have been constructed at road crossings, and road shoulders have been graded to allow water to flow north toward the valley floor where it can percolate and aid groundwater recharge. In some areas, lined channels safely carry runoff down hillsides, preventing erosion by running water. Unlined channels allow runoff flow to percolate, decreasing the volume of storm water carried to the dry lakebeds north of the area.

Storm drainage facilities in the City consist of both natural and lined channels. In addition to allowing groundwater recharge, natural drainage channels can support significant biological communities. However, these unimproved channels can pose a threat to life and property due to the possibility of intermittent floods. A balance between resource protection and public safety must be achieved. Factors influencing decisions on drainage improvements include the cost of improvements and the availability of funding to implement them, land use regulations (low density zoning and lot coverage limits), and the potential of flood hazard areas for uses compatible with periodic flooding (recreation).

Law Enforcement

The City of Palmdale receives police law enforcement services under contract with the Los Angeles County Sheriff's Department. The unincorporated areas surrounding the City receive law enforcement services from the Sheriff's Department and traffic enforcement services from the California Highway Patrol (CHP). Each agency provides backup for each other. An independent sheriff sub-station in Palmdale was established in early 1992. A new state-of-the-art sheriff's station, located in Palmdale on Sierra Highway and Avenue Q, opened to the public in July 2006.

Fire Protection and Prevention

Fire protection services for Palmdale are provided by the Los Angeles County Fire Department. Fire protection services are financed through property tax assessments.

Stations 24, 37, and 131 are currently located within the Palmdale Planning Area. There are five additional stations (Station 84, 114, 129, 92 and 117) that serve the outlying areas

The Los Angeles County Fire Department also receives mutual aid from the U.S. Forest Service. As a part of the Los Angeles County Fire Department, all manpower and resources of the Department back up the fire stations in Palmdale. Fire protection needs in the Planning Area will be met by the entire department's resources, if needed, regardless of the number of firefighters and equipment stationed in the Palmdale area.

The fire prevention office located in Lancaster is responsible for reviewing new development applications and building permits to ensure that new construction projects adhere to fire code requirements. The State Responsibility Areas (SRA) land requirements for fire safety in construction include the use of fire retardant materials, water storage tanks, fire hydrants,

sprinkler systems, fire alarms, signage, defensible space, and fire escapes. Fire code requirements vary according to the type of use and construction materials employed. Additionally, fire protection requires a ready source of water for firefighting uses. Fire suppression water flow requirements are calculated together with domestic requirements, to ensure adequate availability of water to meet both domestic and emergency needs.

Staffs from individual fire stations within the area conduct onsite inspections of new construction, as well as annual inspections of existing structures, to ensure compliance with the fire code. Additionally, the fire protection office conducts information programs for the community on fire awareness and protection.

In order to adequately serve the growing population, additional fire stations will be required. New fire stations will be located in the areas with the greatest amount of development, as the need for additional fire service is determined by the Los Angeles County Fire Department. There is one fire station proposed for the Ritter Ranch area and a second station within the City Ranch area, along with fire suppression personnel and equipment. Other fire stations are planned at Massari and Rancho Vista Park sites. Future expansions of fire protection facilities will be coordinated with the Los Angeles County Fire Department.

Electric Power

The Southern California Edison Company (SCE) provides electricity to the Antelope Valley. Its service area extends to Bishop on the north, Nevada on the east, Orange County on the south, and Santa Barbara on the west. Smaller electric companies exist within these boundaries as well. SCE provides electric service to 835 cities and communities. SCE serves 4.6 million customer accounts, including 285,000 commercial, industrial, and non-profit customers in these areas of central and Southern California.

Natural Gas

The Southern California Gas Company provides natural gas to most areas in Southern California, including the Antelope Valley. The City of Palmdale is within the boundaries of the Foothill distribution division and the North Basin transmission division; the company serves domestic and commercial uses in the Palmdale area and has about 28,000 customers.

Solid Waste Disposal

Residential solid waste disposal in the City is provided through a franchise contract with Waste Management; the Antelope Valley Landfill is used (located at 1200 W. City Ranch Road in Palmdale). The franchise agreement sets residential pick-up rates and establishes standards for service.

Schools

The elementary school, high school, and college districts serving Palmdale are independent agencies, each governed by a Board of Trustees. The Palmdale School District, the East Side Union School District, the West Side Union School District, Lancaster School District, Keppel Union School District, Soledad-Agua Dulce School District, Hughes Elizabeth Lakes Union School District, the Antelope Valley Union High School District, and the Antelope Valley Community College District serve the Palmdale Planning Area.

The Palmdale School District serves the central developed core of the City. The district has twenty-one existing elementary school sites serving 22,120 students. Westside Union School District currently serves 7,792 students at ten campuses and Keppel Union School District serves 3,022 students at six campuses, although few of these students reside in Palmdale.

Hospitals and Medical Facilities

There are currently no hospitals located within the Planning Area. However, a new 170-bed hospital is under construction on 37 acres located at the northeast corner of Avenue Q-7 and Tierra Subida Avenue. The hospital is scheduled to for completion by the end of 2009.

Other hospitals located in the proximity to the area include Lancaster Community Hospital and the Antelope Valley Medical Center in Lancaster. The Lancaster Community Hospital is located at 43830 N. 10th Street West.

Antelope Valley Medical Center is located at 1600 W. Avenue J in Lancaster. It is a district facility serving a 1,586 square mile area. It has 370 beds with approximately 2,300 full-time and part-time employees and offers many of the same services as Lancaster Community Hospital.

The California State Water Project

An important factor affecting hazard mitigation planning in Palmdale is the location of the California Aqueduct immediately adjacent to the City.

The California State Water Project (SWP) is a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. Its main purpose is to store water and distribute it to twenty-nine urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. Of the contracted water supply, 70 percent goes to urban users and 30 percent goes to agricultural users.

Maintained and operated by the State Department of Water Resources (DWR), the SWP makes deliveries to two-thirds of California's population. Other purposes of the SWP are to improve water quality in the Sacramento-San Joaquin Delta, control Feather River floodwaters, provide recreation, and enhance fish and wildlife.

This significant State resource crosses the San Andreas Fault within the jurisdictional boundary of the City of Palmdale, just north of the DWR pumping station and reservoir and Highway 14. This choke point of critical resources is the poster child for vulnerability, and the assets at risk are significant to local and statewide interests.

1.7 Analysis of Development Trends

The City's General Plan was adopted in 1993. The Plan has been periodically updated so that it is current with emerging trends and issues. In addition to the General Plan and special-subject plans, such as the Drainage Master Plan, the City has adopted and maintains an Emergency Operations Plan for response to various emergency and disaster situations. The Emergency Operations Plan was developed in coordination with the State and Local Office of Emergency Services and the Los Angeles County Sheriff and Fire departments.

Substantial portions of the land area of the City of Palmdale remain undeveloped. The areas already developed are typically characterized by one or two story structures of wood frame or steel reinforced concrete block. Older structures are predominately wood frame construction, built without the building codes adopted during the 1970's and 1980's. Most of the residential development in Palmdale has occurred since 1980. The Building Department indicates that there are no known unreinforced masonry or tilt-up structures in the City.

Development within the City has dispersed residential neighborhoods over a wide area, leaving vacant areas surrounded by new development. This scattered development pattern makes efficient use of regional infrastructure difficult and increases costs of serving each unit. The City's General Plan encourages infill development that utilizes the existing infrastructure and discourages continued leapfrog development away from the City center into outlying rural areas. Development pressures to urbanize in rural areas are expected to continue, due to lower land costs in these areas. The City's view is that development should support itself, with no negative impact upon services being provided to existing City residents. The policies under this objective apply to long-term maintenance and operation of public facilities, as well as to capital costs.

In addition, the Land Use Element of the General Plan promotes infill developments. Implementation of this policy could foster a more continuous and cohesive pattern of urban development within the City core area.

A total of 12 approved specific plans are currently active, ranging from plans recently "built out" to those still in pre-development stages. By use of the specific plan process the City has been able to ensure that potential hazards are identified and mitigation measures in place prior to granting entitlements. Table 1.1 lists each of the approved specific plans, identifies the hazards applicable to that plan, and the required mitigation measures.

Table 1.1

HAZARD MITIGATION FOR FUTURE DEVELOPMENT City of Palmdale Specific Plans				
Specific Plan	**Location**	**Land Use**	**Hazard Areas**	**Mitigation Actions**
Trade and Commerce Center	756 Acres in central Palmdale	Mixed use, commercial, public, industrial	100 yr Flood Zone 500 yr Flood Zone AICUZ Restricted AP Zone	1. Compliance with General Plan, Flood, AICUZ, and AP requirements. 2. Compliance with Federal and state seismic requirements. 3. Customer-intensive retail prohibited 4. Employee densities restricted to 25 per acre 5. Implement City Master Drainage Plan
Antelope Valley Business Park	120 Acres east of SR-14, so. of Ave. M, no. of Ave. N	Commercial, Industrial, Business Park	100 yr Flood Zone	1. Amargosa Creek channel improvements 2. Compliance with General Plan and municipal codes.
Ave S Corridor Area	Approx. ½ mile north and south of Ave. S from 20th St. E and 20th St. W. Approx 1840 acres.	Residential, commercial	Alquist-Priolo Gas pipelines	1. Special hazmat requirements 2. Restrict non-residential FAR 3. Compliance with General Plan 4. Setbacks and buffering 5. Provide alternative access
Antelope Valley Auto Center	68 Acres west of SR 14 and Ave. Q	Auto sales and service	none	n/a
College Park Palmdale	540 Acres so. of Pearblossom Hwy, SE of Barrel Springs Rd., 47th St. East	Mixed use residential, open space, commercial, educational	Alquist-Priolo 100 yr Flood Zone	1. Structural setback zones 2. Restricted use zones 3. Debris & retention basins 4. Fire-resistant plant materials
Rancho Vista	1,223 acres west of 30th Street, south of Ave. N-8	Residential, open space, commercial	none	n/a
Ritter Ranch	10,625 acres, approx 4 miles west of SR 14, south of Elizabeth Lake Rd.	Residential, open space, schools, commercial, recreational	Alquist-Priolo 100 yr Flood Zone High voltage pwr Lines Brush fires Liquefaction	1. Structural setback zones 2. Compliance with General Plan 3. Restricted use zones 4. Fuel modification plan 5. Special foundation areas

Table 1.1 (cont'd)

HAZARD MITIGATION FOR FUTURE DEVELOPMENT (continued) City of Palmdale Specific Plans				
City Ranch	1,985 acres east of SR 14, south of Elizabeth Lake Rd	Residential, open space, recreation, commercial, public uses	Alquist-Priolo High voltage pwr lines Calif. Aqueduct rupture Brush fire 100 yr Flood Zone	1, Compliance with General Plan and municipal codes 2. Fuel modification zones 3. Elevated building pads 4. Building setbacks 5. Restricted building zones 6. Critical facility siting
Hillside	223 acres in northwest Palmdale	Residential	none	n/a
Joshua Hills	435 acres bounded by 25th St. on the west, Ave. S on the north, and 40th St. on the east	Residential, open space, commercial, public facilities	Alquist –Priolo Gas pipelines	1. Construction prohibitions
Lockheed	Approx. 539 acres bounded on north and east by USAF Plant 42, west by SPRR, and south by Ave. P and Lockheed Way	Office, industrial	APZ Alquist-Priolo 100 yr. Flood Zone Haz. Mat. storage	1. Compliance with AICUZ 2. Land use restrictions 3. Height restrictions 4. Retention and flood control basins
Palmdale Business Park Center	632 acres bounded on east and south by USAF Plant 42, north by Ave. M, SPRR on west	Commercial, recreational	100 yr Flood Zone (minimal)	1. Drainage improvements

SECTION TWO

PLANNING PROCESS

SECTION TWO – PLANNING PROCESS

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process* ***shall*** *include:*

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c) (1): *The plan* ***shall*** *document the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

2.1 Plan Initiation

In July, 2004 the City of Palmdale initiated development of a Local Multihazard Mitigation Plan (LMHMP) in response to the Federal Disaster Mitigation Act of 2000 (DMA 2K). In addition to qualifying the City for Federal grants, the preparation of an LMHMP provides a framework for concerted action by all City departments, neighboring jurisdictions, and other interested stakeholders to mitigate the effects of natural and human-caused hazards on the community. While DMA2K only requires that LMHMP's address natural hazards, the City of Palmdale LMHMP addresses all hazards – natural and human-caused – that are perceived to be significant threats to the community.

The process of developing the City's Hazard Mitigation Plan can be divided into the following steps:

Step 1: Get Organized – Building the Planning Team
Step 2: Plan for Public Involvement – Engaging the Public
Step 3: Coordinate with Other Departments and Agencies
Step 4: Hazard Identification
Step 5: Risk Assessment
Step 6: Identifying Goals
Step 7: Review Possible Measures
Step 8: Draft the Mitigation Action Plan
Step 9: Adopt the Plan
Step 10: Implement the Plan

2.2 Pre-Plan Development Activities

The first step in the process was to marshal the technical and human resources necessary to assure an effective planning process. The Department of Public Works was assigned the responsibility for coordinating plan development, and the City contracted with James Thernes & Associates, Inc, (JTA) technical consultants to provide support. Lynn Glidden, Senior Civil Engineer with the Department of Public Works was designated as lead City staff for the project. JTA worked with the City to establish the framework and organization for development of the Plan.

On September 23, 2004, two meetings were held to obtain input for plan development. The first meeting was the Quarterly Utility Coordination Meeting. The Quarterly Utility Coordination Meeting is a regular meeting between key City of Palmdale staff and representatives of the various private utilities that serve the City. A copy of the attendance list for the meeting is included in Appendix B. Meeting attendees were briefed by City staff and the consultant on the requirements of DMA2K, the various elements of the plan, and the steps necessary to develop an approvable plan. Meeting attendees were invited to complete a Local Multihazard Mitigation Planning Assessment Survey. The results of that survey are contained in Section Three- Risk Assessment and Section Four – Mitigation Strategy.

The second meeting consisted of a broad-based group of community partners. In addition to City of Palmdale staff, this group consisted of representatives from the County of Los Angeles Sheriff, Fire, and Health Services department, local educational institutions, Antelope Valley Hospital, local water agencies, local and regional transportation agencies, area chambers of commerce, state and federal agencies, and other stakeholders. A list of participating agencies and a copy of the meeting agenda are shown below and in Appendix A respectively. Meeting attendees were briefed by City and consultant staff, and invited to complete copies of the Assessment Survey.

In addition, the City conducted an open forum for members of the general public on the evening of Tuesday, October 5, 2004 in the City Council chambers. Members of the public were invited by means of a press release (see Appendix B) in the local newspaper and by local radio. Members of the public were also invited to complete copies of the Assessment Survey with was available on the City's website and in the Lobby of City Hall.

Because a significant amount of time had passed between the meeting in October and the development of the Final Draft of the LMHMP, the City held another open forum on March 25, 2008. The meeting was publicized in the media and on the City's website. The Final Draft LMHMP was available for public review, and the public was also invited to complete an Assessment Survey. (See Appendix B for copies of the 2004 and 2008 surveys.) The results of both Assessment surveys are displayed in Sections 3 and 4.

Initially, the purpose of these meetings was to gain input from the public, neighboring jurisdictions, private utilities, and other interested parties. This input was used to guide plan development and to assure participation in plan development from a broad spectrum of interests. The meeting conducted in 2008 was to finalize the mitigation strategy developed previously and

provide a forum for final public input. At each public meeting, attendees were given the opportunity to participate more formally in the initial and final development of the LMHMP through serving on the hazard mitigation task force.

2.3 Participation in the Planning Process

Following the initial meetings in 2004, the City created two committees to oversee the planning process. A Hazard Mitigation Planning Task Force was formed to provide broad-based input from neighboring jurisdictions, private sector organizations, and other stakeholders. The role of the Task Force was to provide input at all stages of plan development, to recommend goals and objectives, to recommend mitigation priorities, and to review the draft plan at critical junctures. In addition, the Task Force will have an ongoing role in monitoring plan implementation, will participate in the annual review of the plan and recommend plan updates, if required.

A Steering Committee composed of City staff representing key City departments was also created. The purpose of the Steering Committee was to oversee the planning process, provide a mechanism for coordination among city departments, provide technical and informational input into the Plan, and to develop recommendations for management and/or City Council approval. The following pages contain membership lists for the Hazard Mitigation Planning Steering Committee and Task Force.

CITY OF PALMDALE LMHMP STEERING COMMITTEE

Building & Infrastructure:

Shane Walter – Director of Building & Safety	267-5362
Michael Gass – Building Maintenance Supervisor	267-5349

Finance:

Dan Smith – Purchasing Agent	267-5440
Betsy St. John – Risk Management	267-5413

Planning:

Asoka Herath – Director of Planning	267-5211

Parks and Recreation:

Russ Bird –Parks and Recreation Director	267-5626

Public Safety:

Anne Ambrose – Public Safety Administrator	267-5569

Public Works:

Michael J. Mischel – Director of Public Works/City Engineer	267-5300

Lynn Glidden – Senior Civil Engineer	267-5300
Bill Padilla – Traffic Engineer	267-5363
Mike Behen – GIS Coordinator/ Senior Transportation Planner	267-5337

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Danny Roberts – Director

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2.4 Review and Incorporation of Existing Plans, Studies, and Technical Information

The planning process began with a review of existing literature on risk assessment, hazard identification, and mitigation planning. This included, but was not limited to, material produced by FEMA and OES.

- **FEMA –** Getting Started: Building Support for Mitigation Planning; Understanding Your Risks: Identifying Hazards and Estimating Losses; Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies;
- **OES –** Disaster Recovery and Mitigation Handbook.

The FEMA produced guide books provided direction to the planning process, helped in assessing risks and vulnerabilities, and served as templates for developing the LMHMP. In addition, the requirements of the National Incident Management System (NIMS) and the California Standardized Emergency Management System (SEMS) were reviewed in the light of the mitigation planning process. Federal, county, and state agency produced fire, earthquake, and flood histories and projections were reviewed. Other pertinent literature on natural hazards and a diverse group of websites were reviewed for historical hazard data and vulnerability assessments.

The "Crosswalk" reference document developed by FEMA for the review and approval of local mitigation plans was used to assure that the City of Palmdale LMHMP included all of the required elements. Current hazard mitigation activities were identified and evaluated by the Planning Team. The evaluation of current activities allowed those activities to be reviewed in relation to the City's hazard risk assessment, which in turn, identified those hazards that required additional or initial mitigation activities. Mitigation options for each hazard were then identified, analyzed, and prioritized. These options or alternatives became the core of the City's action plan.

Since its inception, the City of Palmdale has taken an aggressive approach to identify and mitigate natural and human caused hazards. There are several local ordinances which affect or promote disaster mitigation, preparedness, response, and recovery. Specifically, there are ordinances that govern development in hazard prone areas, specify mitigation measures to be taken during and after land development activities, etc.

The Safety Element of the General Plan provides detailed assessments of various potential hazards that threaten the City, and includes policies and programs designed to mitigate these hazards. The General Plan addresses several potential hazards in detail, including earthquake, flood, wild fire, urban fire, potential inundation areas, and aircraft accidents.

In addition to the General Plan, the City also has adopted a detailed Emergency Operations Plan for response to various emergency and disaster situations. The Emergency Operations Plan was developed in coordination with Los Angeles County Sheriff and Fire departments, which provide public safety services in Palmdale, under contract with the City.

These documents were a rich source of information, data, goals and policies, and were utilized extensively in the preparation of the Hazard Mitigation Plan. In addition, various other information sources were used for information during plan development. The following is a partial list of information sources used:

- City of Palmdale General Plan
- Emergency Operations Plan
- County of Los Angeles All Hazard Mitigation Plan (2004)
- City of Palmdale Hazardous Waste Plan
- 1996 Hazard Threat Analysis (1996)
- State of California Multihazard Mitigation Plan (2004)

Hazard mitigation plans for current or proposed land development activities are reflected in the City of Palmdale specific plans. A total of 12 approved specific plans are currently active, ranging from plans recently "built out" to those still in pre-development stages. By use of the specific plan process the City has been able to ensure that potential hazards are identified and mitigation measures are in place prior to granting entitlements. **Table 1.1** on Pages 25 and 26 lists the plans and the mitigation measures they incorporate.

In addition, hazard mitigation plans developed by other agencies including Southern California Edison, LA County Fire Department and LA County Sheriff's Department are included by reference.

2.5 Public and Stakeholder Involvement

Opportunities for the general public to participate in plan development were provided at three stages in the planning process. Prior to initiation of work on the plan, a public workshop was held on October 5, 2004 to obtain input. A public forum was again held on March 25, 2008.

A copy of the Hazard Mitigation Planning Survey, along with a description of the plan, and the plan development process were posted on the City's web site. As development of the plan progressed, regular status reports were posted on the site. All meetings of the Hazard Mitigation Planning Task Force were open to the public and notice was provided in accordance with the Brown Act and posted on the City web site.

Upon completion, both the first draft and final draft Plan were posted on the City's website. "Hard" copies were made available at City Hall and in public libraries. Public input was evaluated and incorporated into the plan as appropriate. Minutes and agendas for public meetings, as well as lists of attendees appear in Appendix B. In addition to the public workshops, presentations were made to various community and business groups to increase public awareness of the plan and to community obtain input.

The following is a list of the meetings conducted during the preparation of the plan:

Date	Invited Attendees	Meeting Purpose
08/11/04	Key City Staff	Explain DMA 2000, organize plan approach
09/23/04	Stakeholders	Explain DMA 2000 & plan process
09/23/04	Community partners and the Public	Explain DMA 2000 & plan process, distribute survey
10/05/04	Public meeting	Explain DMA 2000 & plan process, distribute survey
11/03/04	Key City staff	Review Plan requirements
12/16/04	Department heads	Describe plan process
01/27/05	Key City staff	Review preliminary information
04/7/05	Key City staff	Distribute Administrative Draft, discuss information required in all sections of the plan
09/14/05	Key City staff	Distribute revised Administrative Draft and review sections City needs to address
03/22/06	Key City Staff	Distribute Final Administrative Draft to City Staff for Comments
1/28/08	Key City Staff	Distribute Final Draft to City Staff for Project Prioritization
2/6/08	Key City Staff	City Meets to Prioritize Projects
3/1/08	City Staff Stakeholders Community partners & public	Update of survey form
3/25/08	Public Meeting	Explain DMA 2000 & plan process, review Local Hazard Mitigation Plan, Receive Public Input
11/5/08	Public Meeting	Local Hazard Mitigation Plan adopted by the City Council

Prior to adoption, the public was invited to provide comments for consideration by the City Council.

2.6 Stages of Plan Development

The plan was developed in three stages. First, utilizing the information sources listed previously, interviews with key city staff, the results of the Community Planning Survey, and input from the public meetings, the consultant prepared an Administrative Draft for review by the Steering Committee. In addition to providing a vehicle for obtaining input, the Administrative Draft identified where additional information was needed from City departments. After review by the Steering Committee, a working draft was prepared and reviewed with the Task Force. Key elements of the working draft were detailed hazard profiles and risk assessments for each of the identified potential hazards. Working with the consultant and City staff, the Task Force reviewed the potential hazards and developed recommended goals and objectives, as well as priorities for mitigation. The Task Force and City staff also developed and prioritized a comprehensive set of proposed mitigation actions to address the identified hazards and reflecting the recommended goals and objectives. A final draft was then prepared which incorporated the working draft, recommended goals and objectives, and proposed hazard mitigation actions. The final draft was circulated for review and comment to city departments, neighboring jurisdictions, business organizations, community based organizations, and the general public. Following the comment period, the final plan will be adopted by the City Council on November 5, 2008.

2.7 Prior Mitigation Actions/Projects

In the past the City of Palmdale has been aggressive in identifying potential hazards and implementing measures to mitigate the effects of hazards. Prior mitigation actions/projects implemented are included in Table 2.1 below:

Table 2.1

Mitigation Description	Coordinating Organization	Time Line	Ideas for Implementation	Plan Goals Addressed	Common Sense Rationale	Constraints
Earthquake Strapping Project	COP/Maint.	Completed in mid 1990's	Provide earthquake strapping for filing cabinets, water heaters, bookshelves, etc	YES	To provide safety from potential injury during an earthquake	NONE
Structural Seismic Reinforcement Project of the Administrative Services Building	COP/CIP	Complete in late 1990's	Provide structural seismic retrofit roof structure on an existing City facility	YES	To provide safety from potential injury during an earthquake	Project was completed in conjunction with a remodeling project
Auto Shut off on all Gas Meter of City facilities	COP/CIP	Completed in mid 1990's	Provide earthquake shut off valves for gas lines on City facilities	YES	To provide safety from potential injury during an earthquake	NONE
Book Shelf Seismic Bracing – Main Library Project	COP/CIP	Completed in late 1990's	Provide earthquake strapping and bracing for all library shelves in the City of Palmdale Main Library	YES	To provide safety from potential injury during an earthquake	NONE

Table 2.1 (cont'd)

Secondary Containment Pool Chemical Storage to meet Seismic Requirement	COP/Maint.	Completed in early 2000's	Provide secondary containment of chemical storage on two City maintained swimming pools	YES	To provide safety from potential injury during an disaster event and reduce hazard material liabilities	NONE
Back Up Power Generator Project – Development Services, Administration, Maintenance Center and Palmdale Playhouse	COP/CIP/ Maint	Completed in early 2000's	To provide a backup generator for all facilities listed	YES	To provide safety and insure that the City is functional during and after a disaster	NONE
Adopted LA County Regional Structural Amendment to keep up with current design minimum	COP/Public Safety	2001	2001 Adoption of more stringent structural design elements	YES	To provide structural safety design standards for all facilities within the City of Palmdale.	NONE
Worked with AVEK and the LA County Fire Department to convert large chlorine gas cylinder to liquid chlorine	COP/Maint.	2002	To provide safer containment of hazardous material at two treatment sites located within the City of Palmdale	YES	To provide safety from potential injury during an earthquake	NONE
Developed 1st phase of disaster inspection reporting system for Building Inspection	COP/B&S	1999	To provide for better database inventory of disaster inspection	YES	To create a database of permits allowing easy access to information on building projects and their compliance	NONE
Adopted Appendix Chapter 34 Division III Repairs to buildings and structures damaged by the occurrence of natural disasters.	COP/B&S	2001	Outlines the percentage damage vs. compliance with current codes for reconstruction	YES	Allows the City to have a better understanding of the damage caused by an earthquake in relation to the code compliance of the project	NONE
Marie Kerr Park Drainage Basin and Park Improvements	COP/CIP	1993	Development of 14 acre park site with two detention basins. Basins are used for play fields. Detention basins store water and released at a monitored rate. This creates less water on the street, thus decreasing flooding and accidents	YES	City of Palmdale uses many of their park facilities as drainage basins. Since this area does not get an abundant amount of rain, the park basins are dry and can be used for practice fields	NONE
Domenic Massari Drainage Basin and Park Improvement	COP/CIP	1995	Development of 25 acre park site with two detention basins. Basins are used for play fields. Detention basins store water and released at a monitored rate. This creates less water on the street, thus decreasing flooding and accidents	YES	City of Palmdale uses many of their park facilities as drainage basins. Since this area does not get an abundant amount of rain, the park basins are dry and can be used for practice fields	NONE

Table 2.1 (cont'd)

20th Street East Storm Drain	COP/CIP	1995	Development of a storm drain system in 20th Street East from Palmdale Blvd to Avenue R	YES	Reduce amount of flood water along streets	NONE
Various Storm Drain Project	COP /CIP	1990-2008	City has installed numerous storm drain facilities within City streets in order to minimize the amount of the water on the street and decrease accidents	YES	Reduce amount of flood water along streets	NONE
Amargosa Creek Improvement Project	COP/CIP	2004	This project completed drainage improvements along the Amargosa Creek from the AV Freeway to Avenue O	YES	Modification of the Amargosa Creek Channel to be able to handle large volumes of water	Needed to construct habitat mitigation area
Amargosa Creek Habitat Mitigation	COP /CIP	2004	Construction of a habitat mitigation area, required by California Department of Fish & Game	YES	Construction of above project affected 0.08 acres of marsh/willow riparian vegetation located in the channel.	Maintain mitigation areas
City of Palmdale Water Efficient Landscape Requirements	COP	2008	Updating Water Efficient landscaping requirements	YES	By using more drought tolerant landscape and irrigation measures, this creates less water on the street, thus decreasing flooding and accidents	Must follow City Ordinance 1362

2.8 Local Capabilities and Resources

Various city departments, state and county agencies, local public and private utilities, and other service providers have designated technical staff to assist in plan development by providing information, reviewing technical drafts, and serving on the Hazard Mitigation Planning Task Force. In addition, the City obtained the services of an experienced technical consultant to provide support throughout the mitigation planning process.

The technical resources that can be used in Palmdale's overall mitigation effort include several types of equipment, GIS and other software, and most importantly, personnel. Several staff have been trained and/or certified in mitigation concepts, firefighting, hazardous materials response and containment, first aid, CPR, and emergency management. Individual staff members have backgrounds in land development, land use planning, land management, environmental planning, risk management, security, facilities operations, and grant writing.

Figure 2.1 indicates the technical and administrative capacity that the City of Palmdale can bring to bear on the planning,, development, implementation, and management of mitigation actions/projects.

Figure 2.1 – Technical and Administrative Capabilities

Resource	Staff	Consultant/Contractor
Planner(s) or engineer(s) with knowledge of land development and land management practices	√	
Professionals trained in construction practices related to buildings and/or infrastructure	√	
Professionals trained in facilities management and operations	√	
Planner(s) or engineer(s) with an understanding of natural and/or manmade hazards	√	√
Planner(s) or engineer(s) with experience developing and managing mitigation projects and/or recovery projects	√	√
Environmental Planner		√
Professionals trained in assessing and/or mitigating against man-made hazards; professionals with risk assessment expertise	√	√
Construction project managers	√	As needed
Fiscal and Budget Management	√	
Personnel with GIS expertise	√	As needed
Grant Writer	√	
Administrative & Operational Support	√	

Financial support for Palmdale's mitigation activities is available from both FEMA and OES. There are several local financial resources that are also potentially available for implementation of proposed mitigation projects. Those sources include, but are not limited to:

- Gas Tax
- Propositions A & C Funds
- Traffic Impact Funds
- Amargosa Drainage
- Anaverde Drainage
- Portal Ridge Drainage
- Pearland Drainage
- City's General Funds

For charts reflecting the City of Palmdale's organizational structure, reference Appendix A.

2.9 Existing and Ongoing Mitigation Projects

The City of Palmdale has been aggressive in identifying potential hazards and implementing measures to mitigate the effects of these hazards. Ongoing projects include:

Table 2.2

Mitigation Description	Coordinating Organization	Time Line	Ideas for Implementation	Common Sense Rationale	Constraints
Fuel reduction/modification requirements in high fire hazard zones	COP	Prior to issuance of occupancy permits in affected areas	Require developers to provide initial fuel reduction and/or modification during grading	Reduction of fuel levels provides for a decreased risk in wildfire damage.	Assurance of on-going maintenance is the responsibility of Home Owner's Associations
Reduction in development densities in Seismic hazard zones	COP	In effect	Limit densities through zoning and development review process	Reduction of households places fewer people at risk and creates less displacement of families following a seismic event	Action will be effective only as long as the City Council maintains the policy.
Development of conditions of approval requiring flood hazard mitigation prior to development	COP	Prior to issuance of occupancy permits in affected areas	Currently being implemented	By requiring flood control improvements prior to construction, flood hazards to structures are reduced.	Costs for certain regional improvements are very high.
Public safety division review of development projects for application of Community Policing through Environmental Design (CPTED) principals.	COP	Prior to approval of development	Currently being implemented	Requiring development design that discourages crime assists with law enforcement activities and staffing	None at the present time
Geotechnical review in earthquake hazard areas	COP	Prior to approval of development and prior to approval/ certification of grading	Currently being implemented	Ensuring that new development occurs outside of geologic setback areas and that any extraordinary construction requirements are implemented will reduce hazards to structures within and near fault zones.	None at this time

Table 2.2 (cont'd)

Mitigation Description	Coordinating Organization	Time Line	Ideas for Implementation	Common Sense Rationale	Constraints
Require Electro-magnetic Fields (EMF) reports for new cell tower sites.	COP	Preliminary report is required prior to approval and within six months of beginning operation, a report providing actual facility emissions is required.	Currently being implemented	Review of the reports provided information to the public on EMF produced by this equipment.	Most studies on EMF have concluded that there are no public health risks associated with these facilities. The requirement is precautionary only, and does not affect any known risk or hazard.
City of Palmdale Water Efficient Landscape Requirements	COP	Ordinance in effect October 2008	Currently being implemented	Drought tolerant landscape and water efficient irrigation will create less water on the streets, thus creating less flooding and accidents	Must follow Ordinance 1362

END NOTE: The process implemented by City of Palmdale in the development of the LMHMP has provided a variety of opportunities for participation by the general public, other jurisdictions, state, local, and county agencies, and other interested stakeholders. All relevant existing technical documents were reviewed and information was incorporated in the LMHMP as appropriate.

The City's commitment to incorporating mitigation into every day operations is evidenced in the number of completed and ongoing mitigation activities.

SECTION THREE

RISK ASSESSMENT

SECTION THREE - RISK ASSESSMENT

3.1 Risk Assessment Process

Introduction

As indicated previously, the mitigation plan process includes four broad tasks:

- **Organize Resources**
- **Assess Risks**
- **Develop Mitigation Plan**
- **Implement the Plan and Monitor Progress**

The City of Palmdale organized resources during the beginning of the planning process. Once that was accomplished, the process of assessing risks could begin. A risk assessment helps answer questions about "what if" situations, such as "what if there is major flooding along Amargosa Creek, Anaverde Creek, Little Rock Wash, and Big Rock Wash?" The risk assessment process enabled the City to better understand their vulnerability to natural, man-made, or technological hazards. The information gathered during the process can serve as a basis for emergency management planning, as a justification for preparedness related expenditures, and as a foundation for mitigation actions and recovery policy decisions. The data from the risk assessment is the framework the City of Palmdale used to develop and prioritize mitigation strategies and actions, in the hope of reducing risk and vulnerability from future hazard events.

The risk assessment process followed the methodology described in the FEMA publication "*Understanding Your Risks – Identifying Hazards and Estimating Losses,*" and it was based on a five-step process:

- Identifying Hazards
- Profiling Hazards
- Inventorying Assets
- Assessing Vulnerability/Estimating Losses
- Analyzing Development Trends

3.2 Identifying Hazards

Risk Assessment Research, Document Review, and Planning Survey

Several activities were involved in identifying hazards and profiling past hazard events. A variety of information was reviewed. Information included existing literature, technical data, and maps produced by the California Department of Forestry (CDF), the CDF Fire and Resource Assessment Program, OES, and FEMA, as well as City of Palmdale generated maps and

documents, emergency operations plans, and the *Los Angeles County Multi-Jurisdictional Hazard Mitigation Plan*. Newspaper articles, journals, climatic data, development trends, and watershed information were examined, as well as documents produced for the City by specialized engineering and environmental analysis firms. Documents included, but were not limited to, Environmental Impact Reports, Environmental Assessments, reports on soil stabilization, the General Plan and specific development plans, and the reports relating to the environmental impacts of proposed projects.

The *State of California Multi-Hazard Mitigation Plan* was also reviewed. Anecdotal information on previous natural disasters affecting the City was gathered during interviews with Palmdale Public Works staff and other engineering and managerial staff. As appropriate, information from these sources has been incorporated into this LMHMP. In particular, hazard and risk assessment information generated by Los Angeles County and information produced by federal, state, or local agencies, including graphics, have been used to support the risk assessment narrative. Specific sources of information include, but are not limited to:

- CALTRANS;
- California Geological Survey;
- FEMA Flood Insurance Rate Map;
- Southern California Earthquake Data Center;
- California Department of Fish and Game;
- California Department of Forestry (CDF);
- CDF Fire and Resource Assessment Program;
- FEMA Hazards Website;
- National Oceanic & Atmospheric Administration (NOAA);
- Other similar sources.

Technological hazards, such as those created by man-made conditions or originating within the human environment (bio-terrorism, hazardous material spills, e.g.), were also considered. Technological hazards frequently have a significant impact on a localized area and are highly unpredictable.

In addition to research into existing materials and conversations with City, FEMA, and OES staff, a community planning and perceived hazards survey instrument (Reference **Appendix B**) was distributed to city and county employees, the general community, and other agencies. The survey asked individuals about the types of disasters they felt were the greatest threat to the City of Palmdale and what the City's mitigation planning priorities should be.

The results of the community survey are detailed later in this Section and in Section 4.

Listing of Hazards

The public, City of Palmdale, Hazard Mitigation Task Force and Mitigation Steering Committee, the Safety element of the General Plan, research, and the County's mitigation plan have identified the natural and human-caused hazards that pose significant threats to the City. Those

hazards that pose the highest risk and have the highest probability of occurring are profiled in this LMHMP.

The list of hazards discussed within this plan includes:

- Earthquakes and Earthquake Related Hazards
- Floods, Dam Failure and Inundation
- Wildfires/Wildland Urban Interface Fires
- Transportation Accident/Hazmat Spill
- Drought
- Severe Weather
- Power/Utility Failure

Mitigation against the impacts of these identified hazards forms the basis of the City's mitigation strategy.

3.3 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.*

The following hazard profiles are not presented in any particular order or rank of importance.

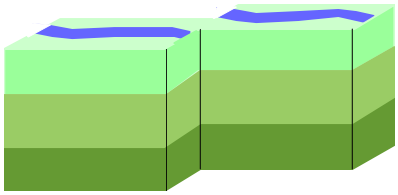
EARTHQUAKE

What is an earthquake?

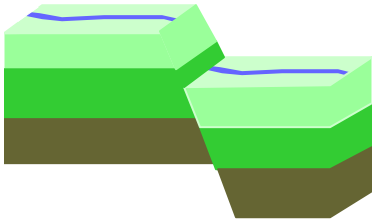
An earthquake is the ground shaking caused by the sudden movement of rock along a fracture in the Earth's brittle outer layer. This sudden slip, referred to as faulting, releases waves of energy that radiate outward in all directions from the area of initial movement. Most faulting and associated earthquakes occur in response to temperature-driven movements of rock that is deep inside the Earth. This slow movement pushes and pulls against the Earth's outer layer.

Causes of Earthquakes in Southern California

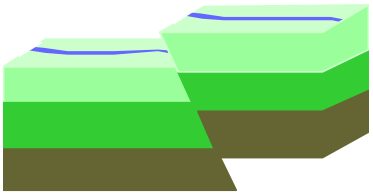
Earthquakes are caused by earth movement along a fault. Movement can be horizontal along the fault line ("strike slip") or vertically ("dip slip"). Typical fault movements are illustrated below:



A fault is a fracture along between blocks of the earth's crust where either side moves relative to the other along a parallel plane to the fracture.



Strike-slip faults are vertical or almost vertical rifts where the earth's plates move mostly horizontally. From the observers' perspective, if the opposite block looking across the fault moves to the right, the slip style is called a right lateral fault; if the block moves left, the shift is called a left lateral fault.



Dip-slip faults are slanted fractures where the blocks mostly shift vertically. If the earth above an inclined fault moves down, the fault is called a normal fault, but when the rock above the fault moves up, the fault is called a reverse fault. Thrust faults have a reverse fault with a dip of 45 ° or less.

Thrust Fault

How is earthquake size measured?

Magnitude: Earthquake size or magnitude can be determined using an instrument called a seismograph. This instrument measures the movement of the Earth's surface by recording the radiating earthquake waves. Each whole number magnitude increase represents a ten-fold increase in the up and down motion recorded by the seismograph. An M = 6 earthquake causes 10 times the recorded motion of an M = 5 and 100 times the motion of an M = 4 earthquake. The magnitude may be used to calculate the amount of energy released by the earthquake. Each whole-number increase in magnitude corresponds to an energy increase of about 32 times the lower magnitude value. An M = 6 earthquake releases about 30 times the energy of a M = 5 and nearly 1,000 times the energy of a M = 4 earthquake.

As earthquakes increase in size, the movement of the earth in response to the earthquake waves saturates. That is, the ground motion no longer increases in a way directly related to the increased size of the earthquake. A different method of determining magnitude based on the number of factors, such as area of slip, is used to calculate the size of earthquakes generally greater than M = 8.

Intensity: Earthquake size may also be determined using a subjective scale of observed damage. This method was used before the installation of seismographs and before the development of the Richter Magnitude Scale. An example is the Modified Mercalli Intensity (MMI) Scale first published in 1931. Defining the intensity of an earthquake is similar to describing the brightness of a light bulb at a particular location in a room. What is observed depends not only on the light bulb's "magnitude" as measured by the number of watts, but also on the characteristics at any particular location that might effect the light's brightness.

Similarly, the intensity of damage observed at a specific building depends upon a number of factors, such as the earthquake's magnitude, distance from the fault generating the earthquake, type of geologic materials underneath the building, type of building construction, age of construction, and other attributes. Over time the MMI scale has been modified to address

changes in building types. All these possible variations in damage result in a single earthquake being capable of producing intensities ranging from *not felt at a particular location* (MMI = I) to *causing catastrophic damage* (MMI = XII) at another place. Historical records generally list an earthquake's maximum observed intensity and the size of the area in which the earthquake was felt.

Earthquake Damage

Introduction

Earthquakes shake the ground in all directions. Because of this multi-directional shaking, the structural and nonstructural elements of a building must be specially designed to resist earthquake forces in a variety of directions. Structural and nonstructural elements of a building that are not secured to resist expected up and down and side-to-side earthquake shaking pose a hazard to building occupants

Structural Damage

The structural elements of a building must be designed and constructed to support heavy weights under the force of gravity. Structural elements of newer Palmdale public buildings generally have sufficient strength to prevent collapse due to vertical earthquake motions. However, special earthquake-resistant design is often needed to strengthen structural elements to resist lateral or side-to-side earthquake motions.

Nonstructural Damage

Nonstructural elements can be vulnerable to damage from both vertical and lateral earthquake motions. When an earthquake shakes a building, the result can be:

> **Distortion and damage** to nonstructural elements, such as windows, partition walls, and elevators, caused as the shape of the building deforms in response to earthquake shaking.
>
> **Sliding and overturning** of book shelves, file cabinets, mechanical equipment, and many other types of furnishings and equipment.
>
> **Falling of items** from counters, desks, and shelves.
>
> **Swaying and shaking** of suspended elements such as piping and light fixtures resulting in breaks, leaks, and falls.

Earthquake-resistant design of nonstructural elements was generally not a major concern in local or national building codes before 1980. Even in the most recent building codes, only a few nonstructural elements must be designed to resist earthquake damage. Therefore, the nonstructural elements in most buildings in the United States remain vulnerable to damage during earthquake shaking.

Benefits of strengthening nonstructural elements

Securing the nonstructural elements improves the safety and security of the community during an earthquake emergency:

- Reduces casualties
- Helps maintain safe and clear exit ways for evacuation and to access the building
- Reduces dangerous chemical spills, fires, and gas leaks
- Improves the likelihood of using the facility following a damaging earthquake event.

Securing the nonstructural elements also improves the safety and security of the individual employees, the general public and the continuity of business operations following a significant earthquake:

- Bookshelves and file cabinets attached to walls reduce damage and improve the safety of exit routes.
- Locked storage rooms and secured equipment discourage theft.
- Safety film on glass provides increased safety in the event of a damaging earthquake, a bomb blast, accidents, and similar incidents.
- Glass safety films may be tinted to improve energy conservation.
- Anchored vending machines prevent casualties caused by overturning during an earthquake or if shaken by users.
- City staff and community members who inventory building areas for nonstructural earthquake hazards will also be learning skills that will enable them to make their homes and businesses safer.
- The inventory promotes teamwork among the community and helps team members become more familiar with building areas.
- Secured and properly stored chemicals help reduce spills during normal operations.

Securing nonstructural elements tends to foster recovery:

- Repair of earthquake induced damage to nonstructural elements can cost millions of dollars and keep facilities and businesses closed even when no structural damage has occurred.

Previous Occurrences

Earthquake events constitute the most likely serious hazard facing the City of Palmdale. Since 1769 the Southern California Region has experienced 33 recorded earthquakes of magnitude 5.0 or greater (see Table 3.1 below). The region is criss-crossed by dozens of earthquake faults, the largest being the San Andreas. Among the other faults in the region are the Newport-Inglewood, Charnock (considered part of the Newport-Inglewood fault zone), Whittier, Chatsworth, Elsinore, Hollywood, Los Alamitos, and Palos Verdes. In addition to known faults, there are potentially dozens of faults below the surface that have not yet been charted. For example, the Whittier Narrows earthquake of 1987 occurred along a previously uncharted fault. More recently, the Northridge Earthquake was caused by an unknown thrust fault.

Table 3.1

Southern California Region Earthquakes with a Magnitude 5.0 or Greater	
1769 Los Angeles Basin	1916 Tejon Pass Region
1800 San Diego Region	1918 San Jacinto
1812 Wrightwood	1923 San Bernardino Region
1812 Santa Barbara Channel	1925 Santa Barbara
1827 Los Angeles Region	1933 Long Beach
1855 Los Angeles Region	1941 Carpenteria
1857 Great Fort Tejon Earthquake	1952 Kern County
1858 San Bernardino Region	1954 W. of Wheeler Ridge
1862 San Diego Region	1971 San Fernando
1892 San Jacinto or Elsinore Fault	1973 Point Mugu
1893 Pico Canyon	1986 North Palm Springs
1894 Lytle Creek Region	1987 Whittier Narrows
1894 E. of San Diego	1992 Landers
1899 Lytle Creek Region	1992 Big Bear
1899 San Jacinto and Hemet	1994 Northridge
1907 San Bernardino Region	1999 Hector Mine
1910 Glen Ivy Hot Springs	

Source: http://geology.about.com/gi/dynamic/offsite.htm?site=http%3A%2F%2Fpasadena.wr.usgs.gov%2Finfo%2Fcahist_eqs.html

Earthquakes in California

An earthquake large enough to cause moderate damage to structures – those of magnitude 5.5 or larger – occurs three or four times a year. The 1987 Whittier Narrows earthquake (M6), caused by a buried thrust fault, was responsible for hundreds of millions of dollars in property damage. Most recently, the San Simeon (M6.5) hit an area six miles northeast of San Simeon on December 22, 2003.

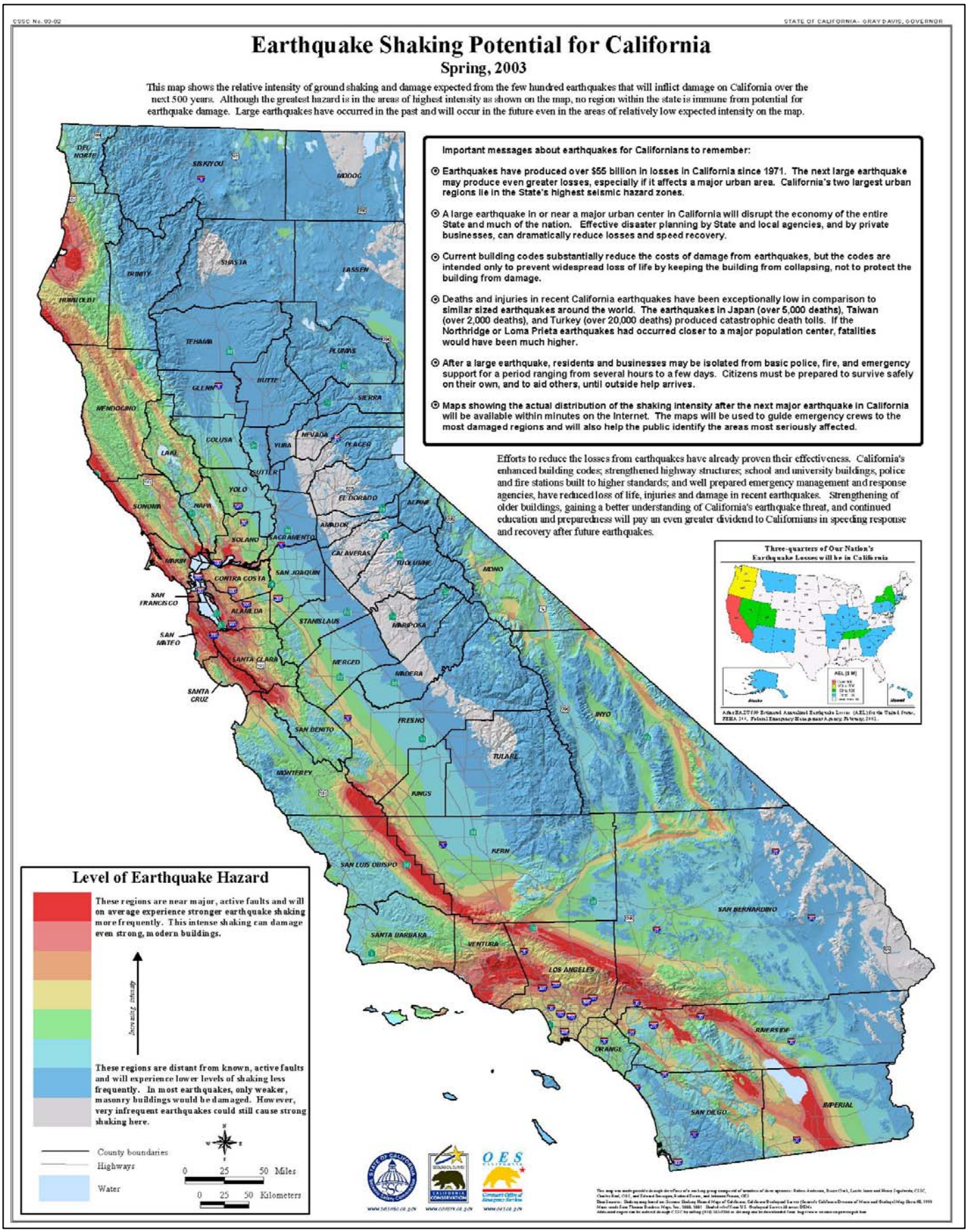
Once every two to three years, a strong earthquake (M6 to M6.9), strikes somewhere in the state. An earthquake of this size, such as the Northridge Earthquake (M6.7) or the 1983 Coalinga earthquake (M6.5) is capable of causing major damage if the epicenter is near a densely populated area.

Major earthquakes (M7 to M7.9) occur in California about once every ten years. The two largest earthquakes in California, the 1857 Fort Tejon Earthquake and the famous 1906 San Francisco Earthquake were similar in magnitude (M7.9 and M7.8) and resulted from movement along the San Andreas Fault. Earthquakes of this size (M7.7 to M7.9) can cause more extensive damage over a larger area than the M7.1 to M7.4 earthquakes that have struck California is recent decades.

Since seismologists started recording and measuring earthquakes, there have been tens of thousands of recorded earthquakes in Southern California, most with a magnitude below three. No community in Southern California is beyond the reach of a damaging earthquake.

While the well-known San Andreas Fault is capable of producing an earthquake over magnitude 8 on the Richter scale, there are many faults in the Southern California area that are capable of producing earthquakes in the 6 to 7 magnitude range. These faults have the potential to cause greater damage in the area due to their proximity to highly dense, built up urban areas. A 6.0 magnitude quake along the Newport-Inglewood fault, for example, could cause more death, injury, and destruction in the urban area than an 8.0 quake on the San Andreas, due to the greater distance of the San Andreas from the urban core. While scores of quakes occur in the region in a typical year, most are measured 3.0 and under on the Richter scale, causing little or no damage. Many smaller quakes go virtually unnoticed except for detection by scientific instrumentation.

Map 3.1 on the following page indicates the earthquake shaking potential for the state of California. All of Los Angeles County lies within areas that are near major active faults. These areas experience stronger shaking, more often.


CGSC No. 03-02
STATE OF CALIFORNIA - GRAY DAVIS, GOVERNOR
Earthquake Shaking Potential for California
Spring, 2003
This map shows the relative intensity of ground shaking and damage expected from the few hundred earthquakes that will inflict damage on California over the next 500 years. Although the greatest hazard is in the areas of highest intensity as shown on the map, no region within the state is immune from potential for earthquake damage. Large earthquakes have occurred in the past and will occur in the future even in the areas of relatively low expected intensity on the map.
Important messages about earthquakes for Californians to remember:
Earthquakes have produced over $55 billion in losses in California since 1971. The next large earthquake may produce even greater losses, especially if it affects a major urban area. California's two largest urban regions lie in the State's highest seismic hazard zones.
A large earthquake in or near a major urban center in California will disrupt the economy of the entire State and much of the nation. Effective disaster planning by State and local agencies, and by private businesses, can dramatically reduce losses and speed recovery.
Current building codes substantially reduce the costs of damage from earthquakes, but the codes are intended only to prevent widespread loss of life by keeping the building from collapsing, not to protect the building from damage.
Deaths and injuries in recent California earthquakes have been exceptionally low in comparison to similar sized earthquakes around the world. The earthquakes in Japan (over 5,000 deaths), Taiwan (over 2,000 deaths), and Turkey (over 20,000 deaths) produced catastrophic death tolls. If the Northridge or Loma Prieta earthquakes had occurred closer to a major population center, fatalities would have been much higher.
After a large earthquake, residents and businesses may be isolated from basic police, fire, and emergency support for a period ranging from several hours to a few days. Citizens must be prepared to survive safely on their own, and to aid others, until outside help arrives.
Maps showing the actual distribution of the shaking intensity after the next major earthquake in California will be available within minutes on the Internet. The maps will be used to guide emergency crews to the most damaged regions and will also help the public identify the areas most seriously affected.
Efforts to reduce the losses from earthquakes have already proven their effectiveness. California's enhanced building codes; strengthened highway structures; school and university buildings, police and fire stations built to higher standards; and well prepared emergency management and response agencies, have reduced loss of life, injuries and damage in recent earthquakes. Strengthening of older buildings, gaining a better understanding of California's earthquake threat, and continued education and preparedness will pay an even greater dividend to Californians in speeding response and recovery after future earthquakes.
Three-quarters of Our Nation's Earthquake Losses will be in California
Level of Earthquake Hazard
These regions are near major, active faults and will on average experience stronger earthquake shaking more frequently. This intense shaking can damage even strong, modern buildings.
Increasing intensity
These regions are distant from known, active faults and will experience lower levels of shaking less frequently. In most earthquakes, only weaker, masonry buildings would be damaged. However, very infrequent earthquakes could still cause strong shaking here.
County boundaries
Highways
Water
0 25 50 Miles
0 25 50 Kilometers
DEL NORTE
SISKIYOU
MODOC
SHASTA
TRINITY
LASSEN
HUMBOLDT
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
NEVADA
YUBA
PLACER
LAKE
SUTTER
YOLO
EL DORADO
SONOMA
NAPA
ALPINE
AMADOR
SOLANO
SACRAMENTO
CALAVERAS
MARIN
TUOLUMNE
MONO
CONTRA COSTA
SAN JOAQUIN
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
MADERA
SANTA CRUZ
INYO
FRESNO
SAN BENITO
TULARE
MONTEREY
KINGS
KERN
SAN LUIS OBISPO
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
RIVERSIDE
ORANGE
IMPERIAL
SAN DIEGO

Map 3.1

Probability of Future Events

The probability that, sooner or later, the City of Palmdale will suffer a major seismic event is virtually 100%. As described in the Safety Element of the City's General Plan –

The City of Palmdale and the Planning Area are located in a seismically active region. The dominant seismic feature affecting the City is the San Andreas Fault which traverses the southernmost portion of the Planning Area. The San Andreas Fault is the boundary where the North American plate and the Pacific plate meet. Relative movement of the plates along this boundary causes earthquakes. This fault is considered one of the most dangerous in the state in terms of destructive potential. The San Andreas Fault extends over 600 miles from the Salton Sea, northwest toward the Pacific Ocean at Point Arena. Two of the three largest (8.0+ Richter) earthquakes in the state have occurred along the San Andreas Fault: the 1906 San Francisco earthquake that caused 21-foot offsets and the 1857 Fort Tejon earthquake. Table S-3 lists earthquake activity on the resulting Modified Mercalli intensity from the San Andreas Fault. Intensity measures the amount of ground shaking caused by an earthquake. An intensity value is assigned by the amount of damage to structures, changes in the earth's surface, and personal accounts.

In addition, several fault traces branch off from the primary fault within the San Andreas Rift Zone. The major fault traces for the San Andreas system in the Palmdale area are the Cemetery Fault, the Nadeau Fault, and the Littlerock Fault. All three faults are active splays of the San Andreas Fault. Thus, movement on the San Andreas Fault may activate one or all of these subsidiary faults. The Nadeau, Cemetery, and Littlerock fault traces are located in Palmdale.
Other splays of the San Andreas Fault which are found in Palmdale are the Powerline Fault and the eastern end of the Clearwater Fault.

In addition to the San Andreas Fault system, other principal faults that could produce damaging earthquakes in the Palmdale area are the Sierra Madre-San Fernando, Garlock, Owens Valley, and White Wolf faults. Their maximum probable magnitudes are listed in Table S-4. A maximum probable earthquake is the largest event expected to occur within 100 years. The Sierra Madre Fault is located at the base of the San Gabriel Mountains approximately 20 miles south of the Planning Area. The Garlock and White Wolf faults are northeast-trending faults located 30 to 60 miles, respectively, northwest of the Planning Area. The Owens Valley fault is 60 miles to the northeast and runs north south. A number of other faults located in the Southern California region could be responsible for earthquakes that would affect the City; although no major damage is expected to occur. (Tables on the following page were excerpted from the Safety Element of the City's General Plan.)

TABLE 3.2
MAJOR SAN ANDREAS FAULT ACTIVITY

Date	Magnitude	Modified Mercalli Intensity		Location
1838	7.0	X	- Comparable to 1906 earthquake	San Francisco
1857	7.9	IX+	- Buildings and large trees thrown down	Fort Tejon
1858	6.1	IX+	- Damage to building frames and foundations	San Francisco
1868	7.0	IX+	- Many buildings wrecked badly damaged. 30 killed	Hayward Fault
1890	6.8			So. Santa Cruz Mountains
1899	6.7	VIII	- Brick buildings badly damaged. 6 killed.	San Jacinto Fault
1906	7.7	XI	- Great earthquake and fire. 700 killed. Greatest damage on poorly filled land. 6.5 meter horizontal slip.	San Francisco
1916	6.0+			Tejon Pass
1922	6.5	IX	- Damage to masonry buildings and reservoir. Ground cracking.	Cholame Valley
1934	6.0	VIII	- $41 million damage. 120 killed	Parkfield
1989 *	7.1	VIII	- Localized freeway and bridge collapse. 63 killed.	San Francisco/Bay Area

*Southern Santa Cruz Mountain segment of the San Andreas Fault.
Source: California Department of Mines and Geology, Fault Map of California and Earthquake Hazards in the Los Angeles Region; Hill et al., 1979; Toppazada et al 1981, 1982; Jennnings 1975

TABLE 3.3
FAULT MAGNITUDES

Fault	Maximum Probable Magnitude (Moment)*	Recurrence Interval (Years)
San Andreas	8.0+	50-200
Sierra Madre-San Francisco	6.6	50-200
Garlock	7.5	500-700
Owens Valley	7.4	850-900
White Wolf	7.2	300

*The Moment Magnitude is preferred to the Richter Magnitude for earthquakes larger than 6M. As the magnitude surpasses 6.5M (Richter), all events begin to take on the same magnitude values. The Moment Magnitude keeps its integrity and delineates the different values greater than 6.5M.

Source: California Department of Mines and Geology Preliminary Report #13, C. W. Jennings; Los Angeles County Seismic Safety Element

1994 Northridge Earthquake

Perhaps the most destructive earthquake in the recorded history of Southern California was the Northridge earthquake, which occurred on January 17th, 1994. Striking at 4:31 in the morning, the quake measured 6.7 on the Richter scale, and shook all of Southern California. Fifty seven people lost their lives as a result of the quake, and more than 1,500 were seriously injured. More than 4,000 buildings were severely damaged and over 11,000 buildings suffered moderate damage. Severe damage occurred to structures as far away as Santa Monica, and several freeways suffered severe damage, including catastrophic failure of freeway bridges on the 10 and 14 freeways; the Santa Susana Mountains rose 15 inches.

Earthquake Related Hazards

The greatest damage caused by earthquakes results from ground shaking. Ground shaking results from seismic waves generated by the earthquake. Seismic waves travel under and on the earth's surface, causing ground motion, or *shaking*.

Ground Shaking: Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of the ground shaking depends on the magnitude of the earthquake, the type of fault, and the distance from the Earthquake epicenter. Buildings on poorly consolidated, compacted, or sandy soils will typically see more damage than buildings on consolidated soils and bedrock.

In addition to damage caused by ground shaking, earthquakes also cause, directly or indirectly, secondary hazards. These include:

Liquefaction: Liquefaction results when ground shaking causes wet, loose soils to become liquefied. As a result, buildings and other structures lose their support and may collapse in whole or in part.

Induced Landslides: The ground shaking associated with earthquakes may cause landslides in unstable hillside or mountainous areas. Landslides pose a hazard to persons and structures of all types in the impacted area.

Amplification: Soil and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes. One of these modifications is amplification. Amplification increases the magnitude of the seismic waves generated by the earthquake. The amount of amplification is influenced by the thickness of geologic materials and their physical properties. Buildings and structures on soft and unconsolidated soils can face greater risk. Amplification can also occur in areas with deep sediment filled basins and on ridge tops.

Fires: Ground shaking may break gas lines, cause electrical lines to fall or short, and bring normally contained flames (such as furnaces and water heaters) into contact with combustible material, resulting in fires.

FLOODS, DAM FAILURE, AND INUNDATION

Flood Hazard

The City of Palmdale and the surrounding planning area are subject to potential flooding from the following causes:

- Overflow of drainage channels into low-lying areas as a result of heavy rainfall ("Sheetflow")
- Inundation resulting from dam failure
- Inundation due to a break in the California Aqueduct

Flood plains seem to be changing and in most cases growing. Areas of the City within the 100 year flood zone are shown on Map 3.2. "100 year floods" are defined as the flood that has a 1% chance of being equaled or exceeded in a given year, such that over the long span of history (say 10,000 years) you would expect it to occur on average once every 100 years. Better technology (mapping and modeling) and better data has yielded a better understanding of what is happening. In other words, it isn't that the flood plain is changing necessarily. Rather, it is our understanding of where the flood plain is located that is changing. Palmdale's Flood Insurance Rate Maps were last updated in September 2008.

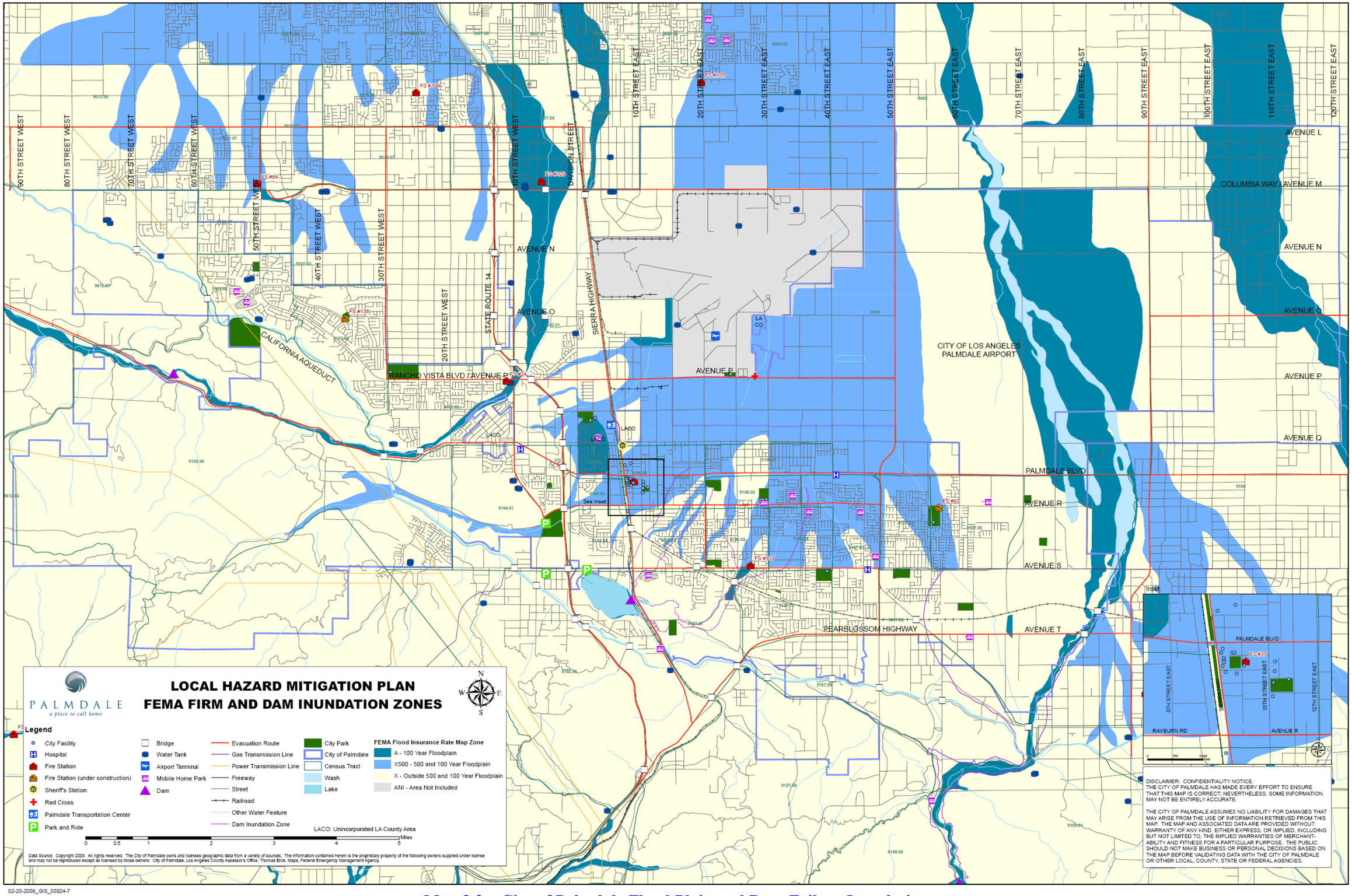
Conventional reality dictates that some solutions designed to protect certain areas create problems for other areas. Therefore, there is a need to create integrated solutions combining "tools" that work together. In 2002, the State of California Floodplain Task Force chose the term "reasonably foreseeable flood" to identify potential flood threats, (see Table 3.4).

Table 3.4 – Better Understanding and Reducing Risks from Reasonably Foreseeable Flooding

Action	Description
Awareness Floodplain Mapping	The State should expand its Awareness Floodplain Mapping Program for use by local governments and the public.
Future Build-Out Mapping	Local and State agencies preparing floodplain maps should consider current and future planned development.
Watershed-Based Mapping	Wherever practical, floodplain maps should be prepared on a watershed basis.
Geographic Information System (GIS)-Based Flood Maps	Local, State and federal agencies should create, develop, produce, and disseminate compatible GIS based flood maps.

Alluvial Fan Floodplains	Priority for alluvial fan floodplain mapping should be given to those alluvial fan floodplains being considered for development. The State should convene an alluvial fan task force to review information on alluvial fan floodplains, determine future research needs, and develop recommendations specific to alluvial fan floodplain management.
Stream Gauging and Monitoring	DWR and other agencies should sponsor projects in cooperation with the United States Geological Survey (USGS) to install real time gauges in priority locations throughout California.
Repetitive Losses	Local agencies should work with the OES and DWR to identify repeatedly flooded structures and inform qualifying residents of voluntary programs to prevent future flood loss.
Flood Warning and Local Community Flood Response Programs	The State should increase assistance to local agencies to improve flood-warning programs for specific watersheds.
Flood Insurance Rate Map Issues	Decision-makers should gather information and data beyond Flood Insurance Rate Maps to better assess reasonably foreseeable floods.
Exceeding Minimum Flood Insurance Requirements	Local communities should be encouraged to require new and substantially improved buildings to set their lowest floor elevations to at least one foot above the NFIP base flood elevation, thus factoring in the effect of full build-out of the watershed.
Executive Order	The Governor's 1977 Executive Order should be updated to direct State agencies to meet or exceed NFIP standards for State facilities.
State Model Hazard Mitigation Plan	DWR, OES, and other agencies should incorporate floodplain management measures into the State Model Hazard Mitigation Plan that will meet the FEMA requirements.
Multihazard Mapping	OES should coordinate with other hazard mapping efforts to develop GIS-based multihazard advisory maps and distribute them to local governments and the public.
State Building Codes	Ensure that the California Building Standards Code meets, at a minimum, NFIP requirements. Ensure that other State codes applicable to public buildings meet, at a minimum, NFIP requirements. Ensure that any local code adoptions or amendments and any development approvals meet, at a minimum, NFIP requirements.

Map 3.2 on the following page, prepared by the City of Palmdale GIS Department, depicts areas in the Palmdale vicinity subject to flooding.



Map 3.2 – City of Palmdale Flood Plain and Dam Failure Inundation

PREVIOUS OCCURRENCES

For the purposes of this Plan, we have listed only those flood incidents for which FEMA provided repair/recovery funding. We have concentrated on those incidents that have occurred within the past 16 years.

DR #	Month/Year
935	2/92
979	1/93 – 3/93
1044	1/95 – 2/95
1046	2/95 – 4/95
1155	12/96 – 4/97
1203	2/98 – 4/98
1577	12/04 – 1/05
1585	2/05

The major causes of the flooding over the past decade and a half have been heavy winter rains and the accompanying high velocity flows within watercourses and the storm drainage infrastructure. Damages have included roadway and shoulder washouts, culvert inlet damage, retention basin damage, and sediment basin overload (as well as minor damage to private property.)

Most recently, the high winds and heavy rains in January and February 2005 caused severe damage upstream of the Amargosa Creek arch culvert inlet, including the riprap-sided drainage channel, concrete inlet structure, and sediment basin, and the Avenue O retention basin. Also damaged were several roadside dirt shoulders, two (2) dirt roads, and three (3) asphalt road sections.

PROBABILITY OF FUTURE EVENTS

Given the flood history of Los Angeles County, the Antelope Valley, and the City of Palmdale, it is almost certain that there will be flooding events similar to those that have occurred in the recent past. The probability of future events is increased because it is reasonable to assume that commercial and residential development will continue. Development increases runoff volume, can affect on-site detention effectiveness, and may affect channel capacity. Any encroachment into the flood plain reduces flood storage and restricts conveyance, when it is needed the most.

The City has made a concentrated effort to mitigate against circumstances contributing to flooding, using such tools as ordinances governing development in flood hazard areas. It also plans to implement mitigation actions to prevent repeated flooding of specific roadways and intersections.

WILDFIRE HAZARDS / BRUSH FIRES

Wildfire/Brush Fire

A wildfire is "any instance of uncontrolled burning in grasslands, brush, or woodlands," whereas "uncontrolled burning within a forested area is a forest fire." The distinction is important mainly to clarify that wildfires do occur in non-forested areas, which most typifies Palmdale.

Hazards Secondary to Wildfire/Forest Fire:

- Landslides, mudslides, more intense water run-off (potential long-term hazard)
- Deadfall of scorched trees (potential long-term hazard)
- Ignition source for flammable and explosive materials
- Smoke and particulates reduce air quality – trouble especially for people with respiratory ailments
- Volatilized hazardous waste – toxic clouds or plumes
- Damaged infrastructure, such as roads, water supply pipes, sewers, which presents possible health and safety risks

Urban/Wildland Interface

The urban/wildland interface is the area or areas where houses and non-residential structures such as businesses, public buildings, and utility stations encroach on an undeveloped, natural resource area. The interface may be better described as the places where houses and other structures are up against and amidst trees, brush, and grassy areas, whether or not residents consider these areas "wild."

Previous Occurrences

Historically, wildfires have been a recurring feature of the California ecosystem. Naturally occurring wildfires play an important role in renewing and revitalizing woodland, scrub, and brush areas, especially in the mountain and foothill areas. While historical wildfires resulted in short-term damage to flora, fauna, soils, and water quality, loss of life and economic damage were minimized due to the lack of urbanization and the sparse population. With the influx of immigration into California in the 19th Century, that began to change.

"Written documents reveal that during the 19th century human settlement of southern California altered the fire regime of coastal California by increasing the fire frequency. This was an era of very limited fire suppression, and yet like today, large crown fires covering tens of thousands of acres were not uncommon. One of the largest fires in Los Angeles County (60,000 acres) occurred in 1878, and the largest fire in Orange County's history, in 1889, was over half a million acres."
(http://www.usgs.gov/public/press/public_affairs/press_releases/pr1805m.html)

With California's increasing urbanization, especially as urban development has encroached on foothill and mountainous areas, the hazards associated with wildfires have increased

dramatically. Wildfires now constitute one of the most dangerous threats to life and property in the state, (see Map 3.3 on the following page).

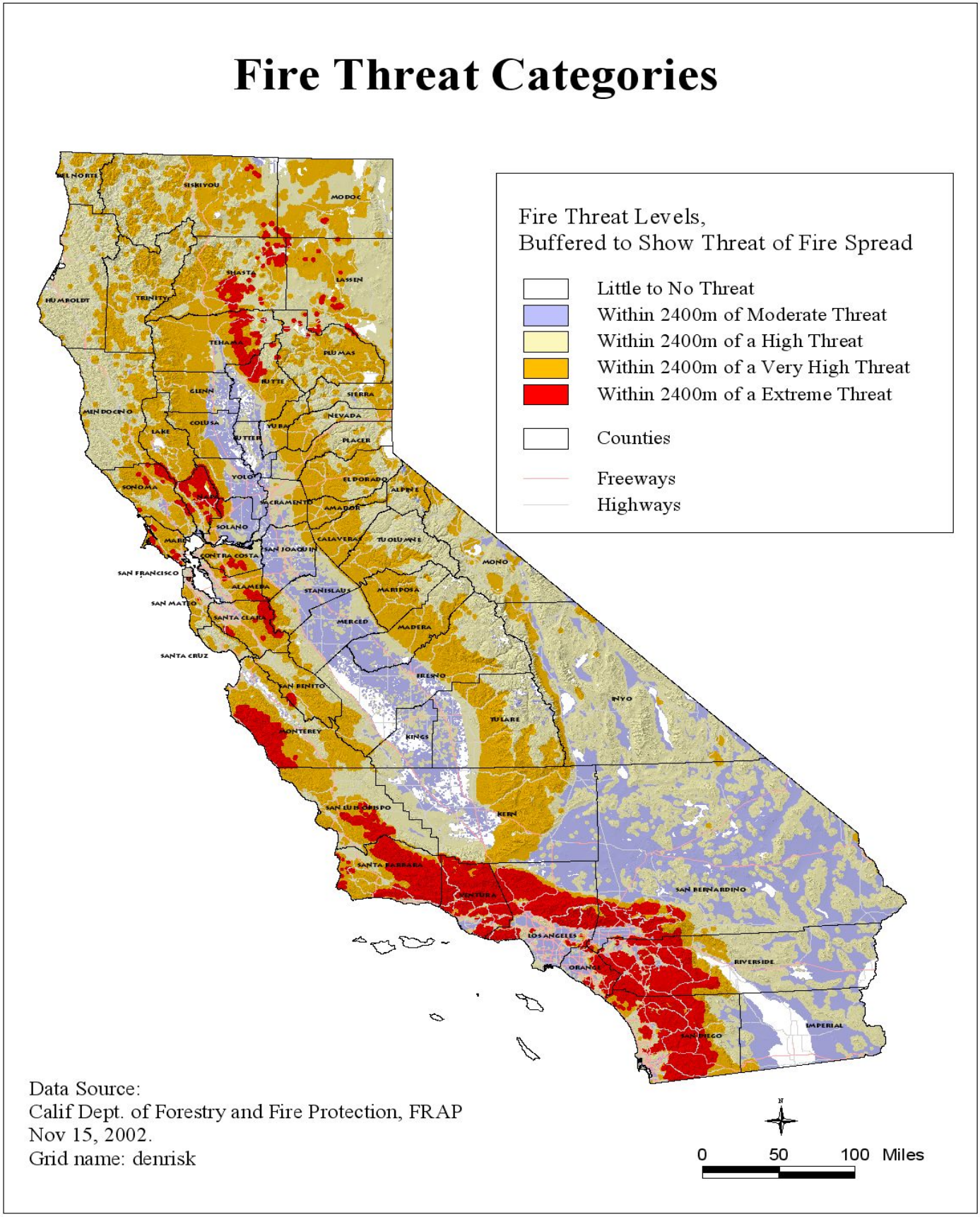
In fact, the 2003 wildfire season proved to be the most destructive in California history. Statewide there were more than 7,000 reportable fires, burning more than one million acres, destroying over 4,800 homes, and resulting in 22 fatalities. The 2003 fire season was especially brutal for Southern California. In October, 2003, fires burned almost three quarters of a million acres.

In addition to causing loss of life, damage to ecosystems, and property, wildfires result in increased costs to governments at all levels. In a recent study, Yale University researchers estimated that in 2002 more than $1.6 billion was spent in fire suppression efforts. Other economic damages include loss of crops, soil erosion due to loss of plant cover, and water quality degradation of water quality due to increased sedimentation and runoff.

The most dangerous wildfires occur in "urban interface" areas, i.e., areas where development encroaches on woodland and/or brush land areas.

There are three categories of interface fire: The **classic** wildland/urban and suburban development presses up against open expanses of wildland area; the **mixed** wildland/urban interface is characterized by isolated homes, subdivisions, and small communities situated predominately in wildland settings; and the **occluded** wildland/urban interface exists where islands of wildland vegetation occur inside a largely urbanized area. ***(Michael e. Martinet, "Wildland/Urban Interface Fire Hazards in Southern California", 2004)***

It should be noted that all three categories of urban/wildland occur within the planning area of the City of Palmdale.



Map 3.3
California High Fire Hazard Threat Map

Table 3.5 below lists major fires in Southern California during October 2003.

Table 3.5

October 2003 Firestorm Statistics

County	Fire Name	Date Began	Acres Burned	Homes Lost	Homes Damaged	Lives Lost
Riverside	Pass	10/21/03	2,397	3	7	0
Los Angeles	Padua	10/21/03	10,446	59	0	0
San Bernardino	Grand Prix	10/21/03	69,894	136	71	0
San Diego	Roblar 2	10/21/03	8,592	0	0	0
Ventura	Piru	10/23/03	63,991	8	0	0
Los Angeles	Verdale	10/24/03	8,650	1	0	0
Ventura	Simi	10/25/03	108,204	300	11	0
San Diego	Cedar	10/25/03	273,246	2,820	63	14
San Bernardino	Old	10/25/03	91,281	1,003	7	6
San Diego	Otay / Mine	10/26/03	46,000	6	11	0
Riverside	Mountain	10/26/03	10,000	61	0	0
San Diego	Paradise	10/26/03	56,700	415	15	2
Total Losses			749,401	4,812	185	22

Source:
http://www.fire.ca.gov/php/fire_er_content/downloads/2003LargeFires.pdf

Tables 3.6 and 3.7 on the following pages list the twenty largest wildfires occurring in California since 1961.

Table 3.6
Twenty Largest Wildfires in California Since 1961 by Acres Burned

	FIRE NAME/CAUSE	DATE	COUNTY	*ACRES*	STRUCTURES	DEATHS
*1	CEDAR *(HUMAN)*	October 2003	SAN DIEGO	273,246	2,820	15
2	MATILIJA *(UNDETERMINED)*	September 1932	VENTURA	220,000	0	0
3	MARBLE CONE *(LIGHTNING)*	July 1977	MONTEREY	177,866	0	0
4	LAGUNA *(POWERLINES)*	September 1970	SAN DIEGO	175,425	382	5
5	MCNALLY *(HUMAN)*	July 2002	TULARE	150,696	17	0
6	STANISLAUS COMPLEX *(LIGHTNING)*	August 1987	TUOLUMNE	145,980	28	1
7	BIG BAR COMPLEX *(LIGHTNING)*	August 1999	TRINITY	140,948	0	0
8	CAMPBELL COMPLEX *(POWERLINES)*	August 1990	TEHAMA	125,892	27	0
9	WHEELER *(ARSON)*	July 1985	VENTURA	118,000	26	0
*10	SIMI *(UNDER INVESTIGATION)*	August 1996	VENTURA	108,204	300	0
11	HWY. 58 *(VEHICLE)*	August 1996	SAN LUIS OBISPO	106,668	13	0
12	CLAMPITT *(POWERLINES)*	September 1970	LOS ANGELES	105,212	86	4
13	WELLMAN *(EQUIP. USE)*	June 1966	SANTA BARBARA	93,600	0	0
*14	OLD *(HUMAN)*	October 2003	SAN BERNARDINO	91,281	1,003	6
15	KIRK *(LIGHTNING)*	September 1999	MONTEREY	86,700	0	0
16	REFUGIO *(MISC. - STRUCTURE)*	September 1955	SANTA BARBARA	84,770	20	0
17	FORK *(UNDETERMINED)*	August 1996	LAKE	82,980	40	0
18	SCARFACE *(LIGHTNING)*	August 1977	MODOC	79,904	0	0
19	LAS PILITAS *(EQUIP. USE)*	July 1985	SAN LUIS OBISPO	74,640	41	0
20	MANTER *(UNDER INVESTIGATION)*	July 2000	TULARE	74,439	15	0

There is no doubt that there were fires with significant acreage loss in years prior to 1932, but those records are less reliable, and this list is meant to give an overview of the large acreage-loss fires in more recent times. (Also note that this list does not include fire jurisdiction. These are the top 20 within the state, regardless of whether they were state, federal, or local responsibility.)

Table 3.7
Twenty Largest Wildfires in California Since 1961 by Structures Destroyed

	FIRE NAME/*CAUSE*	DATE	COUNTY	ACRES	*STRUCTURES*	DEATHS
1	TUNNEL *(REKINDLE)*	October 1991	ALAMEDA	1,600	2,900	25
*2	CEDAR *(HUMAN)*	October 2003	SAN DIEGO	273,246	2,820	15
*3	OLD *(HUMAN)*	October 2003	SAN BERNARDINO	91,281	1,003	6
4	JONES *(UNDETERMINED)*	October 1999	SHASTA	26,200	954	1
5	PAINT *(ARSON)*	June 1990	SANTA BARBARA	4,900	641	1
6	FOUNTAIN *(ARSON)*	August 1992	SHASTA	63,960	636	0
7	CITY OF BERKELEY *(POWERLINES)*	September 1923	ALAMEDA	130	584	0
8	BEL AIR *(UNDETERMINED)*	November 1961	LOS ANGELES	6,090	484	0
9	LAGUNA FIRE *(ARSON)*	October 1993	ORANGE	14,437	441	0
*10	PARADISE *(HUMAN)*	October 2003	SAN DIEGO	56,700	415	2
11	LAGUNA *(POWERLINES)*	September 1970	SAN DIEGO	175,425	382	5
12	PANORAMA *(ARSON)*	November 1980	SAN BERNARDINO	23,600	325	4
13	TOPANGA *(ARSON)*	November 1993	LOS ANGELES	18,000	323	3
14	49ER *(BURNING DEBRIS)*	September 1988	NEVADA	33,700	312	0
*15	SIMI *(UNDER INVESTIGATION)*	October 2003	VENTURA	108,204	300	0
16	SYCAMORE *(MISC. - KITE)*	July 1977	SANTA BARBARA	805	234	0
17	CANYON *(VEHICLE)*	September 1999	SHASTA	2,580	230	0
18	KANNAN *(ARSON)*	October 1978	LOS ANGELES	25,385	224	0
19	KINNELOA *(CAMPFIRE)*	October 1993	LOS ANGELES	5,485	196	1
*19	GRAND PRIX *(HUMAN)*	October 2003	SAN BERNARDINO	69,894	136	0
20	OLD GULCH *(EQUIP. USE)*	August 1992	CALAVERAS	17,386	170	0

Note that this list does not include fire jurisdiction. These are the Top 20 within California, regardless of whether they were state, federal, or local responsibility. Also note that "structures" is meant to include all loss - homes and outbuildings, etc.

4/22/2004

Map 3.3 classifies geographic areas according to the degree of threat from wildland fires, ranging from "Little to No Threat" to "Extreme Threat". Most of the City of Palmdale lies within the "Moderate Threat" area. Just east and west of the proposed Palmdale Regional Airport and USAF Plant 42 are areas designated "High Threat." The southern and western foothills of the City are designated "Very High Threat," and the mountainous area in the far southwestern corner of the City is designated "Extreme Threat".

The City of Palmdale GIS Section has prepared fire hazard and frequency maps of the Palmdale area. Map 3.4 "Wildland Fire Hazards" and Map 3.5 "Wildland Fire Frequency" are shown on the following pages.

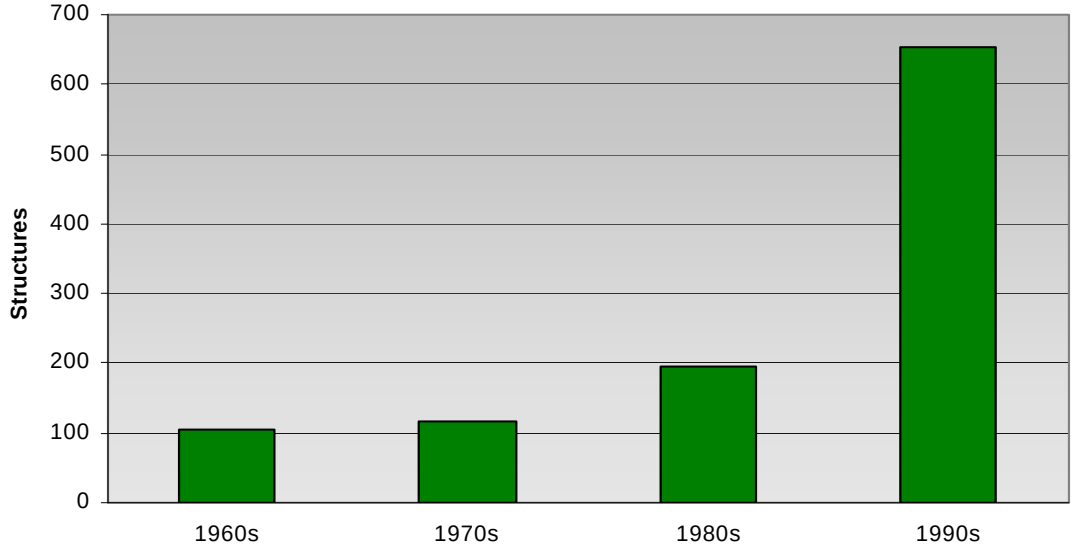
Probability of Future Events

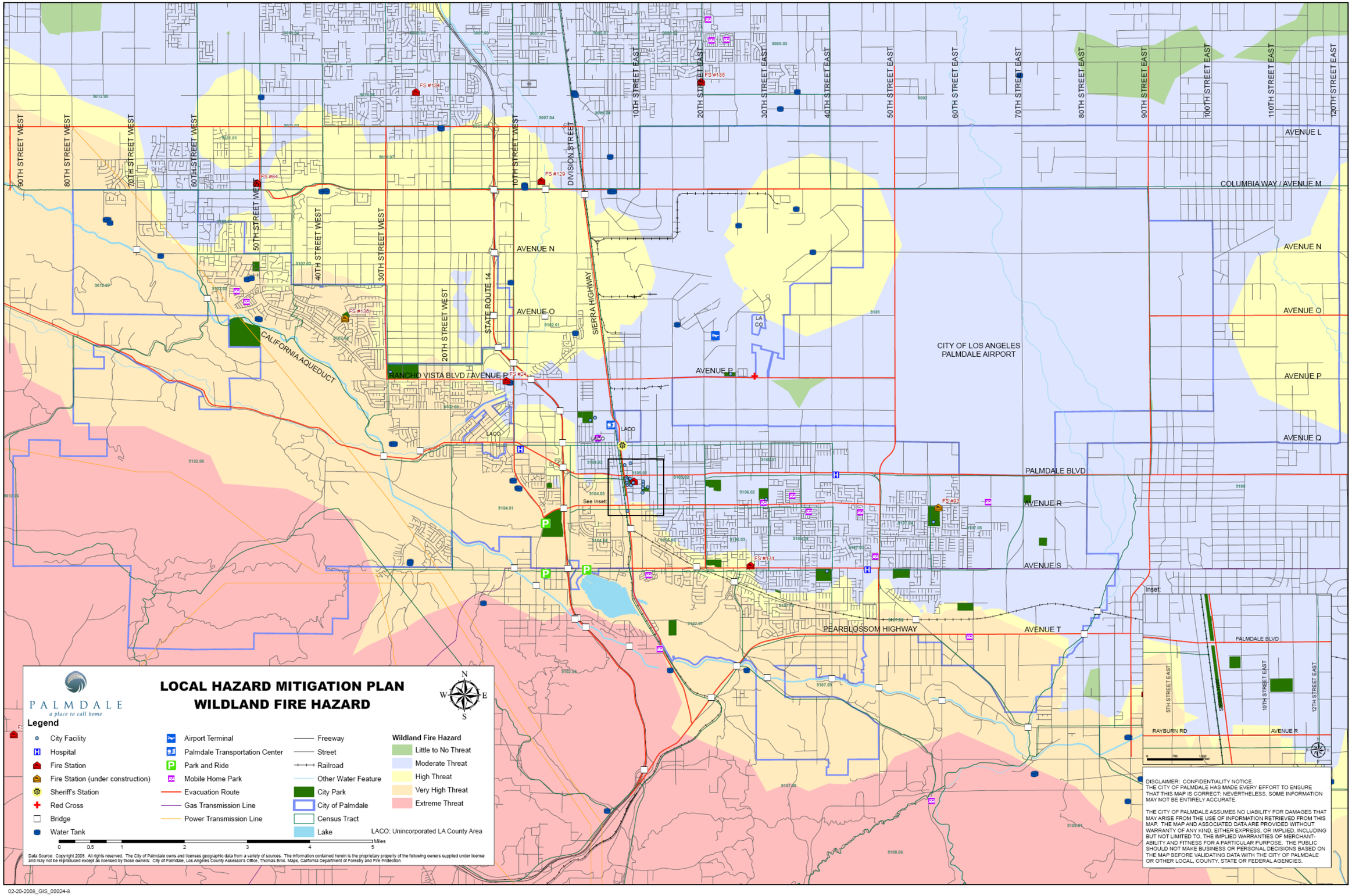
Considering the past history of Palmdale and the surrounding area, the risk of wildfires and/or urban wildland interface fires in the future is high and will probably continue to rise. The chance of a wildfire occurring is measured using an index of "expected fire frequency." The potential of a fire event to cause change is based on the measure of "potential fire behavior." Together these two measures comprise the "fire threat." In order to be better able to prepare for future events, the City of Palmdale has determined that a HAZUS run for fire will be completed as a priority mitigation project, and the LMHMP will be expanded and updated as new information becomes available.

The risk and probability of a wildfire and/or wildland urban interface fire is reflected in statistics that indicate a consistently increasing structure loss from wildland fires (Martin and Sapsis, 1994). The risk is predominantly associated with Wildland-Urban Interface (WUI) areas. As noted previously, all three categories of urban/wildland fires occur within the planning area of the City of Palmdale.

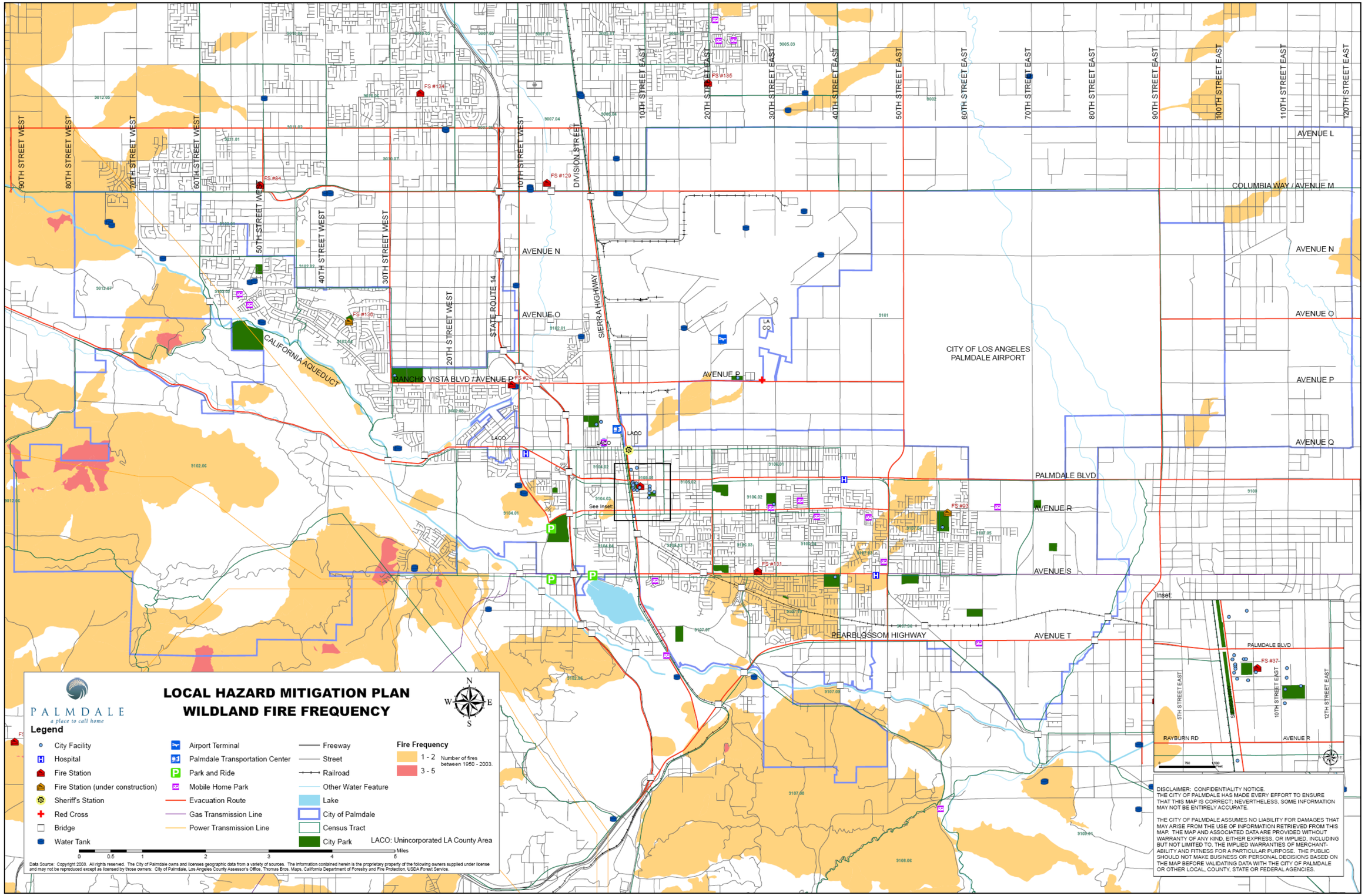
The following Figure summarizes the mean annual structure loss in California from wildfire by decade from 1960 to 1999.

Figure 3.1
Mean Annual Structure Loss from Wildfire by Decade





Map 3.4 – City of Palmdale Wildland Fire Hazards



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Map 3.5 – City of Palmdale Wildland Fire Frequency

TRANSPORTATION ACCIDENT/HAZMAT SPILL

Transportation Accident/ Hazardous Materials Release

The City of Palmdale faces significant threats from transportation accidents. Palmdale is located at a critical "choke point" for a number of transportation facilities. Due to the City's geography, and the limited number of access corridors, a serious transportation accident has the potential to cause death, personal injury and property damage in the immediate area, and in addition, cause substantial economic and social damage if there was an extended closure of critical transportation arteries.

The types of transportation accidents which could occur and cause substantial damage include:

- Major highway accident on SR 14 or SR 138 resulting in extended closure.
- Aircraft accident related to USAF Plant 42 or Palmdale Regional Airport.
- Rupture of 36" gas pipelines traversing the City. This could result in fire and explosion, and/or release of large quantities of hazardous materials.
- Railway accident (Metrolink or freight).
- Rupture of the California Aqueduct (this hazard is discussed in the Flood Hazards section.)

Due to the City's strategic position as an entry/exit point for the Greater Los Angeles Basin, there is a high probability that a major transportation accident would also involve the release of hazardous materials.

The figure on the following page indicates the average number of spills per month involving hazardous materials, per county. Los Angeles County has one of the highest averages.

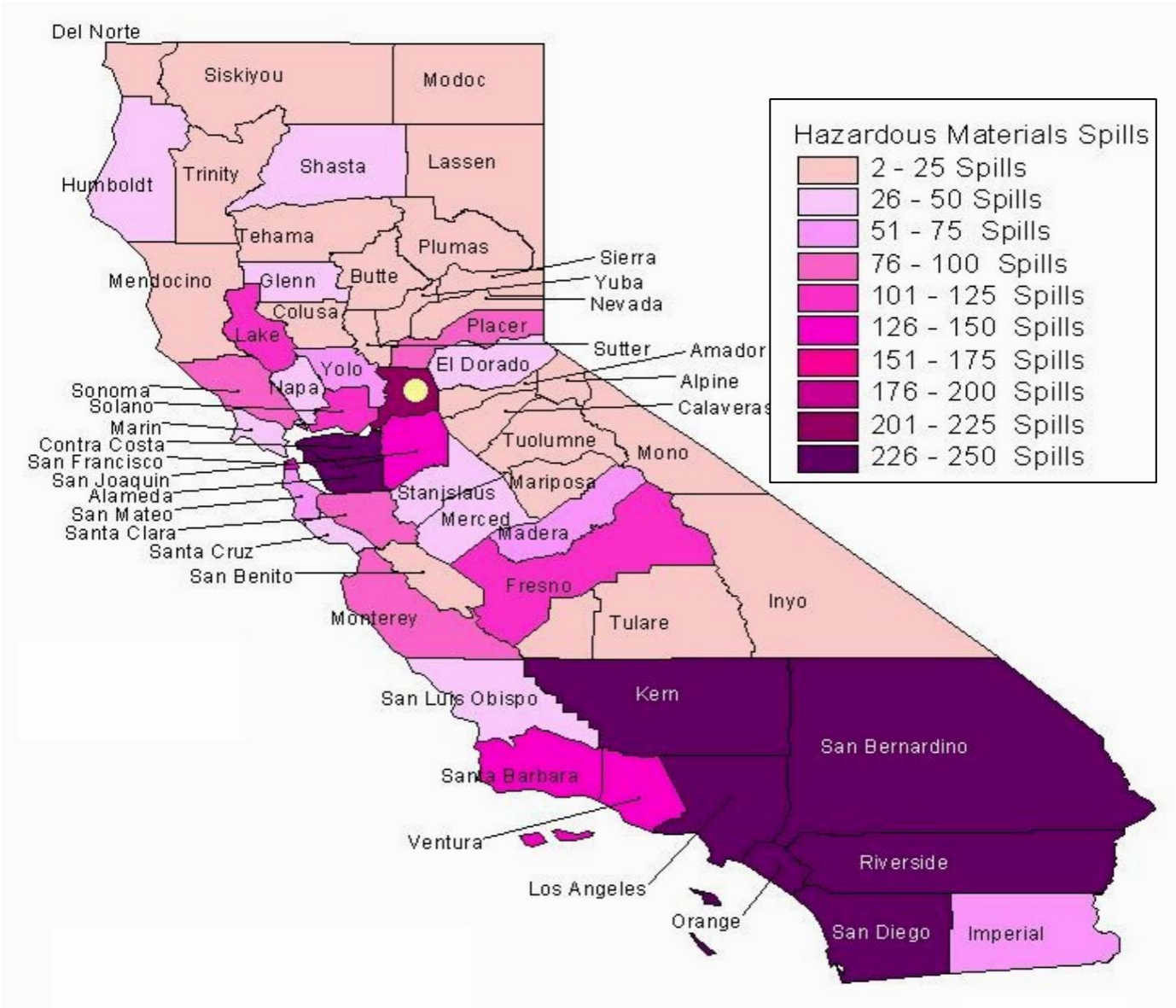
Previous Occurrences and the Probability of Future Events

There is a detailed discussion about past events and the probable risk of future events in the discussion on assessing vulnerability and estimating losses, later in this Section. The discussion explores the possibility of several types of transportation accidents and/or incidents involving the release of hazardous materials.

Because of the tremendous volume of commercial and private vehicle traffic in and out of Los Angeles County and the Palmdale area specifically, the potential for a disastrous transportation related event always exists. Combine a transportation accident with the release of a hazardous material and you have an event that can affect a large number of people or a large area. According to the Department of Transportation (CALTRANS), there were a total of 5725 fatal vehicle accidents in California in 2003 (the highest in the nation); largest number was in LA County.

Of the reported hazardous materials spills during the month of November 2006, more than 60% were on roads and highways in Southern California.

Figure 3.2 – Average Number of Hazardous Material Spills Per Month by County



DROUGHT

What is Drought?

Unlike most other natural hazards, drought is not a sudden, catastrophic occurrence. Droughts occur over several years. In fact, it is almost impossible to tell when a drought begins and often difficult to determine when it ends.

According to the Glossary of Meteorology (1959), drought is defined as "A period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area." However, Tannehill noted in Drought and Its Causes and Effects (1959)

"We may say truthfully that we scarcely know a drought when we see one. We welcome the first clear day after a rainy spell. Rainless days continue for a time and we are pleased to have a long spell of such fine weather. It keeps on and we are a little worried. A few days more and we are really in trouble. The first rainless day in a spell of fine weather contributes as much to the drought as the last, but no one knows how serious it will be until the last dry day is gone and the rains have come again…we are not sure about it until the crops have withered and died."

Droughts may be measured by a number of indicators, including:

- Levels of precipitation
- Soil conditions (moisture)
- Temperature

There are fours ways in which droughts can be viewed:

Meteorological – a measure of departure of precipitation from normal. Due to climatic differences, what may be considered a drought in one location of the country might not be a drought in another location.

Agricultural – refers to a situation where the amount of moisture in the soil no longer meets the needs of a particular crop.

Hydrological – occurs when surface and subsurface water supplies are below normal.

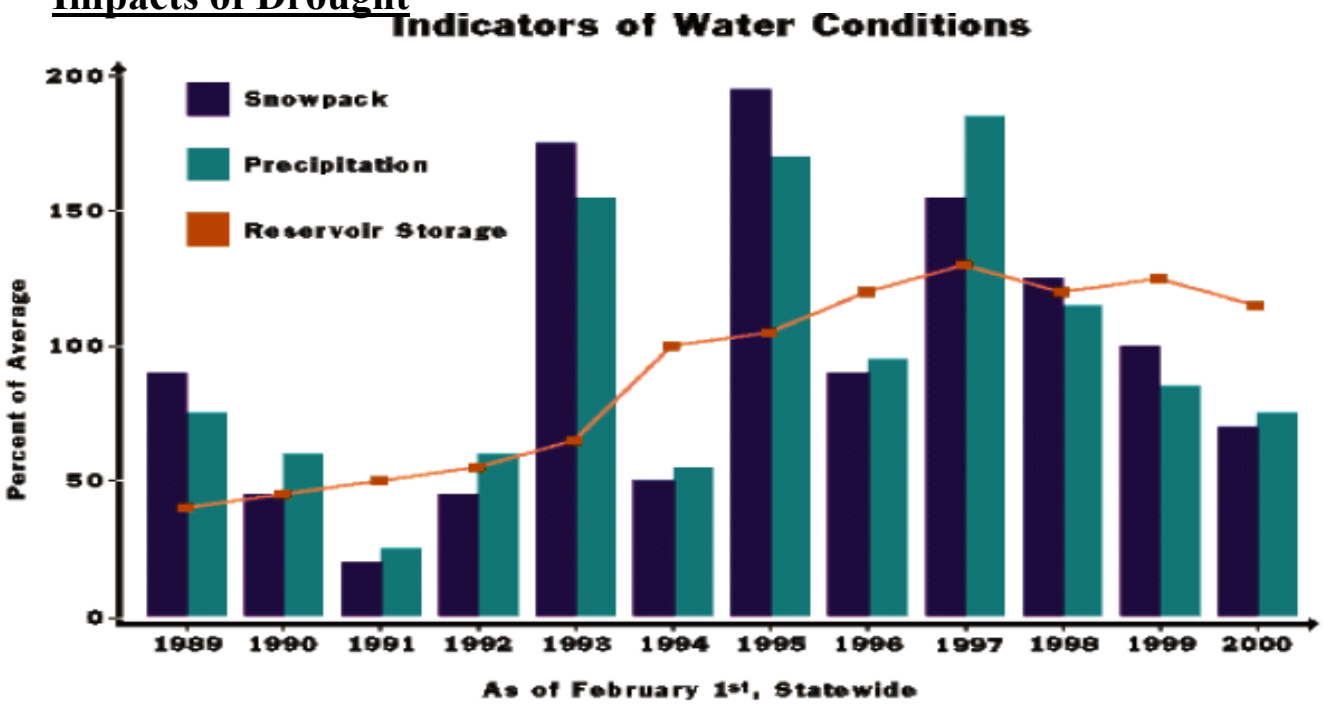
Annual Indicators – the California Department of Water Resources uses three indicators to evaluate water conditions in California. These are Snowpack, Precipitation, and Reservoir Storage as percentages of the annual average. Figure 3.3 on the following page illustrates these measurements for the years 1989 through 2000.

Previous Occurrences

Very limited data is available to evaluate periods of drought in California before the 1900's. During the 20th Century, California suffered from eight periods of extreme dry weather (1912 – 13; 1918 – 20; 1922 – 24; 1929 – 34; 1947 – 50; 1959 – 61; 1976 – 77; and 1987 – 92). Of these, only the 1929-34, 1976-77, and 1987-92 periods are considered extreme droughts.

Figure 3.3

Impacts of Drought



The impacts of drought may be defined as direct and indirect. Direct impacts include reduction in crop yields, livestock losses, and reservoir depletion. Direct effects also include damage/destruction of natural flora and fauna. Wetlands may also be damaged, or reduced in extent. Indirect impacts include economic damage (loss of income to farmers, increased cost of water supplies due to increased cost to water purveyors); social (increased stress and negative effects on health); and environmental (degradation or water quality, increased susceptibility to disease). In terms of economic impacts, droughts are the most costly of natural disasters in the United States. According to the National Oceanic and Atmospheric Administration (NOAA):

The cost of losses due to drought in the United States averages $6-8 billion every year, but range as high as $39 billion for the three-year drought of 1987-1989, which was the most costly natural disaster documented in U.S. history. Continuing uncertainty in drought prediction contributes to crop insurance payouts of over $175 million per year in western Canada. (www.ncdc.noaa.gov/paleo/drought/drght_alleve.html)

Droughts may also exacerbate the effects of other natural events. The reduction in natural vegetation in hillside areas due to drought may significantly increase the risk of mudslides or landslides during periods of wet weather. Dry vegetation resulting from drought increases both the risk and the potential severity of wildfires.

Mitigation of the Impacts of Drought

Mitigation of the effects of drought is often costly and difficult to implement. Among the measures that may be taken to reduce the adverse effects of drought are:

- Development of irrigation systems in drought-prone areas
- Inter-basin water transfer agreements
- Crop and soil management programs
- Zeroscape landscape in urban areas
- Development of water storage and reclamation projects
- Moratoriums on new development/growth
- Ordinance 1362 – Water efficient landscaping requirement to include recent updates to state law (approved October 2008)

Probability of Future Events

Considering the history of the Antelope Valley and Palmdale's location on the edge of the Mojave Desert, the City is likely to deal with the effects of drought in the future. In February of 2008, the Metropolitan Water District (MWD) Board considered a new plan for allocating water in Los Angeles and San Diego Counties. The Plan was in response to an eight year drought in the Colorado River Basin and reduced Sierra Nevada snowpack, the sources of MWD water. The seriousness of the current situation is reflected in the fact that this is the first "drought plan" that the MWD has considered since its founding in 1928.

While unlikely to result in personal injury or loss of life, drought conditions could result in extensive economic damage. In addition, drought conditions increase the potential for damage from mudslides and brushfires, which could result in loss of life.

SEVERE WEATHER

Severe Weather Hazard

Southern California enjoys a relatively mild, temperate climate. However, the area is subject to severe weather episodes. According to the National Weather Service, between January 1, 1950 and July 30, 2004, Los Angeles County experienced:

83 Thunderstorm and high wind events
38 Tornados
13 Hail storms

In addition, the Los Angeles Basin experiences relatively frequent tropical storm activity; however in the last 100 years only one hurricane struck the area, in 1939.

Previous Occurrences

Tornados

Between 1950 and 2004 tornados directly killed or injured 50 persons and caused more than $60 million in property damage in Los Angeles County. Tornados usually accompany massive storms. These storms may also cause mudslides, flooding, and utility interruptions. While the National Weather Service lists 38 tornados, other authorities (Blier and Battan, 1994) document 99 confirmed tornados. This frequency compares with tornado activity in the Great Plains states. The severity of tornados in the area, however, has been relatively mild, ranging from F0 to F2 on the Fujita Tornado scale which ranges from F0 (least severe) to F5 (most severe). Unlike the Midwest, tornados in Southern California usually occur in the winter months.

While tornados have caused significant property damage, there is no record of a fatality directly resulting from a tornado in the area. As many of the tornados that occur in the region begin as waterspouts in Santa Monica Bay, the occurrence of tornadoes in the Antelope Valley is extremely rare.

Micro-bursts

Unlike tornados, micro-bursts are strong damaging winds that strike the ground and often give the impression a tornado has struck. They frequently occur during intense thunderstorms. The origin of a microburst is downward moving air from a thunderstorm's core. But unlike a tornado, they affect only a rather small area.

University of Chicago storm researcher Dr. Ted Fujita first coined the term “downburst” to describe strong, downdraft winds flowing out of a thunderstorm cell. A downburst is a straight-direction surface wind in excess of 39 mph caused by a small-scale, strong downdraft from the base of convective thundershowers and thunderstorms. Micro-bursts are downbursts with winds up to 117 mph that spread across a path greater than 2.5 miles wide at the surface and which last from 5 to 30 minutes.

According to Dr. Fujita:

> *When the microburst wind hits an object on the ground such as a house, garage or tree, it can flatten the buildings and strip limbs and branches from the tree. After striking the ground, the powerful outward running gust can wreak further havoc along its path. Damage associated with a microburst is often mistaken for the work of a tornado, particularly directly under the microburst. However, damage patterns away from the impact area are characteristic of straight-line winds rather than the twisted pattern of tornado damage.*

Hailstorms

While rare, hailstorms occasionally occur in the Palmdale area and can cause substantial damage. On November 12, 2003 a freak storm hit Los Angeles and the surrounding areas. Over 5 inches of rain was recorded. The storm stalled for two hours over the communities of Watts, South

Gate, Lynwood and Compton, where the ground was covered with several inches of hail. The storm resulted in widespread electrical power outages and snarled traffic as streets and intersections were impassable due to the accumulation of hail.

Thunderstorms

Thunderstorms occur relatively infrequently in the basin (estimated average of 4.1 days per year in downtown Los Angeles) but can cause significant property damage, personal injury and loss of life.

One of the most destructive storms to hit the Los Angeles area was on March 2, 1983. Five inches of rain fell in some areas and two tornados struck. The storm caused at least 9 deaths and 30 injuries. Approximately 210,000 homes and businesses lost power. Almost as destructive was the storm of February 10, 1978. This storm dumped over 3.5 inches of rain and resulted in 7 deaths. Wind gusts reached 90 miles per hour. The Antelope Valley receives sporadic summer thunderstorms. On occasion, these thunderstorms are influenced by tropical weather patterns creating the potential for significant short-term, intense rainfall. Flood hazards, property damage from gusting winds, and power outages occur during and/or following the most intense storms.

Sub-Freezing (Freeze/Thaw cycles)

Temperatures during the winter months commonly fall below freezing; however, occasionally, those sub-freezing conditions can persist for over a week. When these conditions occur, hazards related to icy roadways and sidewalks, property damage caused by broken water lines, and extensive damage to crops and landscape plants can affect the community.

Snow

As with the hazards associated with sub-freezing conditions, substantial snowfall can result in traffic hazards and impede emergency vehicles. Although snow does not typically persist for extended periods, the City does maintain a fleet of snow removal equipment to aid in the reduction of snow-related hazards on local streets.

Tropical Storms

The average number of tropical storms in the eastern Pacific Ocean is 16.7 per year. Only about 7 develop into hurricanes. Due to prevailing wind patterns, however, most hurricanes and tropical storms move westward across the Pacific, away from the Southern California land mass. However, residual rains and heavy surf occasionally impact Southern California.

One of the most significant tropical storms experience in the area was the 1939 storm which resulted in over 5 inches of rain in the basin, and more than 11 inches of rain in the nearby mountains. There was substantial loss of life at sea, as well as property damage inland. The most destructive storm in terms of property damage to California occurred in 1976, resulting from the tropical storm Kathleen. Damages to agriculture, and resulting from urban flooding were estimated at $160 million.

Santa Ana Condition

Santa Ana winds are generally defined as warm, dry winds that blow down from the East or northeast into the basins; see Figure 3.4. These winds are usually strongest in the valley and canyon areas near the mountains and usually occur in the fall and winter. Santa Ana winds often blow with exceptional speed in some areas. The term "Santa Ana" winds is generally used for wind conditions exceeding 30 miles per hour (25 knots). Typically Santa Ana winds blow in the 40 – 55 mile per hour range, but may gust up to 90 mph.

The complex topography of Southern California, combined with various atmospheric conditions, creates numerous scenarios that can cause widespread or isolated Santa Ana events. Commonly Santa Ana winds develop when a region of high pressure builds over the high plateau east of the Sierra Mountains and west of the Rock mountains. Clockwise circulation around the center of a high pressure area forces air down the slope from the high plateau. The air warms as it descends toward the California coast due to heating of the air caused by compression. This heating of the air as it is compressed provides the primary source of warming. The air is dry since it originated in the desert, and its moisture will continue to dissipate as it is heated.

Santa Ana winds commonly occur between October and February with December having the highest frequency of events. Summer events are rare. Santa Ana Winds may cause damage such as downed power lines, blown over trees, and blown debris. Typical Santa Ana wind conditions are depicted in the figure at the end of this section. California Department of Forestry and Fire Protection (CDF) maintain Remote Automated Weather Stations (RAWS) throughout Southern California. "Red Flag" Warning days are declared when Santa Ana conditions prevail. The public announcements and increased visibility heighten readiness, activate neighborhood awareness, and increase citizen involvement.

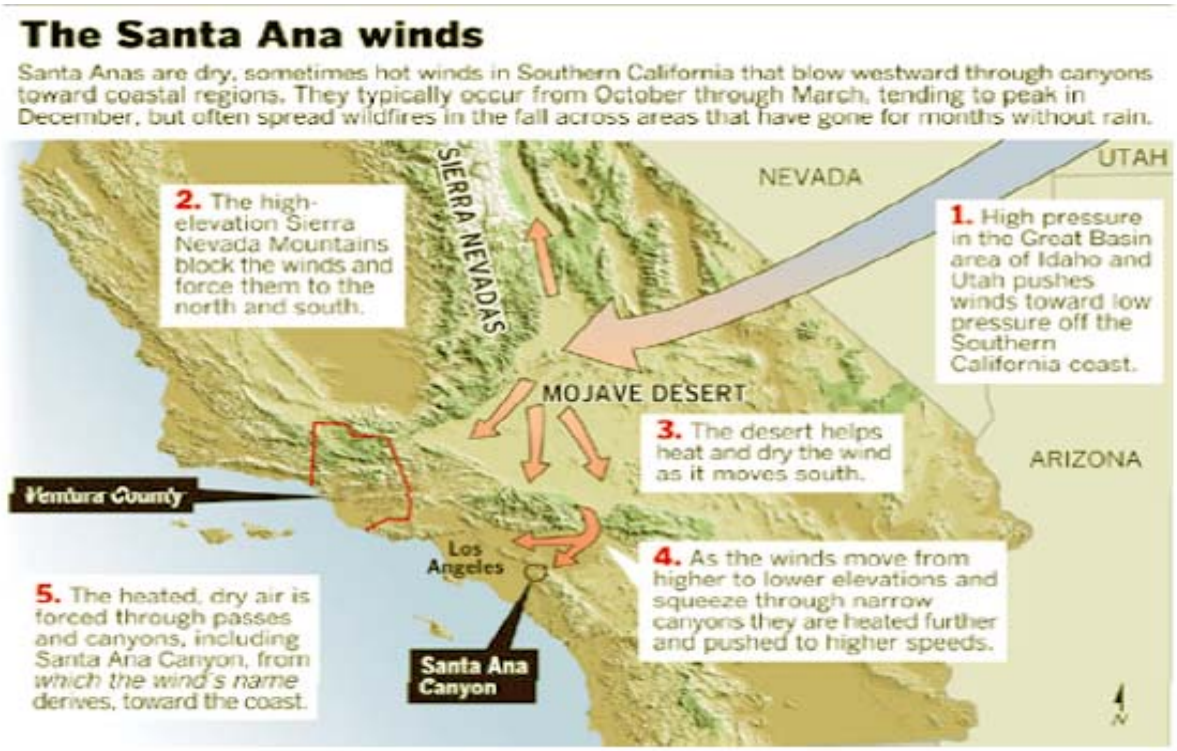


Figure 3.4

El Nino Condition

El Nino is the name given to one of several major ocean-atmosphere conditions that influence weather patterns in Southern California. Increases in the surface temperature of the eastern Pacific equatorial sector correlate with a southward shift of the northern hemisphere jet stream. *El Nino* conditions are thought to be a significant factor contributing to inter-annual variations in rainfall in the region, with unusually wet periods occurring during *El Nino* conditions, followed by unusually dry years. The phenomenon is not totally predictable but on the average occurs once every four years. A typical *El Nino* condition lasts about 18 months.

Urban Flooding

Southern California has historically experienced very heavy rains during an El Nino condition. The part of an El Nino condition that impacted southern California is referred to as the Southern Oscillation which is an irregular "see-saw" in which atmospheric pressure and wind patters shift across the Pacific.

The El Nino storm track affects the location of jet streams, which are a major factor in producing winter weather patterns at mid-latitudes. Instead of coming ashore in the Pacific Northwest as usual, the southern jet stream hits California, carrying moisture and storms. In general, the effect of El Nino on Southern California is increased rainfall with accompanying floods, landslides, and coastal erosion.

High and Low Temperatures

Generally Southern California is considered to have a Mediterranean type climate. However, the area occasionally experiences both very high and significantly low temperatures. High-low extremes are especially pronounced in the Antelope Valley. High temperatures may cause significant economic damage due to loss of crops and livestock, workers sent home, and temporary closure of schools. Very high temperatures in August 1997 contributed to five deaths. During what is referred to as California's fire season, high temperatures may impede firefighting efforts and increase the severity of wildfires. While the Antelope Valley has experienced comparatively low temperatures, with occasional snow and freezing, these events are usually of short duration. The most significant impacts are economic losses due to business/school closures, and loss of crops and vegetation.

Probability of Future Events

It is 100% probable that the City of Palmdale will experience severe weather conditions in the near and distant future. Weather patterns in the region are strongly influenced by periodic *El Nino* conditions. The area is also subject to annual Santa Ana wind conditions, which can generate winds up to 90 miles per hour. While individual severe weather events are usually not as catastrophic as earthquakes, their relative frequency poses a significant threat to life and property in the City of Palmdale. Additional severe weather conditions that affect the Antelope Valley include extended periods of sub-freezing conditions, snowfalls which can exceed one foot in depth and monsoon rains which can cause localized flooding and property damage.

POWER/UTILITY FAILURE

Introduction

Power outages are a region-wide problem in Los Angeles County. It is not unusual to experience several outages a year. In the past, outages have ranged between a few minutes to several hours, from half a day to several days in some areas of the County. If an outage affects several areas of the County, Palmdale is usually affected.

Power failures of longer durations are usually caused by natural events that damage or disrupt large areas of the power transmission and/or distribution systems. Some of the causes of longer duration power failures have been severe winter storms, often accompanied by high winds. Another cause is high-pressure induced windstorms, which can last from 3 to 5 days and disrupt the power distribution system. Vehicular accidents involving power poles or transmission lines and trees falling on transmission lines are often the causes of localized outages of shorter duration.

Those individuals or facilities at greatest risk from loss of power are the elderly, home health care patients, health care facilities, emergency services providers/facilities, and similar entities.

Previous Occurrences

Rather than list all of the power outages Southern California Edison has experienced in Los Angeles County, we have listed those that impacted the Antelope Valley. A sampling of outages over the past seven (7) years includes:

- 2001 – deliberate rotating outages due to statewide energy shortage
- 2005 – 500,00 without power due to failure of a key transmission line
- 2007 – thousands without power due to faulty distribution transformers

There have been other more localized power failures due to downed utility poles and faulty or failed equipment, including the loss of power to 11,500 in September 2007.

Probability of Future Events

There is always the possibility that equipment will fail, and as Los Angeles County and Palmdale continue to grow and be subject to weather cycles that place high demands on power, the probability of future power failures/outages is high.

END NOTE: It was the consensus of City staff, the community, state and federal agencies, and all other interested stakeholders that EARTHQUAKES, and the disaster events that are linked to them, pose the greatest threat to the City of Palmdale. The community's perception of risk, which is sometimes not connected to empirical evidence, is discussed at length in the section detailing the results of the community planning survey

3.4 INVENTORYING ASSETS

City-Owned Assets

Developing a meaningful risk assessment requires developing an inventory of the number and value of city-owned assets. With this information, the City can establish priorities for hazard mitigation actions and determine the best courses of action to protect city-owned resources. It is also necessary to identify all city-owned resources in order to determine which facilities may be at risk from various hazards. Arriving at appropriate asset values is not just simply determining value. Since many structures may have been built or acquired several years ago, it is important to determine the replacement values for structures that could be destroyed or damaged in the event of a natural or human-caused disaster. In addition to replacement values, the value of contents must also be estimated. Lastly, should a facility require replacement or major repairs, the cost of temporary space and/or buildings must also be factored into the total cost.

As part of developing the LMHMP, City staff conducted a complete inventory of city-owned facilities and developed estimates of replacement value, contents, and displacement costs. Estimated replacement values are based on appraisals, historic and current construction costs, current and estimated costs of new facilities, and insured values. The completed asset inventory appears as Table 3.8 on the following page.

Privately-Owned Assets

A complete inventory and detailed cost analysis of all privately-owned structures and facilities in the City of Palmdale area are beyond the scope of this Plan. However, based on generally-available data, "order of magnitude" estimates are possible. To estimate the potential losses to private property associated with Flood and Earthquake events, a computer model developed by the Federal Emergency Management Administration was utilized. This model, called "HAZUS" estimates losses to infrastructure, public, and private structures. These estimates are discussed later in this section. A detailed HAZUS report is included as Appendix C.

For other hazards, staff and the technical consultant developed estimates of potential losses where data was available and reasonable assumptions could be made.

CITY OF PALMDALE - FACILITY ASSET VALUES

Facility	X-Coord	Y-Coord.	Address	Construction Description	Stories	Year	Sq. Ft.	Building Replacement Value	Contents Value	Displacement Cost	Total
City of Palmdale											
City Hall:			38300 Sierra Highway	wood/stucco	1						
Administration - Suite A	6527335.0143	2032641.1226				1970's	8,200	1,640,000	$360,000	$515,800	$2,000,000
Council Chambers - Suite B	6526744.3570	2032651.3164				2002	5,300	1,325,000	$1,250,000	$1,350,700	$2,575,000
City Clerk/City Attorney - Suite C	6526744.3570	2032651.3164				2002 -		part of the Council Chamber cost			
Finance/Inf. Services - Suite D	6526744.3570	2032651.3164				remodel 2001	12,300	2,460,000	$12,000,000	$12,233,700	$14,460,000
Development Services Bldg.	6526834.9592	2032492.2593	38250 Sierra Highway	wood/stucco	2	2000	30,400	760,000	$1,300,000	$1,877,600	$2,060,000
Palmdale Senior Center	6528116.9559	2031831.5582	1002 E. Ave. Q-12	wood/stucco	1	1983	8,500	850,000	$40,000	$201,500	$890,000
Public Services Facility	6527127.4993	2033022.9396	827 E. Avenue Q-9	wood/stucco	1	remodel 2008	5,000	600,000	$200,000	$295,000	$800,000
Human Resources	6527075.0031	2033022.9396	823-B E. Avenue Q-9	wood/stucco	1	remodel 2007	5,000	600,000	$200,000	$295,000	$800,000
Public Works Maintenance Facility	6524105.3853	2038166.1845	39110 3rd St. East	wood/stucco	1 & 2		3,200	320,000	$640,000	$700,800	$960,000
(3,200-Office, 4000 Whse.)				aluminum/modulars			4,000	200,000		$76,000	$200,000
Palmdale Transportation Center	6525605.3726	2037144.1679	39000 Clock Tower Plaza Drive	wood/stucco	1	2005	3,190	875,000	$135,000	$195,610	$1,010,000
Hammack Activity Center	6527095.3278	2034326.5728	815 E. Ave. Q-6	masonry	2	1950's	40,000	2,000,000	$140,000	$900,000	$2,140,000
Youth Library	6526615.3404	2034161.3128	38510 Sierra Hwy.	wood/stucco	1	1998	10,050	2,010,000	$680,000	$870,950	$2,690,000
Main Library	6526754.4239	2033130.5012	700 East Palmdale Blvd	wood/stucco	2	1960	12,650	2,530,000	$800,000	$1,040,350	$3,330,000
Public Works Storage Facility	6526702.0436	2033709.7425	38448 Sierra Hwy.	wood/stucco	1	1970	6,550	163,750	$30,000	$154,450	$193,750
Domenic Massari Park	6552625.7714	2029352.4966	37716 55th St. East	wood/stucco	1	1995	2,700	135,000	$30,000	$81,300	$165,000
Pelona Vista Park	6520546.5845	2029097.5979	37800 Tierra Subida Avenue	wood/stucco	1	1998	2,500	125,000	$5,000	$52,500	$130,000
Marie Kerr Park	6506860.6441	2042034.5435	39700 30th St. West	masonry block	1	1994	2,810	140,500	$35,000	$88,390	$175,500
Marie Kerr Park Recreation Ctr	6507310.7171	2041709.9376	2723 Rancho Vista Blvd.	masonry block	1	2008	16,000	4,800,000	$200,000	$504,000	$5,000,000
Drytown Water Park	6543696.9733	2025183.7354	3850-B E. Avenue S	masonry (various b	1	2007	13,660	4,100,000	$1,000,000	$1,259,540	$5,100,000
Palmdale Oasis Recreation Ctr	6543058.3042	2025166.9913	3850-A E. Avenue S	masonry block	1	2007	16,000	4,800,000	$350,000	$654,000	$5,150,000
Desert Sands Park	6523723.3363	2037946.3584	39117 3rd St. East	wood/stucco	1	1992	5,000	250,000	$35,000	$130,000	$285,000
Manzanita Heights Park Field House	6520246.5653	2032455.2489	431 Mesa Verde Avenue	wood/stucco	1	1988	806	250,000	$20,000	$35,314	$270,000
McAdam Park Pool Building	6538529.9907	2031286.6139	38115 30th Street East	masonry	1	1972	4,160	300,000	$65,000	$144,040	$365,000
Courthouse	6527130.9263	2032451.9917	38256 Sierra Highway	wood/stucco	1	2001	17,500	5,250,000	$500,000	$832,500	$5,750,000
Heritage Air Park	6535099.8548	2043481.2046	2041 E. Avenue P	wood/stucco	1	2002	5,700	200,000	$150,000	$258,300	$350,000
Courson Activities Bldg.	6528132.1344	2032209.4424	38334 10 th St. East	wood/stucco	1	1965	5,400	500,000	$10,000	$112,600	$510,000
Courson Field House	6528132.1344	2032209.4424	38226 10 th St. East	wood/stucco	1	1963	1,030	300,000	$3,000	$22,570	$303,000
Chimbole Cultural Center	6526710.1296	2033013.7251	38350 Sierra Hwy.	wood/stucco	2	remodeled 2002	21,800	5,450,000	$110,000	$524,200	$5,560,000
Palmdale Playhouse	6528175.8712	2032782.1862	38334 10th St. East	wood/stucco	1	1995	12,700	1,270,000	$265,000	$506,300	$1,535,000
Parks & Recreation	6528171.8445	2032520.4467	38260 10th St. East	wood/stucco	1	1963	5,600	560,000	$190,000	$296,400	$750,000
Courson Pool Building	6528132.1344	2032209.4424	38226 10th St. East	masonry	1	1963	6,000	300,000	$65,000	$179,000	$365,000
Courson Maintenance Bldg.	6528132.1344	2032209.4424	38233 11th St. East	wood/stucco	1	1963	3,000	150,000	$35,000	$92,000	$185,000
Chamber of Commerce	6528172.1916	2032593.9171	817 E. Avenue Q-9	wood/stucco		remodeled 2001	1,040	235,000	$35,000	$54,760	$270,000
				TOTALS:			297,746	45,449,250	$20,878,000	$26,535,174	$66,327,250

Table 3.8 – City of Palmdale – Facility Asset Values

Identification of Critical Infrastructure and Facilities

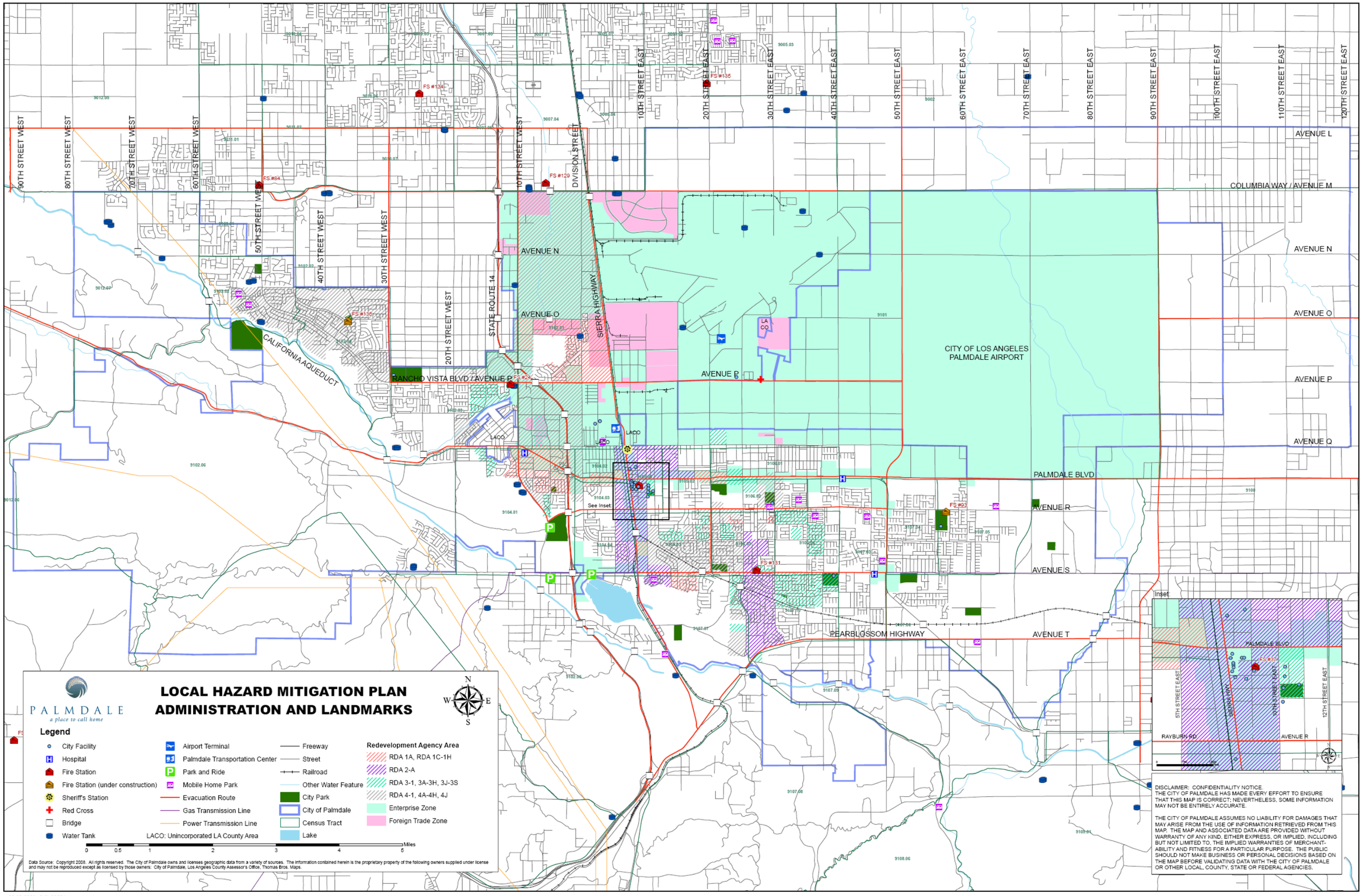
Working with City staff, the Task Force developed an inventory of critical infrastructure and facilities. Critical infrastructure and facilities fall into two categories: (1) facilities and infrastructure required to respond and recover from a natural or human-caused disaster, including fire and police stations, hospitals, evacuation centers, etc., and (2) infrastructure/facilities that deserve special attention. This category of infrastructure includes such things as the California Aqueduct, Palmdale Airport/Plant 42, gas pipelines, and high-voltage electrical transmission lines.

The purpose of identifying critical infrastructure and facilities is to note those community assets that are threatened by specific hazards and should receive priority in the implementation of mitigation measures. Critical infrastructure identified by the Task Force includes:

Table 3.9

Item No.	Category #1	Category #2
1	City of Palmdale Sheriff Department & substations	California Aqueduct
2	City of Palmdale Fire Departments/Stations (5)	Palmdale Plant 42
3	Kaiser Permanent Urgent Care Facility	Palmdale Airport
4	City of Palmdale EOC (Administration, Development Services buildings)	High Pressure gas line along Avenue S (from 14 Freeway to 47th Street East)
5		Edwards Air Force Base
6		Palmdale Water District-water storage tanks, water treatment plants

The locations of critical infrastructure are identified on the following **Map 3.6 – "Administration and Landmarks"**, created by the City of Palmdale's GIS Section.



Map 3.6 – City of Palmdale Administration and Landmarks

3.5 ASSESSING VULNERABILITY & ESTIMATING POTENTIAL LOSSES

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.*

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 ….*

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 ….*

OVERVIEW

It should be noted that all City of Palmdale facilities/assets are vulnerable to the occurrence of an event that is of great magnitude, extreme intensity, or is catastrophic. This type of event might result in the death or injury of residents and City employees, the total loss of many facilities and assets, and it could result in long-term disruption of City services.

For the purposes of the LMHMP, vulnerability was assessed based on past occurrences, past and current experiences of the City, and the probability of future events. In determining vulnerability and impact, the occurrence of a medium intensity event was used as the standard; reference **Table 3.8** for complete listing of individual assets. The following paragraphs contain an overview of asset vulnerability and the impact from the natural hazards of greatest concern to the City and its residents – Earthquake, Flood, Dam Failure, Inundation and Wildfires/Urban Interface Fires.

Following the overview is a detailed discussion on the vulnerability and potential losses to City of Palmdale assets for each hazard profiled in the LMHMP, including Drought, Severe Weather, Power Failure and Transportation Accidents/Hazardous Material Release.

Hazard: **Earthquake**

Type of Facility/Asset: City Hall, Social & Recreational Facilities, Public Services Building, Storage Facility, Public Works Bldg., Maintenance Facilities, Libraries, Transportation Center

Vulnerability: Moderate to high, depending on intensity; all newer City of Palmdale construction meets or exceeds the seismic requirements of the California Uniform Building Code, which mitigates against some of the impacts of earthquakes. However, older facilities, such as the Courson Field House, Pool building, and maintenance facility were built prior to the existence of current codes; in a moderate event, they will probably sustain some damage.

Impact: Newer facilities may sustain minor damage, but it is not anticipated that this will cause a

major disruption in City services. However, in some instances, if an older storage, public service or recreational building sustains damage, there can be a disruption of services. The length of disruption and the intensity of the negative impacts would be determined by the magnitude of the repairs required.

Hazard: **Dam Failure, Inundation**

Type of Facility/Asset: All facilities/assets located in dam inundation areas; reference **Map 3.2, page 59** for the location of flood plain and dam inundation areas within the Palmdale area.

Vulnerability: Dam failure is a low probability, high risk event because of the potential for loss of life or injury. Most frequently, it is a catastrophic event that involves the release of large amounts of water in a short time. Everything in the path of the released waters is highly vulnerable.

Impact: Because the event is by nature catastrophic, even if the effect is localized, the impact could be devastating. At the minimum, the impact might include long-term disruptions to private and commercial transportation, social services delivery, the economy, power/utility/ and public services; there would also likely be negative consequences to the environment.

Hazard: **Floods**

Type of Facility/Asset: Selected intersections, other portions of the traveled way, dirt roads, storm drainage infrastructure, maintenance and service vehicles stored in older facilities, and some recreational playing fields at City parks; no history of City buildings flooding; reference **Map 3.2, page 59**.

Vulnerability: Low to Moderate – In the past decade and a half, the major causes of the flooding have been heavy winter rains and the accompanying high velocity flows within watercourses and the storm drainage infrastructure. Damages have included roadway and shoulder washouts, culvert inlet damage, retention basin damage, and sediment basin overload (as well as minor damage to private property.) The most recent damage to the infrastructure occurred in January and February of 2005; the damage was caused by high winds and heavy rains.

Impact: If portions of the transportation and storm drainage infrastructure are damaged, there can be a negative impact on commercial and private vehicle travel, which can also have a negative impact on the economy. Past damage has not caused a major disruption in City services, however.

Note: Heavy equipment, maintenance vehicles, and similar vehicles may be vulnerable if they are stored in an area that experiences flooding. However, the loss would not cause any major disruption to City services.

Hazard: **Wildfire/Urban Interface Fire**

Type of Facility/Asset: All wood frame & stucco buildings; individual older facilities; recreational areas/parks.

Vulnerability: Moderate – It should be noted that all three categories of urban/wildland interface occur within the planning area of the City of Palmdale. Most of the City of Palmdale lies within what is designated as a "Moderate Threat" area. Just east and west of the proposed Palmdale Regional Airport and USAF Plant 42 are areas designated "High Threat."

***Hazard:* Drought**

Type of Facility/Asset: All wood frame & stucco buildings; individual older facilities; recreational areas/parks; in addition, many private residences face a moderate to high risk.

Vulnerability: Moderate – It should be noted that the western foothills of the City are designated "Very High Threat," and the mountainous area in the far southwestern corner of the City is designated "Extreme Threat". The City of Palmdale GIS Section prepared fire hazard and frequency maps of the Palmdale area. Reference **Map 3.4 "Wildland Fire Hazards" on page 68 and Map 3.5 "Wildland Fire Frequency" on page 69.**

Note: In addition to Earthquakes, Fire, Drought, Floods, Dam Failure and Inundation, other profiled hazards, including Transportation Accident/Hazardous Materials Release, Drought, Severe Weather and Power Failure are discussed in detail on the following pages.

EARTHQUAKE

No community in Southern California is immune from earthquake hazards. Even earthquakes that occur many miles away can cause local damage depending upon the characteristics of structures, soil types and conditions, and other factors. Regardless, the San Andreas Fault clearly poses the greatest natural threat to the City of Palmdale.

The following analysis evaluates the City's vulnerability to a major seismic event from two perspectives: a general assessment of likely damage to structures, loss of life, and personal injuries; an analysis of potential losses to city facilities; and an analysis of potential losses to critical facilities and infrastructure.

The entire City of Palmdale would experience extremely severe ground shaking as a result of a major seismic event on the San Andreas Fault.

Vulnerability Assessment & Estimating Potential Losses

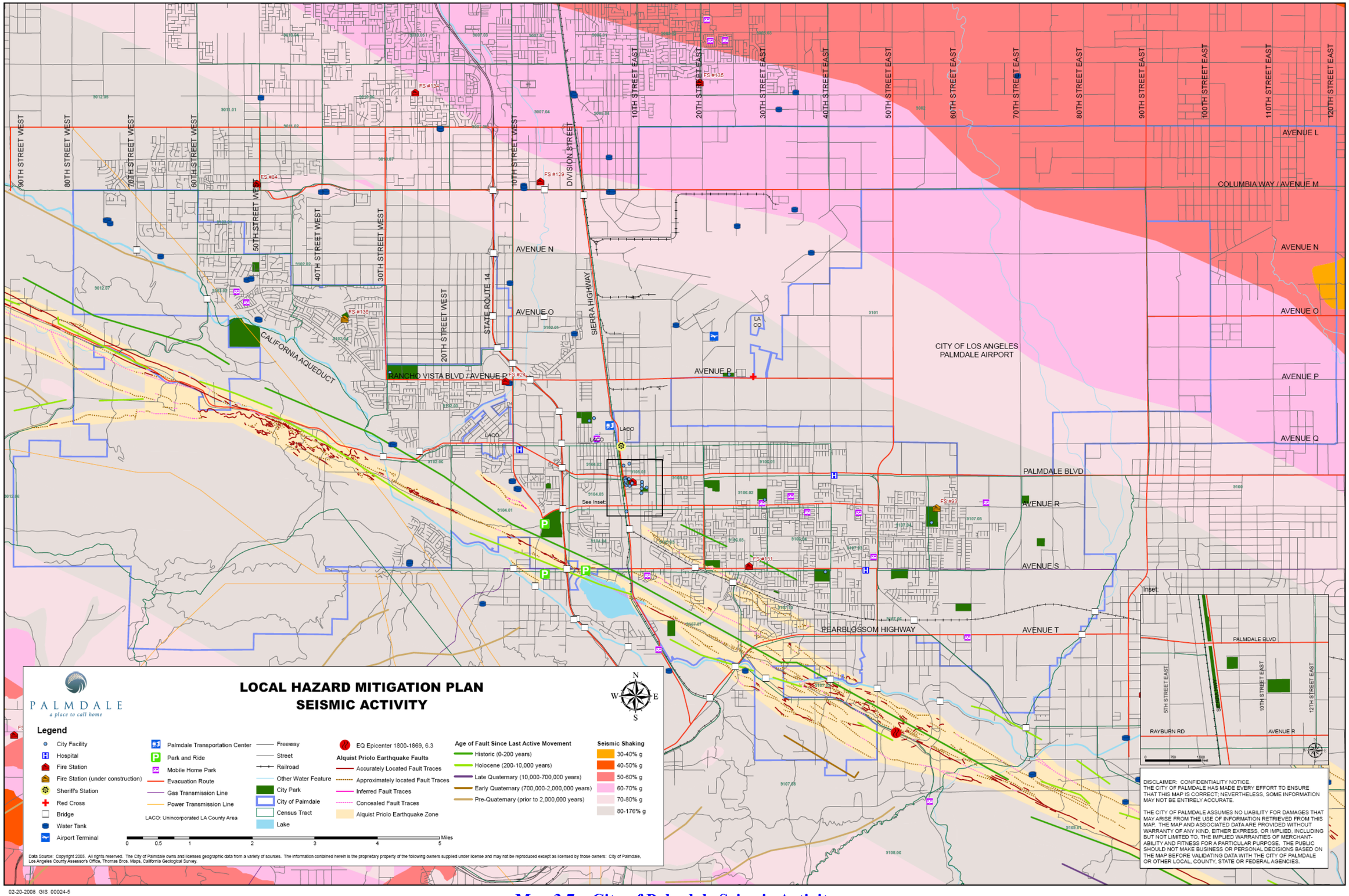
Estimating potential losses involves assessing the damage, injuries, and financial costs likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models. The two measurable components of any risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the community and the state with a common framework with which to measure the effects of hazards on assets.

Factors included in assessing earthquake risk include population distribution in the hazards area, the frequency of earthquake events, landslide susceptibility, soil saturation, buildings, infrastructure, and local capability. These types of analysis can generate estimates of the damages to the regions due to an earthquake event in a specific location. The FEMA approved HAZUS loss estimation software was developed in conjunction with the National Institute of Building Sciences (NIBS). The HAZUS estimates include economic loss, building damage, casualties, and shelter needs. In addition, the HAZUS analysis produced estimates of losses to critical facilities, such as bridges, fire stations, police stations, etc.

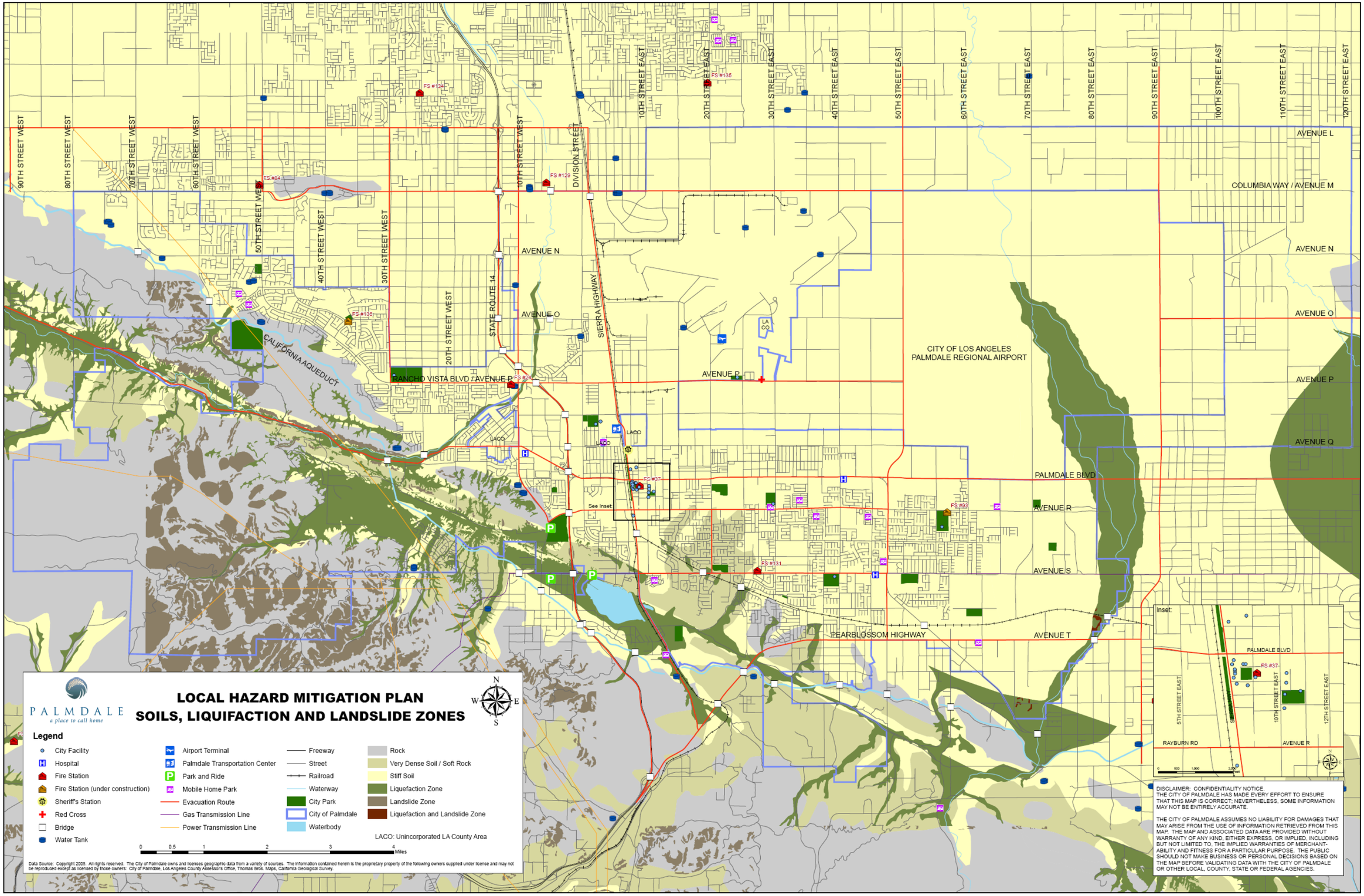
The HAZUS analysis provided in Appendix C evaluates the City's vulnerability to a major seismic event from three perspectives: a general assessment of likely damage to structures, loss of life, and personal injuries; an analysis of potential losses to city facilities; and an analysis of potential losses to critical facilities and infrastructure.

The City of Palmdale would experience ground shaking as a result of a major seismic event on the San Andreas Fault. The extent and magnitude of ground shaking are shown on the following maps which were prepared by the City's GIS Section**: Map 3.7** "Seismic Activity" identifies the earthquake shaking probability of 10% in 50 years by shaking intensity expressed as spectral acceleration at one second frequency in units of gravity, and **Map 3.8**"Soils, Liquefaction and Landslide Zones" identifies soils types and potential liquefaction and landslide zones in the Palmdale area.

Damages from a large earthquake in urbanized areas of Southern California are likely to run into billions of dollars. Although our building codes are some of the most stringent in the world, tens of thousands of older building stock exists not built to current code. California has enacted laws requiring the retrofit of unreinforced masonry buildings, and laws prohibiting construction of buildings less than 100 feet from a known fault, etc. Structural and non-structural retrofits are both effective life safety mitigation actions to reduce damage to lives and property.



Map 3.7 – City of Palmdale Seismic Activity



Map 3.8 – City of Palmdale Soils, Liquefaction, and Landslide Zones

Vulnerability of Critical Public Infrastructure and Facilities

A major seismic event on the San Andreas Fault could cause considerable damage to critical facilities and infrastructure. The following assessment of potential damage is excerpted, in part, from the City of Palmdale Emergency Operations Plan:

Dam and Flood Control Channels

Ground movement from an earthquake may cause the rupture of dams in Palmdale. Rupture of the Lake Palmdale Dam or the Littlerock Dam may result in area flooding.

Aside from dam failure and subsequent flooding, a seismic water wave may occur at Lake Palmdale. The wave could run up the slope and overtop the dam. A reflection of the wave on return is unlikely. The wave volume above the dam would not be substantial enough to cause damaging floods (approximately 1 acre-foot). Flooding over the downstream of the dam would not cause damage to the existing rockfill, as it was designed to withstand it. The Sheriff's Department is responsible for notification and evacuation procedures in the event of dam failure.

Fire Operations

There are five fire stations located in the City, Station Nos. 24, 37, 131, 93 & 136.

Highways and Bridges

The Antelope Valley Freeway would be closed by failure of one or more overpasses, rockfalls, and fault rupture. All secondary mountain roads between the high desert and the urban areas to the south would be closed until cleared of rockfalls and slides. The Antelope Valley Freeway (SR-14) is the main access route between the Antelope Valley and the urban areas of Los Angeles. This route would be closed for at least 72 hours. Secondary routes paralleling SR-14 between Santa Clarita and Palmdale should be examined for possible utilization as an alternative to the freeway, including Sierra Highway and Soledad Canyon Road.

Sierra Highway would be closed between Pearblossom Highway and Avenue S and Pearblossom Highway (SR-138) would be closed between Sierra Highway and Route 138 due to major damage resulting from fault rupture. Both routes would be closed for over 72 hours. SR-138 would be closed from SR-14 to Interstate 15 by damage and roadway obstructions. This route would be closed for at least 72 hours. If bridges did fail and/or collapse, the City could be split into ½, east and west side.

Natural Gas

Two 30-inch gas transmission pipelines are operated along Avenue S. These pipelines come up from Newhall where the gas is pressurized and metered, then sent to Palmdale. Fault ruptures would sever the imported natural gas supplies from the San Joaquin Valley that cross the fault near Tejon Pass. The two 30-inch gas lines that run along Avenue S and cross the fault south of Palmdale could also be impacted. These lines would be shut off automatically by Southern California Gas.

Railroads

The Southern Pacific rail lines crossing the San Andreas Fault near Palmdale would suffer major damage and may be closed for over 72 hours. Other lines, from Acton to Lancaster, would be disrupted due to intense ground shaking. Also, rail lines from Palmdale to Interstate 15 in the east would be disrupted due to track displacement and settlement of bridge-approach fills.

Water Supply

A catastrophic earthquake would cause major damage to both the California Aqueduct and Lake Palmdale, which are primary sources of water for Palmdale. The major reservoirs storing imported water may not be able to deliver water due to damage to downstream transmission facilities. It is expected that residents would have to use conservation measures, and daily water usage would be reduced by approximately 50 percent.

Estimating Potential Losses

Estimates of potential losses were calculated using the Federal Emergency Management Administration HAZUS model. Using information on geology, soils, the history of past events, population data, structure types and characteristics, and inventories of infrastructure, HAZUS produces estimates of property damage, personal injury, and fatalities. The model also produces estimates of economic losses.

For the purposes of this study the three HAZUS scenarios were evaluated based on a M6.7 seismic event on the San Andreas Fault. The three time periods evaluated were: daytime, nighttime, and commute time. Human casualties, in particular, vary according to time of day. For example, a nighttime event would be unlikely to cause significant casualties at schools. An event occurring during daytime would find many commuting residents at their jobs in Los Angeles and the San Fernando Valley. A major earthquake occurring during commute hours would find thousands of commuters on the freeways.

Summary results of the three HAZUS scenarios evaluated for this plan are presented on the following pages. The three HAZUS scenario estimates provided are for: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. For further detailed information, a full detailed copy of the HAZUS model results for all three scenarios appears in Appendix C.

HAZUS-MH Loss Estimation

Estimated Economic Loss ($ Billions)

Category	Description	Range
General Building Stock	Building Damage	0.40 - 1.40
	Building Contents	< 0.1
	Business Interruption	0.00 - 0.10
Infrastructure	Lifelines Damage	
	Total	0.50 - 1.90

Estimated Building Damage(Thousands of Buildings)

Description	Residential	Commercial	Other	Total
Minor	12 - 50	< 1.0	< 1.0	12 - 50
Major	1 - 5	< 1.0	< 1.0	1 - 5
Total	14 - 60	< 1.0	< 1.0	14 - 60

Estimated Casualties : Night Time

Severity Level	Description	# Persons
Level 1	Medical Aid	170 - 700
Level 2	Hospital Care	30 - 120
Level 3	Life-threatening	< 20
Level 4	Fatalities	< 20

Estimated Shelter Needs

Type	Households	People
Displaced Households	500 - 2,000	
Public Shelter		160 - 600

Comments :

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, goetechnical, and observed ground motion data.

Earthquake Information

Location :

Origin Time:

Magnitude : 6.70

Epicenter Latitude/Longitude :
34.56 / -118.14

Depth & Type :0.00/S

Fault Name :
Mojave

Maximum PGA : 1.00

Ground Motion /Attenuation : WUS
Shallow Crustal Event - Extensional

Information Sources:

Comments :

Population and Building Exposure (2002 D&B) (2000 Census)

Population: 124,915

Building Exposure : ($ Millions)

Residential	5,949
Commerical	400
Other	183
Total	6,532

State:

Counties :
- Los Angeles,CA

Major Metro Area :

Time of report: October 24, 2005 11:37 am

2:00 AM Scenario

HAZUS-MH Loss Estimation

Estimated Economic Loss ($ Billions)

Category	Description	Range
General Building Stock	Building Damage	0.40 - 1.40
	Building Contents	< 0.1
	Business Interruption	0.00 - 0.10
Infrastructure	Lifelines Damage	
	Total	0.50 - 1.90

Estimated Building Damage(Thousands of Buildings)

Description	Residential	Commercial	Other	Total
Minor	12 - 50	< 1.0	< 1.0	12 - 50
Major	1 - 5	< 1.0	< 1.0	1 - 5
Total	14 - 60	< 1.0	< 1.0	14 - 60

Estimated Casualties : Day Time

Severity Level	Description	# Persons
Level 1	Medical Aid	190 - 800
Level 2	Hospital Care	50 - 200
Level 3	Life-threatening	10 - 30
Level 4	Fatalities	10 - 60

Estimated Shelter Needs

Type	Households	People
Displaced Households	500 - 2,000	
Public Shelter		160 - 600

Comments :

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, goetechnical, and observed ground motion data.

Earthquake Information

Location :

Origin Time:

Magnitude : 6.70

Epicenter Latitude/Longitude :
34.56 / -118.14

Depth & Type :0.00/S

Fault Name :
Mojave

Maximum PGA : 1.00

Ground Motion /Attenuation : WUS
Shallow Crustal Event - Extensional

Information Sources:

Comments :

Population and Building Exposure (2002 D&B) (2000 Census)

Population: 124,915

Building Exposure : ($ Millions)

Residential	5,949
Commerical	400
Other	183
Total	6,532

State:

Counties :
- Los Angeles,CA

Major Metro Area :

Time of report: October 24, 2005 11:39 am

2:00 PM Scenario

HAZUS-MH Loss Estimation

Estimated Economic Loss ($ Billions)

Category	Description	Range
General Building Stock	Building Damage	0.40 - 1.40
	Building Contents	< 0.1
	Business Interruption	0.00 - 0.10
Infrastructure	Lifelines Damage	
	Total	0.50 - 1.90

Estimated Building Damage(Thousands of Buildings)

Description	Residential	Commercial	Other	Total
Minor	12 - 50	< 1.0	< 1.0	12 - 50
Major	1 - 5	< 1.0	< 1.0	1 - 5
Total	14 - 60	< 1.0	< 1.0	14 - 60

Estimated Casualties : Commute Time

Severity Level	Description	# Persons
Level 1	Medical Aid	200 - 800
Level 2	Hospital Care	50 - 200
Level 3	Life-threatening	10 - 60
Level 4	Fatalities	10 - 50

Estimated Shelter Needs

Type	Households	People
Displaced Households	500 - 2,000	
Public Shelter		160 - 600

Comments :

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, goetechnical, and observed ground motion data.

Earthquake Information

Location :

Origin Time:

Magnitude : 6.70

Epicenter Latitude/Longitude :
34.56 / -118.14

Depth & Type :0.00/S

Fault Name :
Mojave

Maximum PGA : 1.00

Ground Motion /Attenuation : WUS
Shallow Crustal Event - Extensional

Information Sources:

Comments :

Population and Building Exposure (2002 D&B) (2000 Census)

Population: 124,915

Building Exposure : ($ Millions)

Residential	5,949
Commerical	400
Other	183
Total	6,532

State:

Counties :
- Los Angeles,CA

Major Metro Area :

Time of report: October 24, 2005 11:40 am

5:00 PM Scenario

FLOOD, DAM FAILURE & INUNDATION

Vulnerability Assessment

Periodically Southern California is subject to unusually heavy rainfall from tropical storms flowing in from the Pacific Ocean. Severe tropical storms are associated with *El Nino* conditions, i.e., increased Pacific Ocean surface water temperatures. (A more detailed discussion of tropical storms and other severe weather events is contained in the "Severe Weather" section of this document.)

As a result of heavy rains sheetflow occurs along major drainages and adjoining areas on scattered sites. Areas with flood hazards are the natural drainage channels of Amargosa Creek, Anaverde Creek, Little Rock Wash, and Big Rock Wash. Flat plains and natural depressions are also subject to possible flooding.

- **Amargosa Creek** collects runoff from the northern face of the Sierra Pelona Mountains and the southern slope of both Portal and Ritter ridges. It begins at the mouth of the San Francisquito Canyon, travels the length of Leona Valley and enters Palmdale along Elizabeth Lake Road, in the vicinity of the intersection of 25th Street West and Elizabeth Lake Road.

- **Anaverde Creek** collects runoff from the Sierra Pelona Range, and drains easterly through the Antelope Valley. The creek then flows north along Sierra Highway into USAF Plant 42.

- **Little Rock Wash** collects runoff from the San Gabriel Mountains in Little Rock Canyon and travels just west of Littlerock through the east side of Palmdale in a northerly direction.

- **Big Rock Wash** collects runoff from the San Gabriel Mountains in Pallett and Big Rock creeks. Traveling north from Holcomb Ridge through Pearblossom, it is divided by the Alpine, Lovejoy and Piute Buttes and merges at Avenue E.

Urban development reduces the total ground absorption area by creating impermeable surfaces (structures, pavement, and streets). Excess storm runoff, increased by the presence of impermeable surfaces, flows from developed areas, contributes to compromised storm drains, resulting in localized street flooding. Moreover, developed areas generate irrigation water runoff from landscaping that may channel nuisance water flow into nearby undeveloped areas and street gutters.

The amount and frequency of rain varies, and although floodwaters may be diverted, the lack of a completed regional drainage system will continue to result in local flooding problems. The City has an adopted Drainage Master Plan. It will take approximately 20 years to complete construction of the entire system, according to the City of Palmdale Engineering Division. The plan addresses storm water runoff from higher slopes and existing and future developments. The Los Angeles County Department of Public Works has completed and adopted the Antelope

Valley Comprehensive Plan of Flood Control and Water Conservation (June 1987), which is currently being implemented in the unincorporated portions of the Antelope Valley. The storm drainage section of the Public Services Element of that plan discusses flood hazards in more detail, and is incorporated by inference.

Earthquake faults create vertical barriers to groundwater that may result in shallow groundwater conditions. They may also limit the amount of water that can percolate into the subsurface, thus increasing the amount, velocity, and erosive capacity of storm water runoff on hillsides.

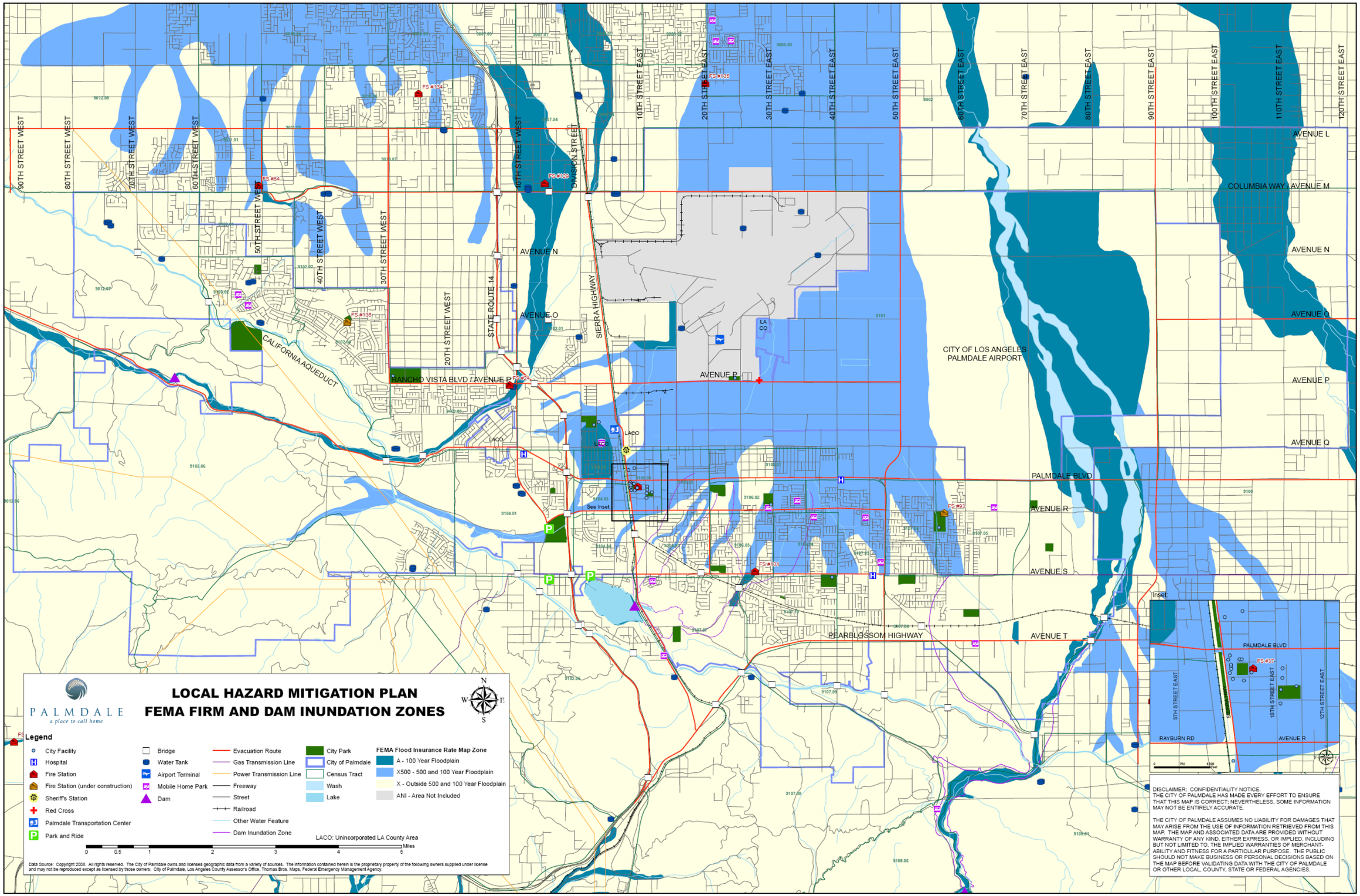
Surface rupture and ground shaking from earthquakes may result in rupture of the Palmdale and Littlerock Dams, causing flooding. Floodwaters could be as deep as 50 feet immediately downstream of the Littlerock Dam. Failure of the Littlerock Dam would result in the inundation of a 300-foot wide area for 0.25 mile north of the dam. Along this length, the water depth would vary from 50 to 15 feet. Ten minutes after failure, the floodwater would veer eastward for 800 feet to Avenue U where the depth would be reduced to 10 feet. Trending north from Avenue U, the water would eventually dissipate so that the depth is no longer a risk to downstream developments.

In addition to dam failure and subsequent flooding, a seismic event could cause a water wave, or seiche, to occur at Lake Palmdale, which could potentially overtop the dam. The design report for the dam considers a reflection of the wave on return unlikely. Also, wave volume above the dam would not be substantial (approximately 1 acre-foot), and would not result in damaging floods. Overpour on the downstream side of the dam will not cause any damage by erosion as the existing rockfill was designed to withstand it. The Sheriff's Department is responsible for notification and local evacuation in the event of dam failure.

In the event of a large magnitude local earthquake on the San Andreas Fault, some portions of the California Aqueduct are likely to fail. The east branch of the aqueduct is highly vulnerable to widespread damage from ground shaking hazards because it closely parallels the San Andreas Fault for over 62.4 miles. Moreover, the east branch crosses the fault at several locations near Palmdale (Leona Siphon and Barrel Springs) which are susceptible to surface rupture hazards. The Department of Water Resources (DWR) has installed flood control gates to mitigate any structural failure. By closing the gates upstream, the section of the Aqueduct in the Planning Area will be isolated and will not receive water. Aqueduct water present during failure will be diverted to pools that serve as detention basins.

The Aqueduct crosses the fault at Leona Siphon and Barrel Springs. The extent and rate of inundation is speculative since the amount of water in the Aqueduct varies between seasons and years. Various factors which affect the size and extent of flooding include structural failure of the Aqueduct and pools while the Aqueduct is operating at full capacity, adjacent pools outside the Planning Area draining, and emergency power failure which could result in the Aqueduct gates not closing fast enough.

Map 3.9 on the following page, prepared by the City of Palmdale GIS Department, depicts those areas in the Palmdale most vulnerable to flooding/inundation.



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Map 3.9 – City of Palmdale Flood Plain and Dam Failure Inundation

Estimating Potential Losses

Building on data from the hazard identification and vulnerability assessment, a risk analysis should include two components: (1) the population and property at risk from a flooding event; and (2) the frequency and severity of the flooding event itself. FEMA's approved HAZUS-MH loss estimation model can now predict the severity of damage from a range of flood events of different magnitudes using GIS technology to map the damage that can be expected over time. The data used to develop these models is based on hydrological analysis of landscape features. Changes in the landscape, often associated with development of the land, can alter the flow velocity and the severity of damage that can be expected from flood event.

The City of Palmdale has determined that a HAZUS run for Flood events should be a priority mitigation project. Once completed, this data will be evaluated and the LMHMP will be updated accordingly.

WILDFIRES/BRUSH FIRES

Vulnerability Assessment

As noted in the previous section, the City of Palmdale and the surrounding planning area are at considerable risk of wildfire. As stated in the Safety Element of the City's General Plan:

Wildfires occur on mountains, hillsides, and grasslands. The speed and extent of their spread depends on the area's vegetation, climate, and slope. In the Planning Area, native vegetation types such as chaparral and grassland provide the fuel that allows fire to spread easily across large tract of land. These plant species are capable of regeneration after a fire, making periodic wildfires and natural part of the ecology of these areas. The hot, dry climate of the Antelope Valley keeps the grass dry and readily combustible. The Santa Ana winds can spread fires into adjacent areas. Steep slopes bring grass and brush within reach of upward flames while impeding the access of firefighting equipment. Within Palmdale, wildfire hazards exist within the southern and western portions of the Planning area.

The fire season in the Palmdale Planning Area occurs roughly from September to November when the Santa Ana winds blow. If rains are minimal, grass may dry as early as May and brush as early as July. From December to April, in the rainy season, wildfires rarely occur.

Wildfires may be started by various methods including: carelessly used matches, cigarettes discarded in the brush, the lack of spark arrestors in off-road vehicles, target ricochets, and arson.

The City of Palmdale GIS Section has prepared fire hazard and frequency maps of the Palmdale area. **Map 3.10** "Wildland Fire Hazards" and **Map 3.11** "Wildland Fire Frequency" are shown on the following pages.

As indicated previously, most of the City of Palmdale lies within the "Moderate Threat" area. Just east and west of the proposed Palmdale Regional Airport/USAF Plant 42 are areas

designated "High Threat". The southern and western foothills of the City are designated "Very High Threat", and the mountainous area in the far southwestern corner of the City is designated "Extreme Threat". **(See Map 3.3)**

Map 3.11 identifies the number and location of fires that have occurred in Palmdale between the years of 1950 – 2003.

Those facilities most vulnerable are located in High Threat fire zones and include a proposed fire station and future Middle, Elementary and High Schools, as well as existing schools such as Highland, Cottonwood, Esperanza, Joe Walker, Rancho Vista, Summerwind, Octotillo, Anaverde, Palmtree, Joshua Ranch, Barrel Springs, Buena Vista, Cimarron, and Tumbleweed.

City facilities that are most vulnerable include Tejon Park, Pelona Vista Park, Joshua Ranch Park, Manzanita Park, Marie Kerr Park, Hillside Park, Rancho Vista Park, and Warnack Park; also included are libraries, maintenance facility satellites, and future Westside parks.

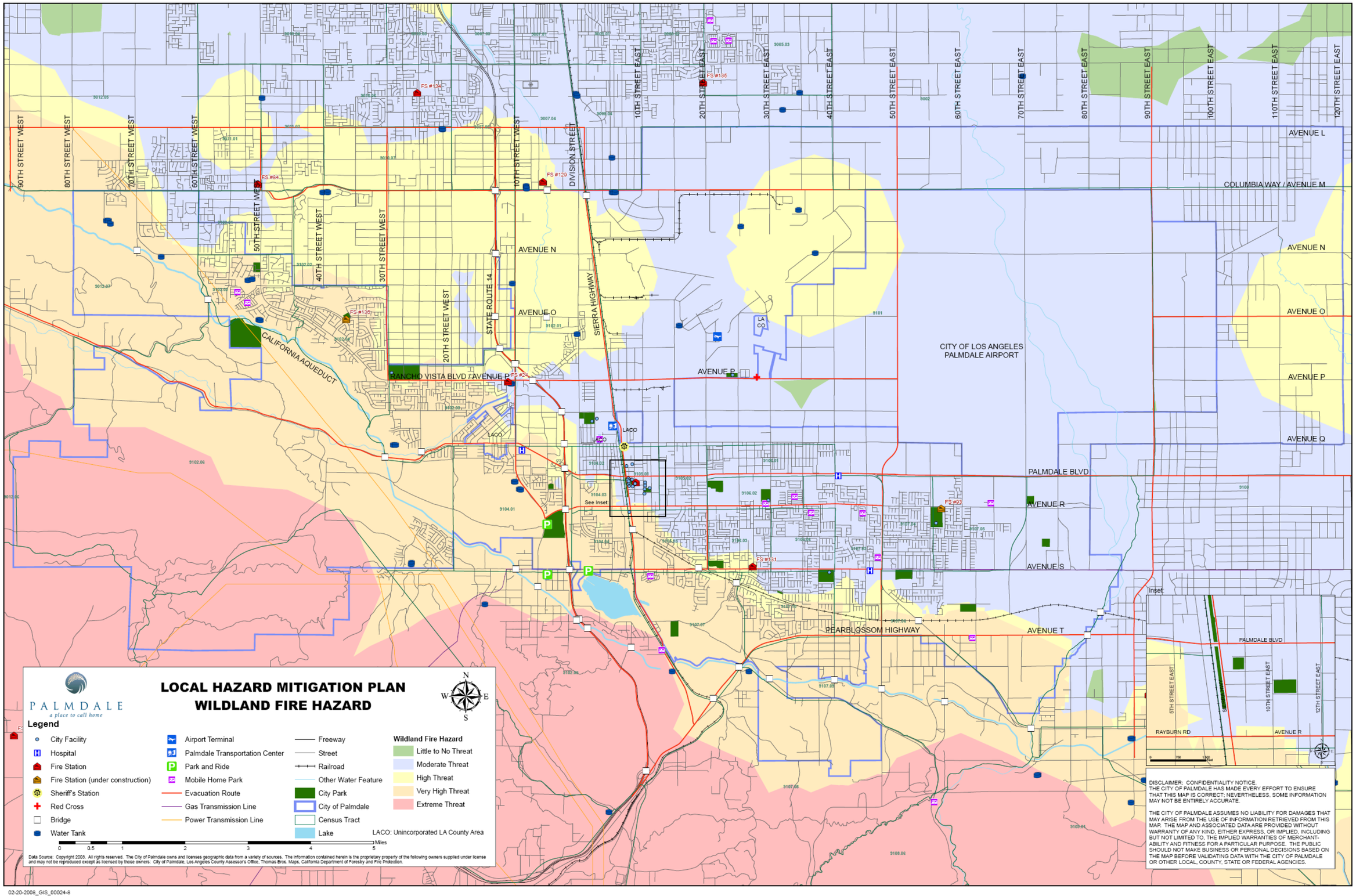
Cultural and environmental resources occurring in the Very High Fire Hazard Zone include Warnack Nature Park, Ritter Ranch Open Space, significant Ecological areas and various prehistoric archaeological and paleontological sites. As development continues to occur in the Ritter Ranch and City Ranch areas, parks, schools, community buildings, and other cultural facilities will be constructed in the areas currently designated as Very High Fire Hazard. However, the development of these areas with urban uses will eliminate existing chaparral, grass and other fuels, which could reduce the overall fire hazard in these areas. Fuel reduction and landscape modifications surrounding the new development will further reduce this hazard.

The environmental resources within Very High Fire hazard areas existed prior to the establishment of the community; they have persisted through previous wildfires. No specific measures are required to protect these resources. The natural vegetation communities are, in many cases, fire dependent. Mechanical or chemical fuel reductions in proximity to urban areas are the only measures required in the open space areas.

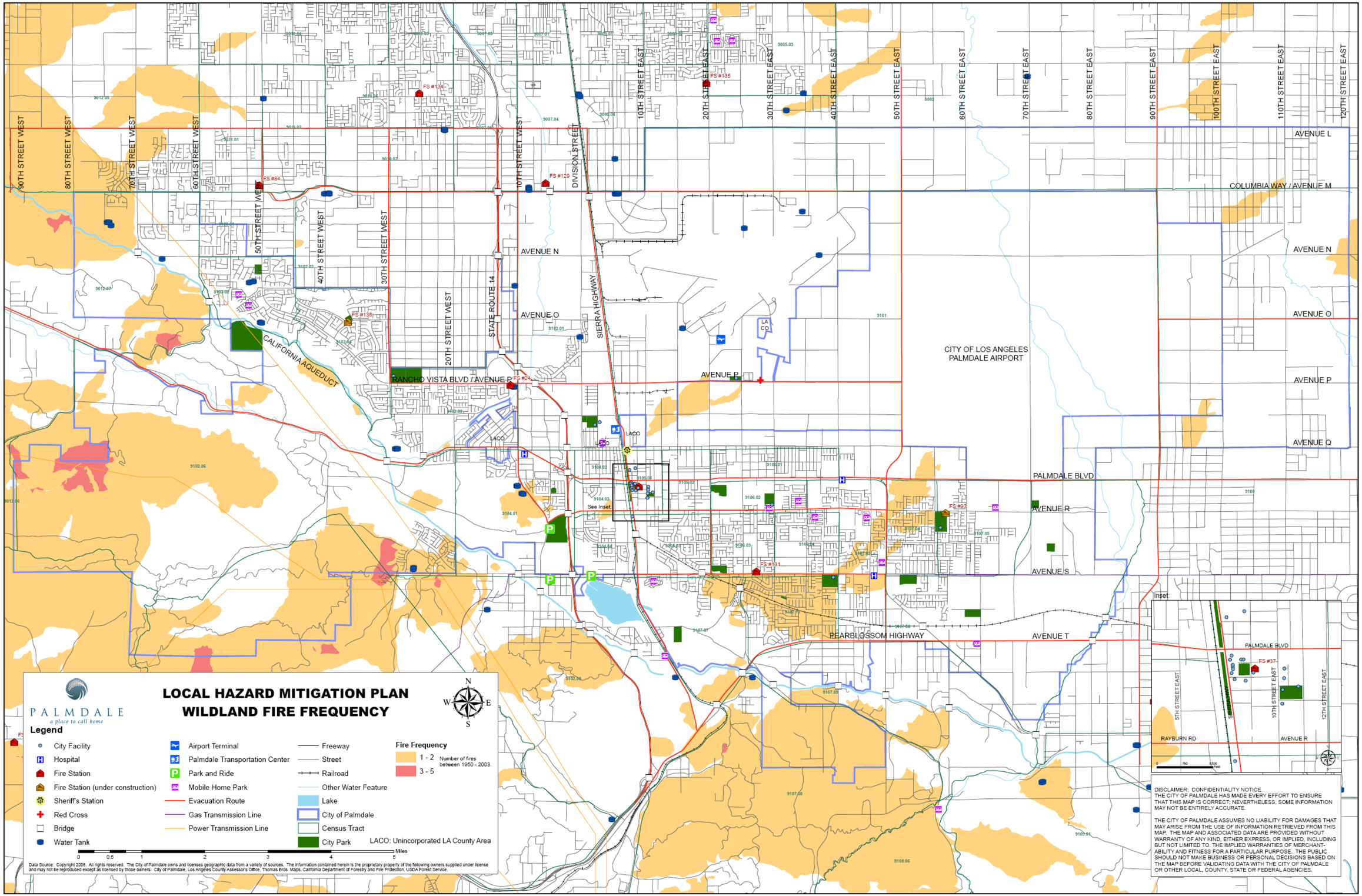
Estimating Potential Losses

The City does not have sufficient information to estimate potential losses accurately. HAZUS information will be generated as a mitigation project, potential $$ losses will be estimated, wildfire hazard risk will be more completely identified and the LMHMP will be updated accordingly.

Modeling and mapping programs use several factors to determine the communities "base hazard factor." Components evaluated are: Topographical location, characteristics and fuels; site/building construction and design; site/region fuel profile (landscaping); defensible space; accessibility; fire protection response and availability of water. The use of Geographic Information Systems (GIS) technology allows for further integration of fuels, weather, and topography data for predicting fire behavior, watershed evaluation, mitigation strategies, and hazard mapping.



Map 3.10– City of Palmdale Wildland Fire Hazards



Map 3.11 – City of Palmdale Wildland Fire Frequency

TRANSPORTATION ACCIDENT/HAZMAT SPILL

Introduction

Much of the land area of the City of Palmdale lies near or adjacent to major transportation corridors; a substantial portion of the population also resides in proximity to these corridors.

State Highway 14 (Antelope Valley Freeway) bisects the City on a north-south axis. SR 14 is heavily used by trucks bringing goods into and out of the Los Angeles Basin. According to the Southern California Association of Governments, 5.54 % of traffic on the freeway includes heavy duty vehicles. It is estimated that this percentage will increase to 13-17% by the year 2030.

State Highway 138 intersects with SR 14 near the center of the City and proceeds east and south east through the City. SR 14 is frequently used as a "by pass" by traffic going to or from the Inland Empire.

Union Pacific Railway runs north-south through the City, approximately one (1) mile east of SR 14. The freight railway transports a wide variety of cargo, including hazardous and flammable materials.

MetroLink commuter trains share the Union Pacific right-of-way through the City.

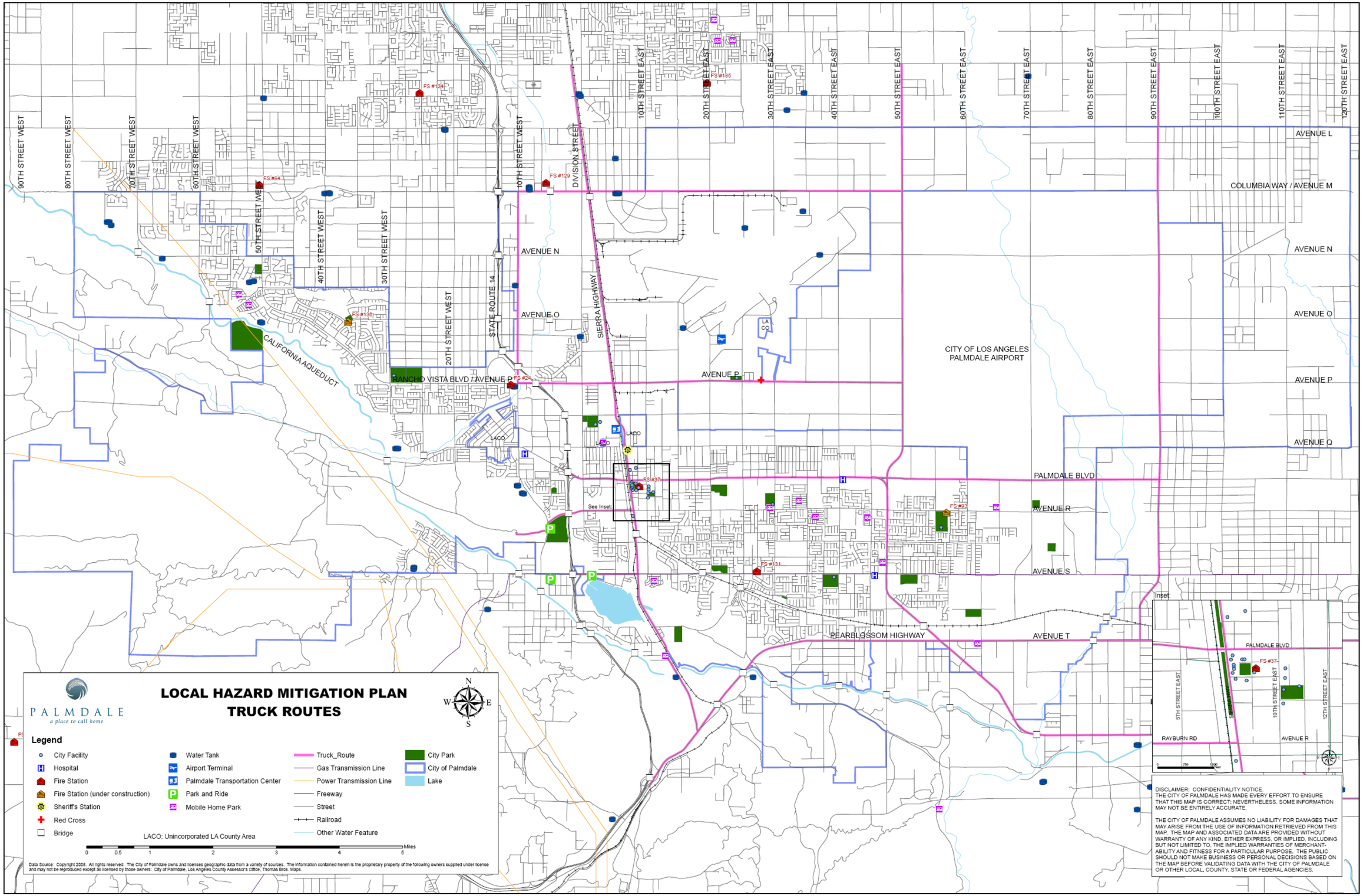
USAF Plant 42/Palmdale Regional Airport runway approach/departure paths cross the City in east west (runway 07-25) and southwest-to-northeast (runway 04-22) direction over heavily populated areas.

Large (36 inch) Natural Gas Pipelines cross the southern portion of the City in an east-west direction along Avenue S.

Major Arterials running both north-south and east-west throughout the City carry large volumes of traffic, including heavy duty trucks.

The California Aqueduct adjacent to the entire southern border of the City in a northwest-to-southeast direction. (California Aqueduct hazards are discussed in Section 3.2 Floods.)

Major transportation areas are shown on **Map 3.12, 3.13,** and HAZ MAT facilities are shown on **Map 3.14.**



Map 3.12 – City of Palmdale Truck Routes

Vulnerability Assessment

As with other accidents, transportation accidents are unpredictable events. The damage and loss of life associated with a particular transportation accident depends upon the confluence of circumstances surrounding the specific occurrence.

For example, the severity of the recent Metro Link accident in Glendale, California was substantially increased by two chance occurrences – another Metro Link train was traveling in the opposite direction on an adjacent track just as the accident occurred, and there was a freight train parked at an adjacent siding at the exact location where the Metro Link train derailed. As a result, in addition to experiencing derailment due to collision with a vehicle parked on the track, the train also collided with two other trains.

Assessment of risks to life and property associated with transportation accidents is an inexact science based on historical and local vulnerability rather than on statistical models. Despite the unpredictability of transportation accidents, application of preventive measures and mitigation actions can reduce, if not eliminate, personal injury, loss of life, and property damage. The following analysis examines potential risks to the City for each of the identified hazards.

Pipeline Rupture/Accident Table below from the National Transportation Safety Administration, Office of Pipeline Safety, summarizes transmission pipeline accidents in the United States from 1986 through 2008. "Transmission Operators" include operators of high-capacity pipelines that deliver from terminal to terminal, as opposed to "Distribution Operators" who distribute from terminals to homes and businesses. The large gas transmission lines in the S Street corridor are classified as transmission lines.

Table 3.10

OFFICE OF PIPELINE SAFETY
NATURAL GAS PIPELINE OPERATORS
INCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 12/31/2008

TRANSMISSION OPERATORS

Year	No. of Incidents	Fatalities	Injuries	Property
1986	83	6	20	$11,166,262
1987	70	0	15	$4,720,466
1988	89	2	11	$9,316,078
1989	103	22	28	$20,458,939
1990	89	0	17	$11,302,316
1991	71	0	12	$11,931,238
1992	74	3	15	$24,578,165
1993	95	1	17	$23,035,268
1994	81	0	22	$45,170,293

1995	64	2	10	$9,957,750
1996	77	1	5	$13,078,474
1997	73	1	5	$12,078,117
1998	99	1	11	$44,487,310
1999	54	2	8	$17,695,937
2000	80	15	18	$17,868,261
2001	87	2	5	$23,674,225
2002	82	1	5	$24,983,569
2003	98	1	8	$47,104,813
2004	109	1	3	$34,857,097
2005	182	0	7	$367,790,045
2006	146	3	5	$52,332,376
2007	132	2	7	$63,868,040
2008	141	0	5	$344,117,303
2009	53	0	5	$35,201,780
Totals	**2245**	**65**	**264**	**$1,308,592,365**

Note: FY 2009 data continues to be updated as the reports are obtained by OPS.

Historical totals may change as OPS receive supplemental information on incidents.

In reviewing the data, it is interesting to note the wide variability in the number of accidents per year; from a low of 54 in 1999 to a high of 141 in 2008.

Railway Accident

The Federal Railroad Administration (FRA), Office of Safety Analysis maintains and publishes railroad safety information by railroad, and by state (www.safetydata.fra.dot.gov/officeofsafety). According to the FRA, there were a total of 148 train accidents in Los Angeles County between January 2000 and June 2004. Of these, 112 were derailments; eighty-four of the 148 accidents were due to human error and 49 were due to faulty track.

Freight railroad accidents can present serious risks, especially when release or potential release of hazardous materials represents serious risks to the community. However, passenger operations may also present serious risks. MetroLink operates 18 trains per day (weekdays) on the line connecting the Antelope Valley with the Los Angeles Basin. These commuter trains operate along the same right-of-way as BNSF freight traffic, on adjacent tracks. Commuter trains operate at relatively high speeds (up to 55 mph) and may carry as many as 200 passengers. In addition, a passenger train derailment has the potential to affect trains on adjacent tracks, and the surrounding community.

On January 26, 2004, at 6:03 a.m., a southbound MetroLink commuter train collided with a stationary vehicle that had been parked and abandoned on the tracks. The accident occurred in

Glendale, California in an industrial area north of Los Angeles. Upon colliding with the parked SUV, the train derailed, jackknifed, and subsequently collided with two other trains, a northbound MetroLink commuter train and a Union Pacific freight train parked on an adjacent track. A fire erupted from leaking diesel fuel. Eleven people died in the accident.

Aviation Accident

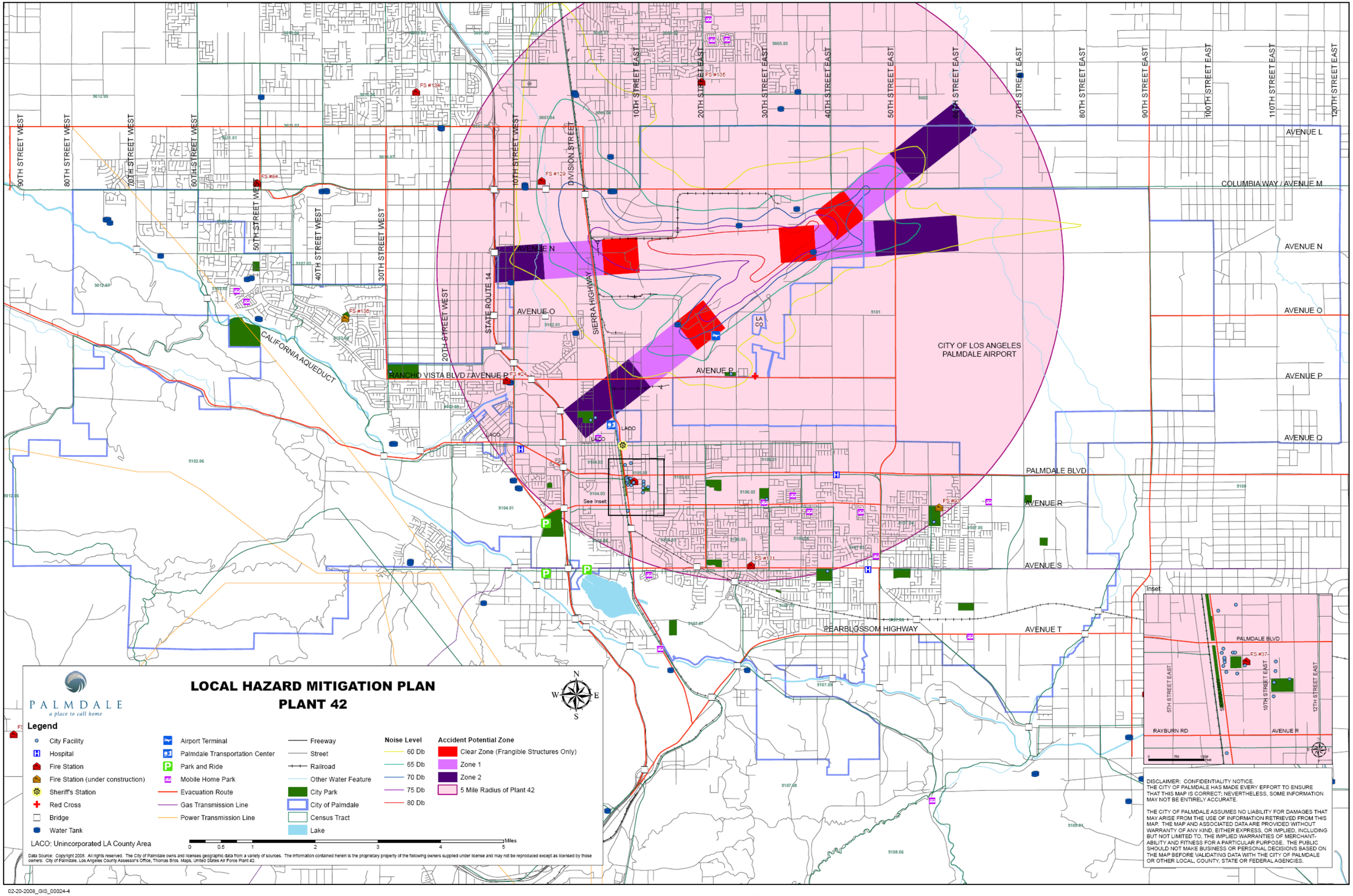
While very rare, aviation accidents in built-up urban areas can cause substantial personal injury, property damage, loss of life on the ground, in addition to passenger and crew injuries/fatalities.

The majority of aircraft accidents involve take-off and landing operations. Palmdale is home to USAF Plant 42/Palmdale Regional Airport, located in the northeastern sector of the City. The airport consists of two runways, 07-25, which runs roughly east-to-west, and 04-22 which runs roughly in a southwest-to-northeast direction. Approach and departure paths for both runways are over relatively densely populated areas of the City to the east and south east of the airport, including both existing and proposed new development

Operations at the airport include of a mix of commercial, private (aircraft owned by tenants), and military. While the number of commercial operations are currently limited, the number of commercial operations at the airport are expect to increase significantly due to population and job growth in the Antelope Valley. The Palmdale Regional Airport could potentially serve a broad geographic area consisting of the Antelope Valley (Palmdale and Lancaster) and portions of western Ventura, northern San Bernardino, and southern Kern Counties.

The Palmdale Regional Airport (PMD) hosted commercial air carrier operations from 1991 until 1997 when they were discontinued due to dwindling passengers. Service was reinstituted in late 2004. The current terminal is capable of handling up to 300,000 passengers annually. In a recent report, GCR & Associates estimated that the airport supports 53,602 annual military aircraft operations. Future military operation volumes will vary depending upon national security considerations.

Considering current and historical information, a major aviation disaster event is highly unlikely. However, given the potential severity of such an event, it cannot be discounted as a potential hazard to the community.



Map 3.13 – City of Palmdale Plant 42

Highway Accidents

The City of Palmdale is traversed by two state highways; SR 14, the Antelope Valley Freeway, bisects the City in a north-south direction, and SR 138, known as Pear Blossom Highway, goes through the heart of the City, from the intersection with SR 14, proceeding east and southeast toward San Bernardino County. Both routes, especially SR 14, carry heavy traffic volumes of inter-city traffic. SR 14 constitutes the primary link – and the only freeway link - between the Antelope Valley and the Los Angeles Basin to the south, and Kern County and the High Desert on the north.

In addition, several major arterials also carry heavy traffic loads. These include the Sierra Highway which runs north and south roughly parallel to SR 14, and Avenue S, Avenue P, and Palmdale Blvd. which run in an east-west direction.

The threats posed to the City by these facilities are two-fold:

1. A major accident on SR 14 resulting in closure of the freeway would virtually cut off the City from vehicular access to the north or to the south, causing significant economic and social damage.
2. A truck accident occurring on SR 14, SR 138, or any of the City's major arterials involving release of hazardous materials could result is serious personal injury, property damage, and loss of life to City residents.

As truck accidents, with or without hazardous material involved, pose the most significant risk to the City, this analysis will focus on potential truck accident hazards.

Truck traffic volumes on both of the state highways that traverse the City are significant and growing. According to data provided by the Southern California Association of Governments (SCAG), the regional transportation planning agency, truck volumes will grow significantly as population and employment increase in the Antelope Valley. SCAG's projections are shown in Table 3.11 below (SR 14 north of Palmdale Blvd, SR 138 south of Avenue S):

Table 3.11

CURRENT AND PROJECTED TRUCK VOLUMES (Average Daily – Both Directions)				
	2000	**2005**	**2020**	**2030**
SR 14	8067	8305	10,517	12,076
SR 138	1457	1544	2545	2738

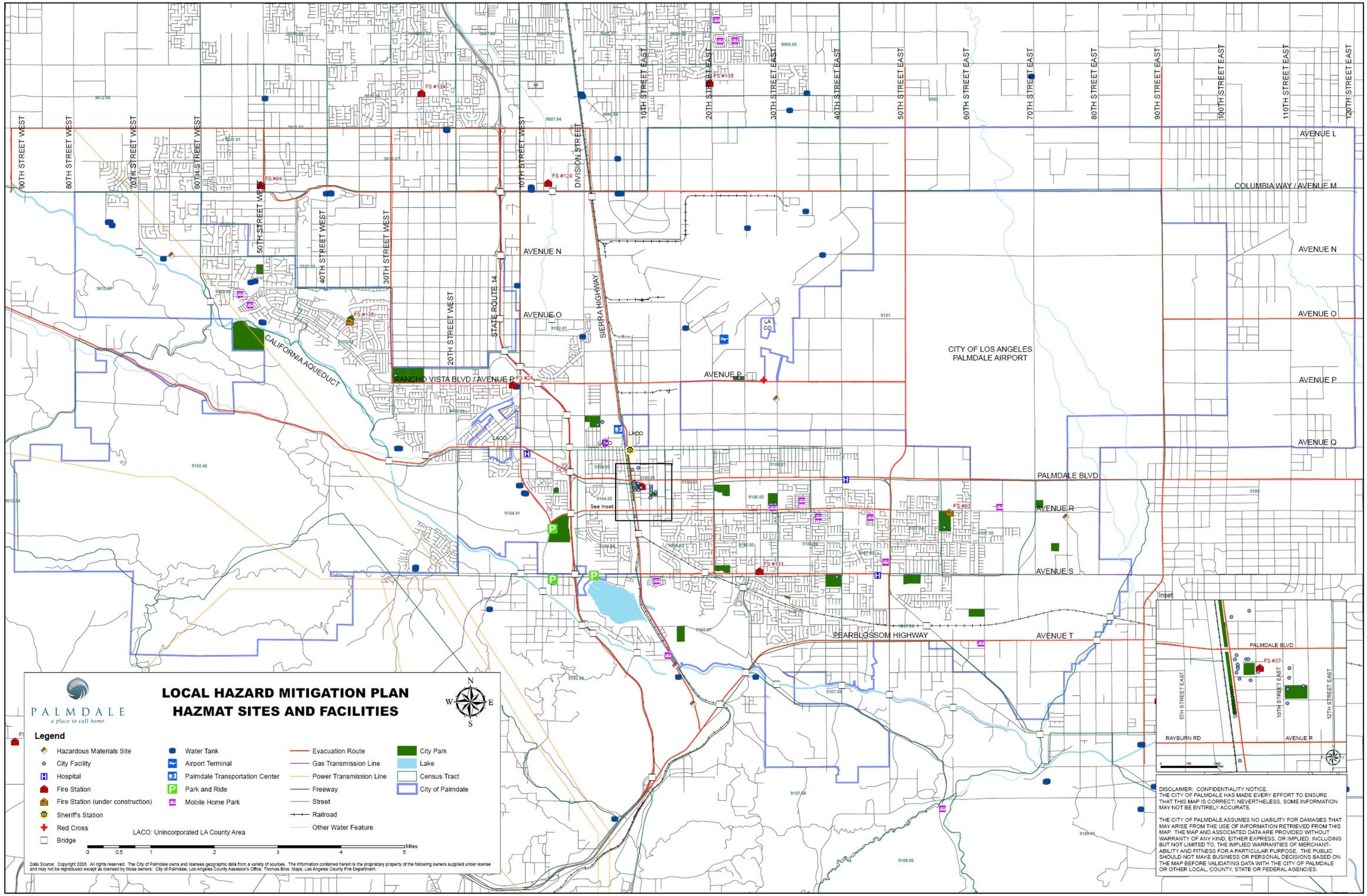
Source: Southern California Association of Governments

These projections were used for the 2004 Regional Transportation Plan (RTP). However, other studies suggest that these numbers may be low. The North County Combined Highway Corridors Study completed for the Los Angeles County Metropolitan Transportation Authority (LACMTA) by Parsons and released as a draft in July, 2002, estimates that substantial increases in truck traffic are likely to result from major planned developments outside the City of Palmdale. These include the proposed Centennial Ranch (23,000 housing units, 30,000 jobs); Newhall Ranch (20,885 housing units, 18,800 jobs) and the Southern California Logistics Airport.

The principal hazard associated with truck traffic is an accident that involves the release of hazardous materials posing threats to the surrounding community from fire, explosion, or exposure to toxic chemicals.

According the data published by the California Highway Patrol, there was an average of 8,545 truck accidents per year in California for the years 1998 through 2002. During the same time period there was an average of 350 truck accidents per year which resulted in one or more fatalities. CHP data do not identify how many of these accidents involved trucks transporting hazardous materials. However, existing data suggests that the results of a truck accident involving release of hazardous materials can be catastrophic.

Map 3.14, on the following page details the location of hazardous material sites and facilities within the City of Palmdale. Los Angeles County is one of the areas within California that experiences a high number of hazardous materials spills each year; reference Figure **3.2.**



Map 3.14– City of Palmdale HAZMAT Sites and Facilities

Estimating Potential Losses

As one of their mitigation activities, the City of Palmdale will gather data for a statistical model that will help predict probability and estimate losses from a major transportation accident. Because of the unpredictability of the time, location, and severity of potential transportation accidents, it is extremely difficult to estimate potential losses with any degree of confidence.

Therefore, for the purposes of the data gathering, all critical facilities within a ¼ mile "band" on each side of major highways and arterial will be identified and their replacement values listed. Likewise, estimates of at-risk population and sensitive facilities such as schools will also be identified.

DROUGHT

Vulnerability Assessment

Located as it is on the edge of the Mojave Desert, the City of Palmdale is extremely vulnerable to the effects of drought. While unlikely to result in personal injury or loss of life, drought conditions could result in extensive economic damage. In addition, drought conditions increase the potential for damage from mudslides and brushfires, which could result in loss of life.

The Antelope Valley has a limited amount of water to begin with being a high dessert community. This fact, coupled with a rapidly increasing population and decreasing water table levels is cause for concern. The level of dependency on the water supplied by the California Aqueduct is increasing. Local water supplies remain static at best and more often are being depleted faster than they can recover. Pollution of wells and subsurface pools has mandated importation of water, along with the infrastructure required to capture and deliver it. As water is used more efficiently (drip systems and water saver products), monitored better (water meters) – there is a reduction in wasted water and water purveyors are able to meet new demands. As demand rises and supply decreases, costs of water service at all levels must go up. Increased revenues foster additional water development, and the cycle starts anew.

Estimating Potential Losses

Because drought is not a sudden, catastrophic occurrence and often occurs over several years, it is difficult to estimate potential losses with any certainty. When the effects of drought also include the destruction of flora and fauna, there is an esoteric value that is not translatable into dollars. Across the United States, the cost of losses due to drought averages about seven billion dollars each year. Losses can include reduction in crop yields and loss of livestock, reservoir depletion, wetlands degradation, etc. Other losses include loss of income, increased cost of water, and degradation of water quality. According to the National Oceanic and Atmospheric Administration (NOAA), in terms of economic impacts, droughts are the most costly natural disasters in the United States.

SEVERE WEATHER

Vulnerability Assessment

Severe weather poses a potential hazard to City citizens, facilities, and personnel. Property damage, personal injury, and loss of life may occur as a direct or indirect result of severe weather events. Specific vulnerabilities include:

- Wind-caused damage to City structures
- Damage caused by secondary events, such as blown over trees, flying debris, etc.
- Personal injury or death resulting from structure damage, downed power lines, etc. on City property
- Personal injury or death on City streets and sidewalks.
- Damage to utilities and other infrastructure

Estimating Potential Losses

While no single event is likely to cause complete loss of all City facilities, any facility is vulnerable to partial damage or complete destruction due to a Severe Weather event; the values of City facilities are listed in **Table 3.8.**

Because of the variety and severity of events involving severe weather, it is difficult to estimate the potential losses that might occur.

Map 3.15, page 114, prepared by the City of Palmdale GIS Section, identifies the census track boundaries that are used by the City to calculate the costs associated with recovery from severe weather events.

POWER/UTILITY FAILURE

Vulnerability Assessment

Power/utility failure/outages can pose a potential hazard to the residents, assets/facilities, and personnel of the City. Property damage, personal injury, and at the extreme, loss of life may occur as a direct or indirect result of a power/utility failure. The risk to City facilities is reduced by the capacity for back-up power at several buildings. At the present time, the following facilities have stationary back-up power capacity:

- Development Services Building
- City Administration
- The Playhouse
- Maintenance Modular
- Pelona Vista Park

In addition, there is also a portable generator at the maintenance yard that can be used at Marie Kerr Park, should the need arise. Two facilities now under construction – Marie Kerr Park Recreation Center and the Palmdale Senior Center will have stationary generators.

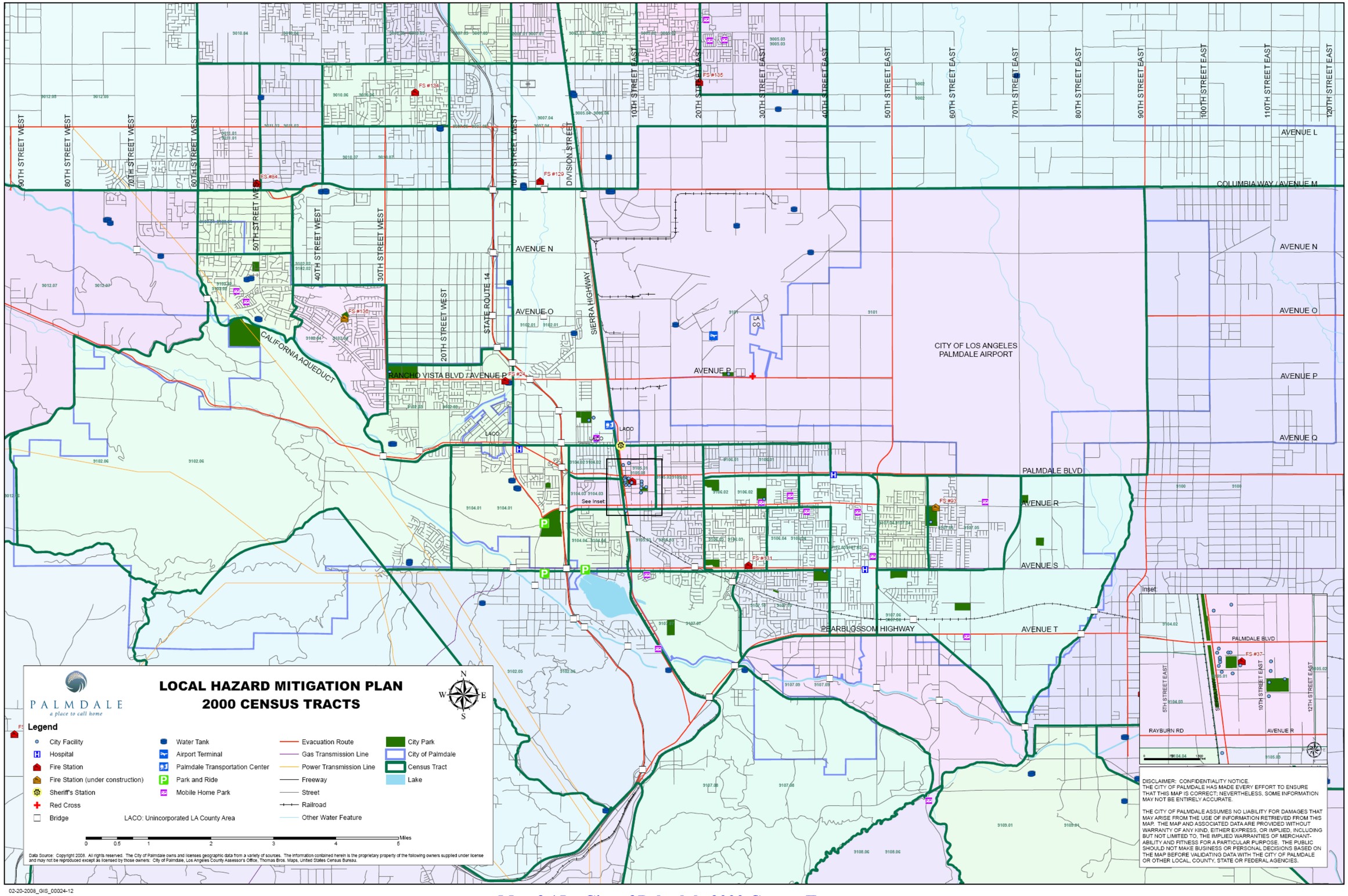
Any power failure of longer duration can compromise public safety; this includes problems with traffic signals that are not operating and communications systems failures.

There are the obvious risks of power loss to critical infrastructure buildings such as health care facilities (hospitals, convalescent facilities, nursing homes, etc.), and fire and life-safety facilities. However, power failure can also compromise public utilities, such as water and wastewater treatment plants. To mitigate possible public health and safety impacts due to a loss of power, the Los Angeles County Water Division recommends that all water companies with pressurized systems and all sewer companies install backup generators. This will assure system integrity.

Estimating Potential Losses

Unfortunately, it is extremely difficult to estimate potential losses because of the diverse nature and potential complexity of this hazard. Southern California Edison has suggested that a formula could be developed by a city, county or region that would allow an order of magnitude estimate of loss. The formula would have to include a significant amount of demographic and economic information, as well as the particular entity's history with power/utility failure. At the present time, City staff does not have the resources necessary to collect the data and develop the predictive model.

It is certainly safe to assume, however, that several areas of the private economy of the City can suffer losses if a power failure exists for more than a few hours. The magnitude of the loss is dependent on the breadth and duration of the failure.



Map 3.15 – City of Palmdale 2000 Census Tracts

3.6 ANALYZING DEVELOPMENT TRENDS

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

The final stage of the vulnerability analysis should include a general assessment of the development trends for a community. Prior development patterns should be assessed in the light of historic hazard events. This allows the identification of problematic zoning or land-use planning decisions. Current zoning or land-use plans can be overlain with the hazard profile maps developed earlier in the planning process, to identify future areas of hazard exposure. Possible changes or revisions to the zoning and land-use plans can then be recommended to mitigate against development of potentially dangerous or hazard prone areas. See **Maps 3.16** "Land Use" and **3.17** "Zoning" for current City of Palmdale information.

The General Plan

California Law requires each city to adopt a general plan for the physical development of the city and the surrounding planning area. The General Plan expresses the community's goals and embodies public policy relative to the distribution of future land uses. The general plan must contain seven mandatory elements -- land use, housing, circulation, conservation, open space, noise, and safety.

The goal of the safety element is to reduce the potential risk of death, injuries, property damage, and economic and social dislocation resulting from hazards such as fires, floods, earthquakes, and landslides. Within the safety element the City addresses fire safety standards, evacuation routes, water supplies, and clearance around structures. The Safety Element of the City of Palmdale General Plan includes specific policies designed to promote land use patterns and development in a manner that minimizes hazard threats. The General Plan policies address developed land, redevelopment areas, and new development.

The Safety Element of the Plan is included by reference in this LMHMP.

Areas subject to inundation and/or flood hazards are shown in the City's General Plan. Prior to approval of any development application in these areas, a detailed hydrology report is required. It must detail the project specific flood hazard mitigation requirements. In most cases, drainage control facilities such as debris/detention basins, concrete or earthen channels, bioswales and culverts, pipes and street gutters, are incorporated into projects. This infrastructure is meant to safely convey stormwater flows generated by a 25-year storm through developed areas and into natural drainages and creek channels. In some areas, natural channels are designated as open space and left undeveloped, or they are developed with uses, which are minimally affected by inundation such as sand and gravel quarries. These open areas allow storm flows to pass through Palmdale to dry lakebeds to the north without causing substantial damage to life or property.

The General Plan land use map, which includes Specific Plans, has taken into account flood hazard areas and development types and densities are specified as described above. The City is committed in providing continual updates to the flood control facilities to provide a high level of safety.

Specific Plans

A significant portion of new development planned in the City of Palmdale will occur in areas within or adjacent to "Very High Threat" and "Extreme Threat" wildland fire hazard areas. The City has taken a number of steps to mitigate the hazards associated with development in these areas.

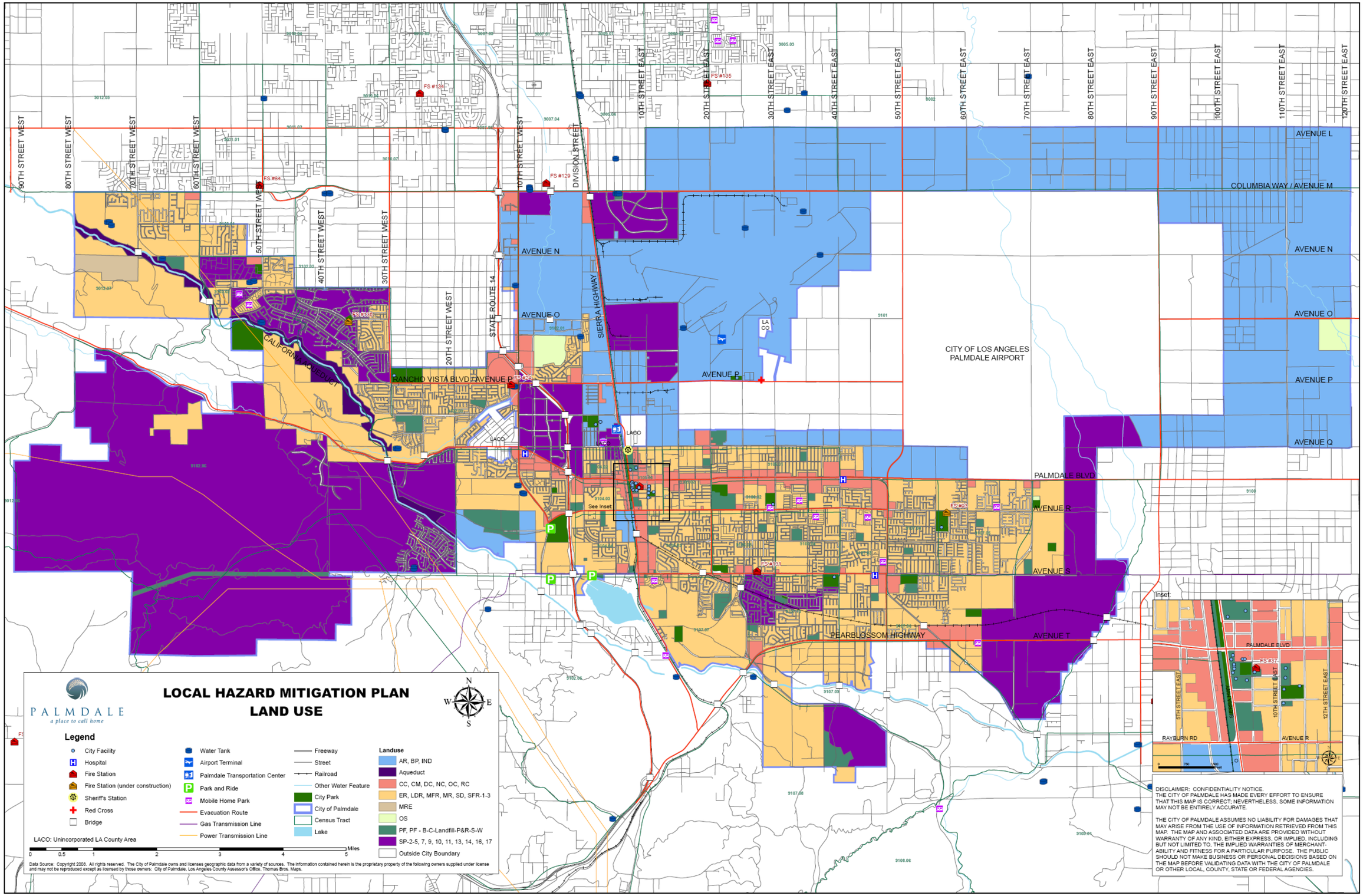
The primary tool utilized by the City to ensure that appropriate mitigation measures are identified and implemented is the Specific Plan Process. The City has utilized this process almost exclusively to guide and control the development of large tracts of land. Under this process, the developer is required to perform an in-depth analysis of potential hazards and to develop and implement mitigation measures to reduce the threats of property damage, injury, and loss of life. A review of the planning and environmental documents related to these specific plans indicates that the City and developers have taken care to identify hazard areas and to plan/implement appropriate mitigation measures. Among the mitigation measures adopted are:

- Community design, i.e., locating vulnerable development outside hazard areas
- Fire-resistant landscaping
- Building and density restrictions
- Building material specifications
- Buffer zones

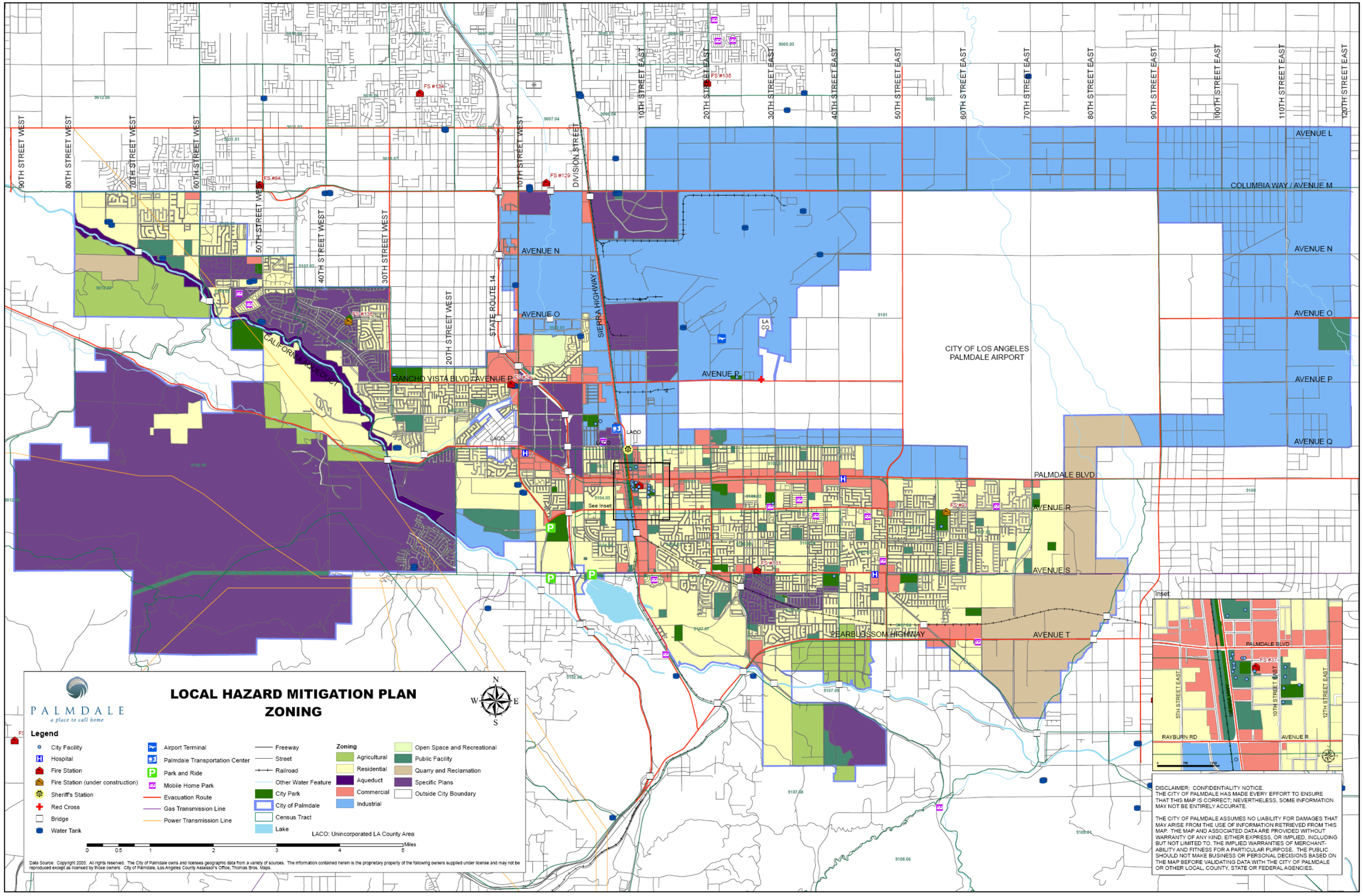
A list of approved Specific Plan areas, identified hazards, and required mitigation measures appears in Section One.

Development within the City has dispersed residential neighborhoods over a wide area, leaving vacant areas surrounded by new development. This scattered development pattern makes efficient use of the regional infrastructure difficult and increases costs of serving each unit. The City's General Plan encourages infill development that utilizes existing infrastructure and discourages continued leapfrog development away from the City center into outlying rural areas.

Development pressures to urbanize in rural areas are expected to continue, due to lower land costs in these areas. The City's view is that development should support itself, with no negative impact upon services being provided to existing City residents. The policies under this objective should apply to long-term maintenance and operation of public facilities, as well as to capital costs.



Map 3.16 - City of Palmdale Land Use



Map 3.17 – City of Palmdale Zoning

3.7 PERCEIVED RISKS – COMMUNITY PLANNING SURVEY

Introduction

A total of 235 surveys were returned; 108 in 2004 and 127 in 2008. Respondents represented City employees, community members, other public agency employees, and included first responders and emergency services providers, among others. Please reference Appendix B for a sample of the planning survey.

In the following narratives and graphs, there are discrepancies in total numbers because several respondents returned incomplete surveys. A few respondents returned blank surveys; some did not answer all of the questions, some answered parts of a question and ignored the remainder, some left the second page of the survey partially or completely blank.

Levels of Concern

Natural and man-made or human caused disasters that had the potential to affect the City of Palmdale were listed. Respondents were asked to indicate how concerned they were about the impact of each disaster. Their choices included: Not Concerned, Somewhat Concerned, Moderately Concerned, and Very Concerned. **Figures 3.5** and **3.5 A** illustrates the range of responses.

Figure 3.5

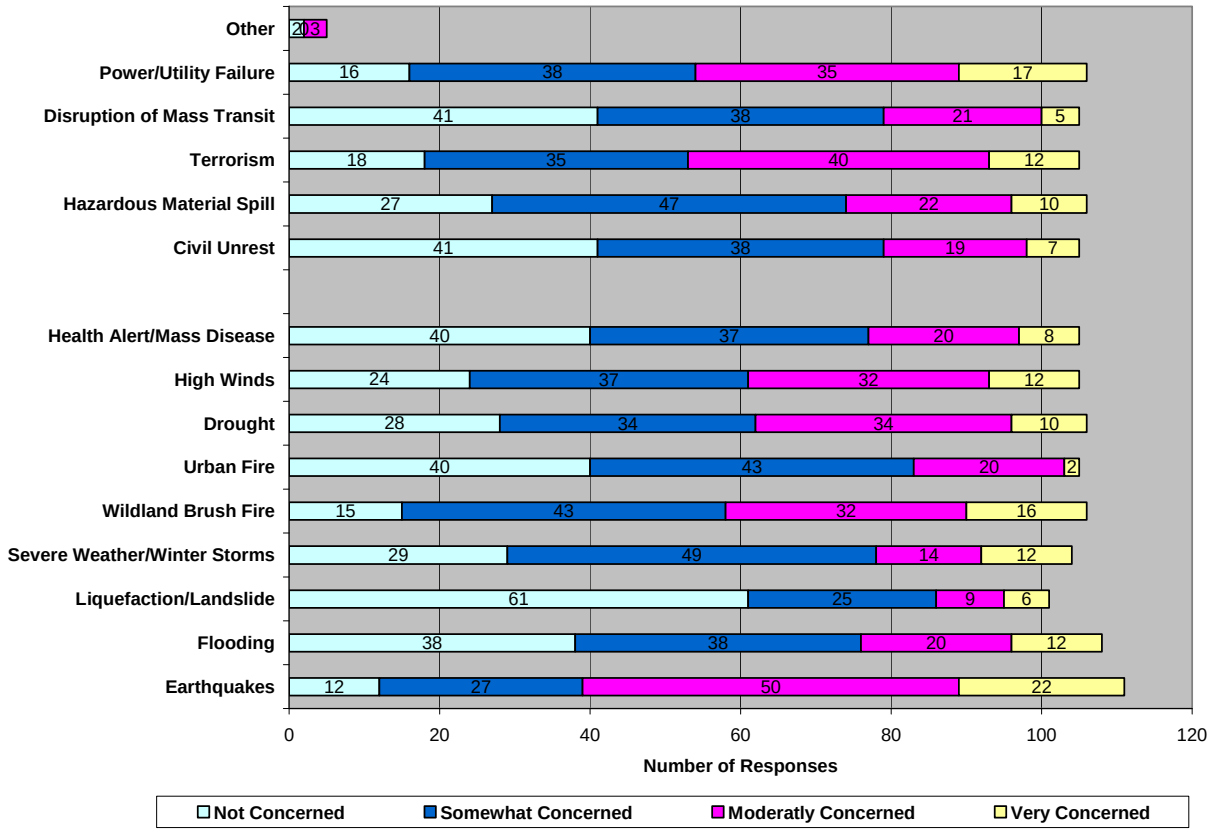
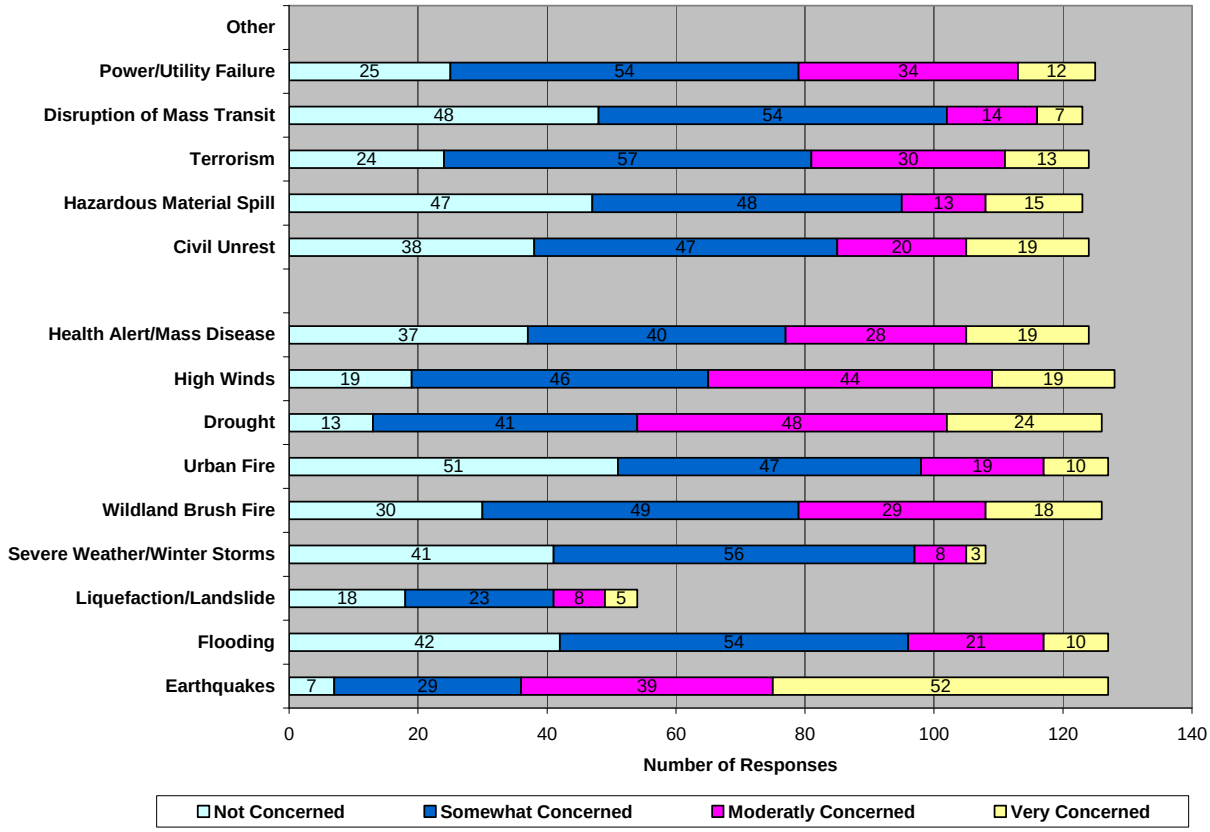


Figure 3.5 A



Overall, 70% of all respondents were either moderately or very concerned about earthquakes. That is in keeping with existing information and data and is reflected in the LMHMP. There was little or no change between 2004 and 2008 in the levels of moderate or serious concern over wildland/brush fires, which stayed at about 40% of all respondents.

Hazard of Greatest Concern

Figure 3.6 and **3.6A** indicate the hazards that respondents were very concerned about, which may or may not have been the hazard they chose as the greatest threat. (Greatest threat choices are detailed later in this narrative.)

It should be noted that respondents' choices of both the hazard that most concerned them and the hazard that posed the greatest threat were not necessarily based on the history of previous events or other empirical evidence. Choices appear to have been made in many instances on **perception**, which is not necessarily reality.

Earthquakes were of great concerns during both surveys; however there was more concern about severe winter storms and power/utility failure from 2004 respondents than from respondents in 2008. There was more concern over civil unrest from respondents in 2008 than in 2004. In particular, respondents mentioned gangs and gang violence as a recent and growing concern. Concern over drought and power/utility failure remained approximately the same, as did concern over wildland/brush fires.

Figure 3.6

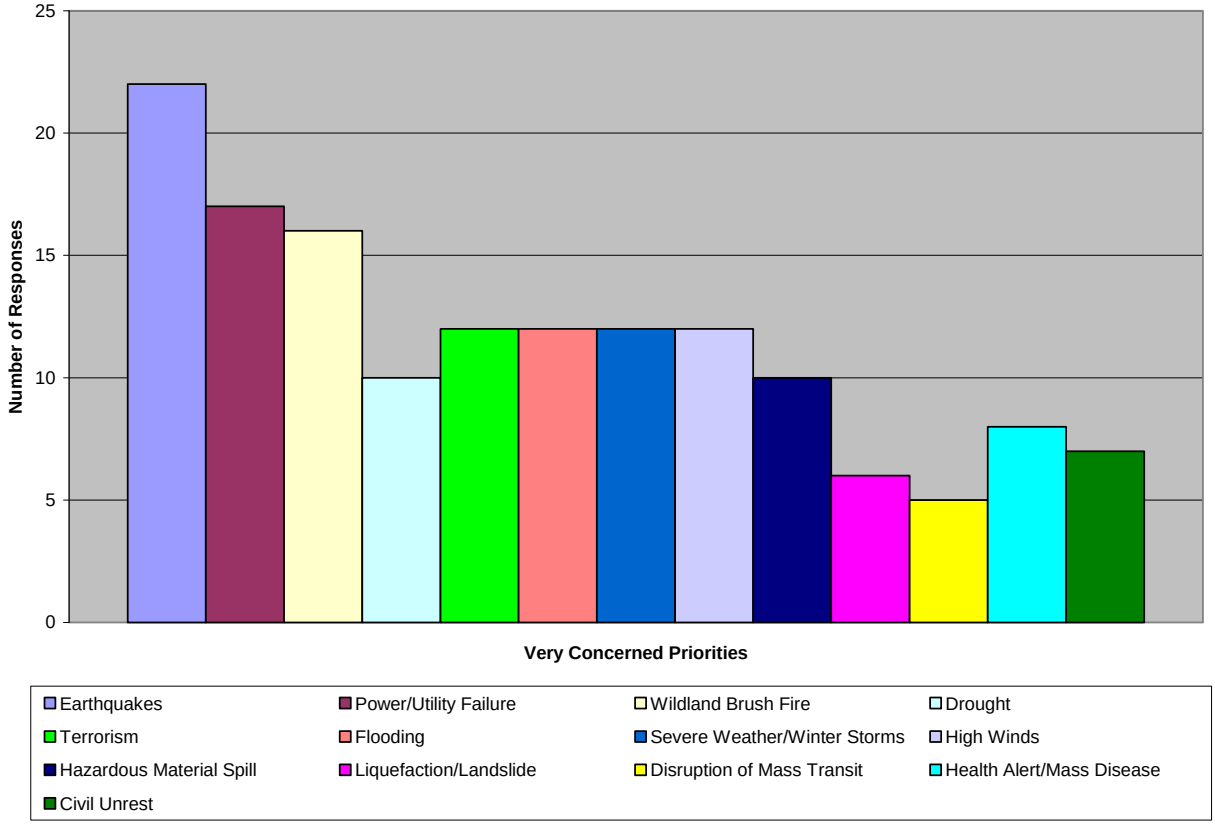
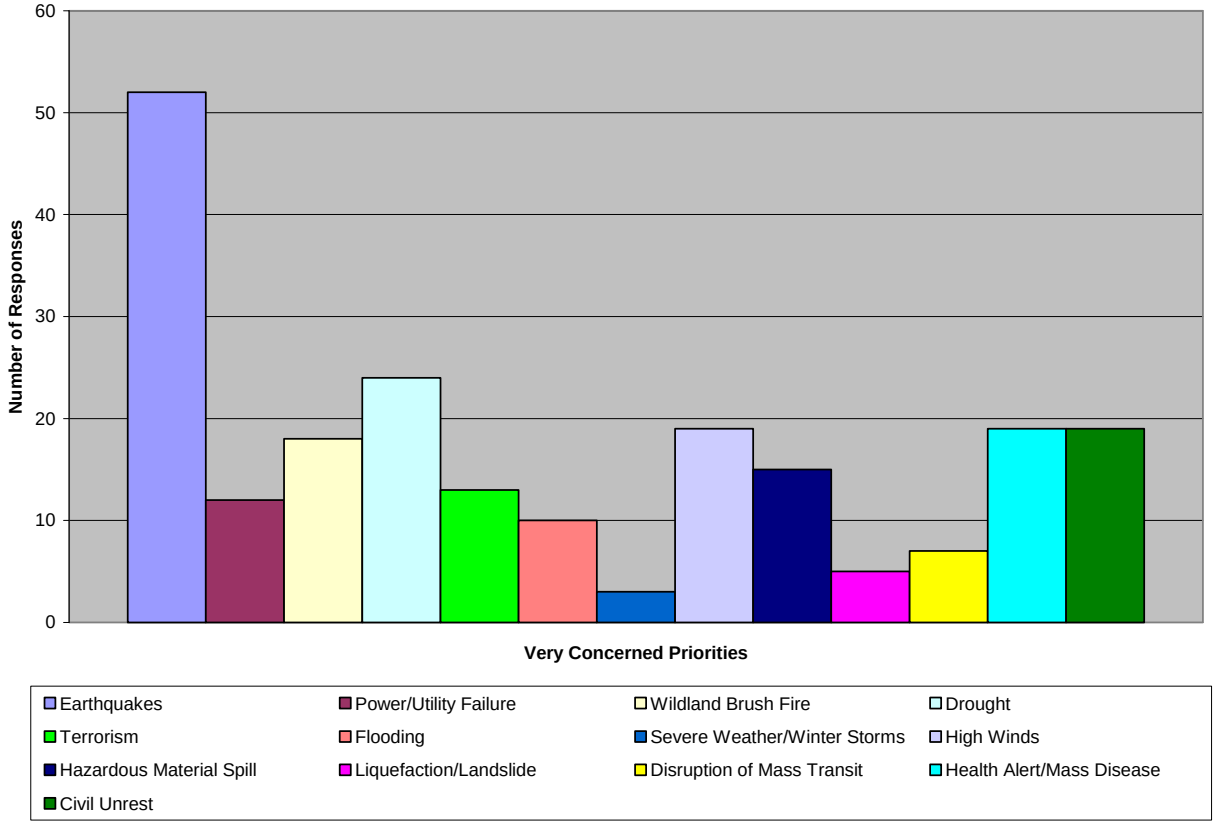


Figure 3.6A



Most Trusted Sources of Information

Respondents were also asked to indicate which sources they would trust the most to provide them with information on how to make their home or place of business safer from natural or human-caused disasters. They were given several choices and could select more than one source. **Figures 3.7 and 3.7A** are graphic representations of those responses. The most trusted sources were government agencies, the American Red Cross and Utility companies.

Figure 3.7

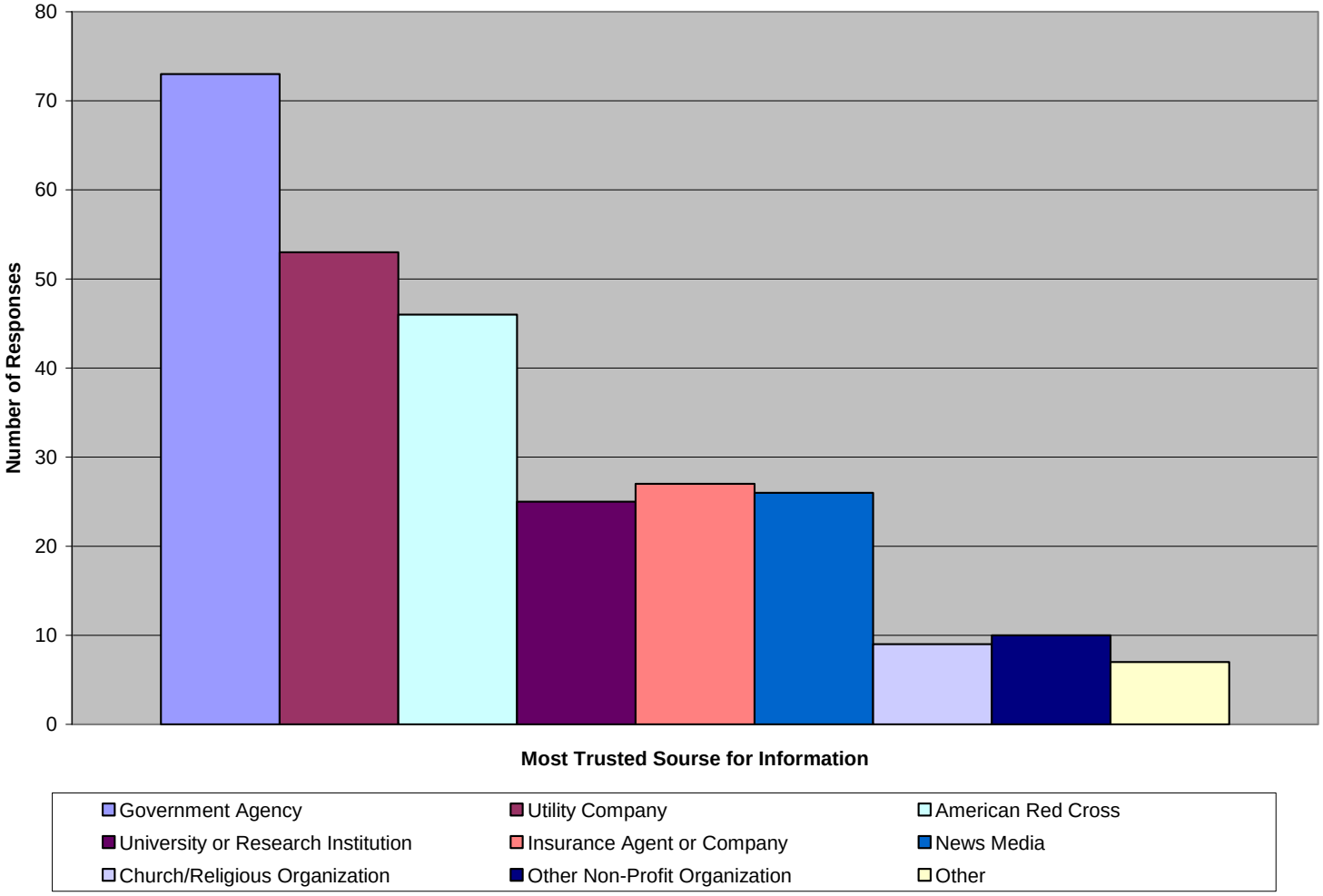
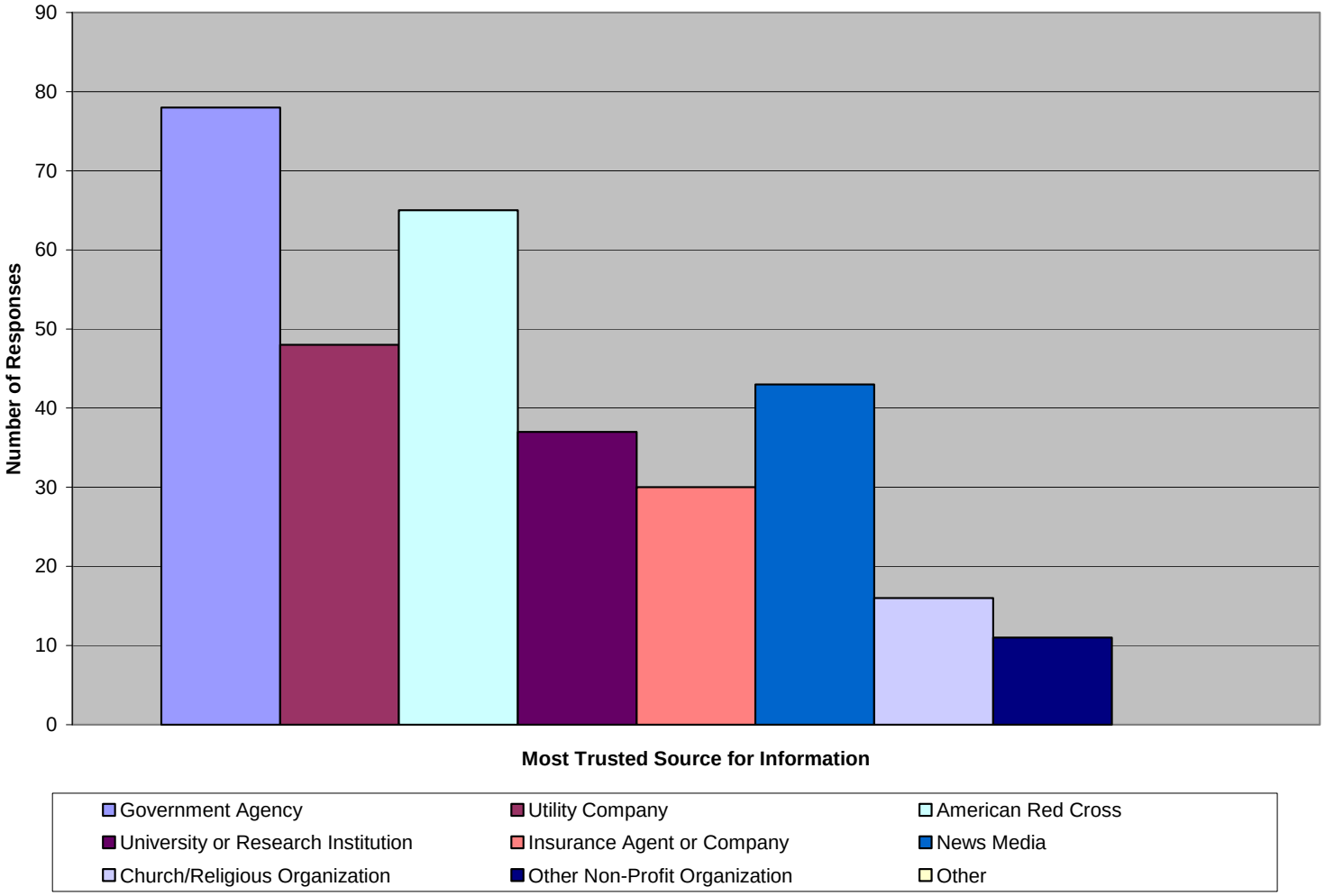


Figure 3.7A



END NOTE: Respondents were also asked to indicate what they thought the City's mitigation planning priorities should be. The information they provided is discussed in the next section, and it is reflected in the mitigation strategy of the City of Palmdale.

SECTION FOUR

MITIGATION STRATEGY

SECTION FOUR – MITIGATION STRATEGY

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

***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.*

***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.*

***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.*

OVERVIEW

The risk assessment section of this plan has identified the "what, when, and how" of hazard impacts and possible effects on the community of Palmdale. The mitigation strategy provides for the development of specific mitigation actions that will reduce or possibly remove the City's exposure and vulnerability to the risks associated with natural and technological/human-caused hazards.

As indicated previously, the mitigation plan process includes four broad tasks:

- **Organize Resources**
- **Assess Risks**
- **Develop Mitigation Plan**
- **Implement the Plan and Monitor Progress**

The LMHMP goals describe the overall direction that the City of Palmdale is taking to minimize the impacts of natural and human caused disasters. These goals are stepping-stones to activities that are outlined in the Mitigation Activities/Projects List. The goals represent the desires and concerns of the community, are future oriented, are qualitative (non-specific) and are time "independent" (not scheduled events). The goals are stated without regard to implementation cost, schedule, or means.

The LMHMP objectives are the actions that must be implemented in order to attain the stated goals. They are specific, measurable, have a defined time horizon, and have specific steps or activities that must be taken in order for the objective to be met.

Once goals and objectives were defined, the City's planning team formulated activities and/or projects that could provide the desired mitigation result. Each activity/project specifically addressed the objectives as closely as possible. Each project is required to perform a cost benefit analysis to determine level of benefits derived from the project.

The first step in implementing the LMHMP is the promulgation of the plan. This "official" adoption demonstrates the community's commitment to hazard mitigation and legitimizes the hazard mitigation planning effort. As a part of that adoption, the City will investigate potential opportunities for incorporation of the hazard mitigation plan into other existing planning mechanisms.

The hazard mitigation planning process identified the natural hazards posing a threat to the City of Palmdale and described the vulnerability of the community to these risks. Prior to forming Goals and Objectives, the planning team assessed the loss prevention mechanisms already in place. Doing so helped define City's "net vulnerability" to natural disasters and more accurately focused the Goals, Objectives, and Proposed Actions of this Plan.

Plans, Programs, Policies, and Ordinances Supporting Mitigation

Public Safety Programs

Existing public safety policies recommend a number of programs that will reduce loss of life, injury, and damage to property and the environment in the event of a disaster. These programs focus on educating the public concerning the proper procedures for avoiding hazards, the need for increased emergency preparedness, and prevention or mitigation of existing and potential hazards.

Emergency preparedness means the awareness of existing and potential hazards and the adoption of mitigation measures to preserve public health and safety. The City's policy is to give first priority to saving human lives; reducing property damage is second. The City also seeks to eliminate a hazard, reduce the risks if the hazard cannot be eliminated or avoided; but above all, to plan for any potential disasters. The prioritized hazard mitigation actions recommended in this Plan will facilitate the allocation of public funds for safety programs with compatible goals and objectives.

Coordination with County Public Safety Agencies

The City annually coordinates service needs with the County Fire Department for fire protection, and reviews the contract with the County Sheriff's Department for police protection services, to assure that adequate facilities and services are available to serve the needs of the City.

The Fire Department and Sheriff's Department are encouraged to participate in the development plan review process to ensure adequacy of services and planning for safety. The City also supports mutual aid programs with the Angeles National Forest and the USAF Plant 42 in providing public services to the Planning Area. In addition, the City coordinates long range master planning with Los Angeles County for Fire Department and Sheriff's Department Services.

Master Drainage Plan

The Master Drainage Plan is designed to provide the City with a comprehensive storm drainage system to reduce the risk of flooding.

Floodplain Standards

The City reviews development proposals for compliance with floodplain standards. Residential development is prohibited in floodplain areas unless the flood hazard has been adequately mitigated.

Hazardous Waste Management Plan

The City of Palmdale has adopted a hazardous waste management plan to comply with state law. In accordance with the Plan, all proposed developments are required to:

a. Provide a list of all chemicals that will be used in the construction and operation of the project.
b. Comply with all existing regulations governing the generation, handling, storage, transport, treatment, and disposal of hazardous wastes.
c. Identify any hazardous waste existing on a site proposed for development.

Building Codes

The City strictly enforces building and fire safety codes to minimize hazards and the demand for emergency services. The City also requires the provision of fire alarms, fire escapes, and extinguishing systems within all commercial, industrial, and multi-family developments.

Public Awareness Programs

The City promotes public awareness programs to educate and integrate Hazard Mitigation principals into all facets of community life. This public education effort is aimed at reducing or eliminating injury or death and damage to property and the environment. Educational programs include earthquake safety and fire prevention.

Provision for Public Financing Of Infrastructure

The City may assist in financing of the infrastructure needed to support new development through establishment of special financing districts, where appropriate. The City will investigate the use of similar mechanisms to finance hazard mitigation projects.

4.1 Existing City of Palmdale Goals and Objectives That Support Hazard Mitigation Actions

Safety Element Section of the General Plan

Specifically, the Safety Element informs the public of public safety goals, objectives, and policies of the City for development until 2010. It provides a comprehensive risk management program to serve as a guide for the day-to-day operational decisions of City staff. The Element evaluates the seismic, flood, geologic, wildfire, and urban fire hazards in the Planning Area, as well as aircraft accident potential, hazardous materials, and crime. It seeks to eliminate or reduce the risks to public safety through planning for the prevention of hazardous situations and for the provision of adequate emergency services. Following are the Safety Element Section Goals:

GOAL S1: Minimize danger and damage to public health, safety, and welfare resulting from natural hazards.

Objective S1.1: Review development within or adjacent to geologic hazards, to ensure adequate provisions for public safety.

Objective S1.2: Minimize hazards associated with flood plains in the area.

Objective S1.3: Ensure compatible development in areas within or adjacent to natural high fire risk areas (urban-wildland interface), and other high fire risk areas.

GOAL S2: Minimize damage associated with man-made hazards.

Objective S2.1: Minimize damage from catastrophic failure of infrastructure.
Objective S2.2: Minimize damage resulting from aircraft accidents.

Objective S2.3: Protect the public from hazardous materials and the hazards associated with the transport, storage, or disposal of such materials.

Objective S2.4: Ensure that development of a federal, state, or county prison in Palmdale shall not impact the health, safety, and lifestyle of residents.

Objective S2.5: Minimize potential hazards related to crime through the development review process and through on-going public education programs.

Objective S2.6: Minimize exposure of residents to other man-made hazards, to the extent feasible.

GOAL S3: Maintain and enhance City emergency services.

Objective S3.1: Prepare the Palmdale community to be self-sufficient in the event of an emergency.

GOAL S4: Protect public safety through the implementation and enforcement of City Ordinances and through public education.

Objective S4.1: Develop, implement and enforce City Codes to insure safe and sanitary living and working conditions throughout the City.

Objective S4.2: Support the development and continued updating of public education programs on health and safety.

Public Services Element of the General Plan

The Public Services Element of the General Plan establishes a framework for provision of infrastructure and public services to existing and new development in a timely and cost-efficient manner. The Element provides background information on issues and opportunities relative to infrastructure planning, as well as goals, objectives and policies to ensure effective coordination of public service provision with development.

Because of Palmdale's rapid growth and dispersed development pattern, the City faces significant challenges in providing public improvements such as regional drainage and traffic facilities.

GOAL PS3: Develop and maintain adequate storm drainage and flood control facilities.

Objective PS3.1: Maintain and implement the City's adopted Master Drainage Plan.

Objective PS3.2: Coordinate drainage master planning with environmental resource management.

GOAL PS5: Support the provision of adequate public and community services to meet the needs of residents.

Objective PS5.1: Ensure provision of fire protection facilities and equipment needed to protect existing and future development.

Objective PS5.2: Support the provision of adequate law enforcement services to meet the needs of City residents.

Objective PS5.7: Provide enforcement services to ensure compliance with municipal codes and ordinances, to protect public health and safety, preserve property values, and maintain a clean and orderly environment for Palmdale residents.

Objective PS6.2: Adopt and implement the City's Hazardous Waste Management Plan (HWMP).

GOAL PS7: Provide for open space elements throughout the planning area that preserve significant natural, historic, scenic, and topographic features while minimizing fiscal impacts to the City and its residents.

Objective PS7.1: Ensure that any land proposed for acquisition, dedication or that is maintained by the City will contribute benefits to the general public, and that short- and long-term impacts of accepting responsibility for such land are adequately evaluated by the City.

4.2 Setting New Hazard Mitigation Goals

The Risk Assessment element of this Plan documents the risks from and vulnerabilities to the natural hazards that threaten the City of Palmdale. Coupled with the additional information provided through the assessment of existing mitigation capabilities, the City was able to begin to formulate mitigation planning goals.

Before formulating the goals, the planning team first reviewed planning goals in general. Each planning team member was provided with a written and graphic explanation of Goals and Objectives, the purpose they serve and how they are developed and written. Following this activity, each planning team member was provided with a list of sample goal statements. Some of these goals were from the State of California and the Los Angeles County mitigation plans and from nearby cities. Others were developed as a result of analyzing the Risk Assessment and some were existing community planning goals, such as “Improve Public Safety Services,” that are compatible with hazard mitigation.

The planning team participated in a discussion on the sample goal statements and developed an understanding of the relationship between goals and objectives and the recommended actions that they would later be tasked to formulate.

Based upon the planning data review, the planning team developed the final goal statements and related objectives. These goals and objectives provide direction for reducing future hazard-related losses within City of Palmdale.

4.3 City of Palmdale Hazard Mitigation Goals & Objectives

MISSION

The mission of the City of Palmdale's Local Hazard Mitigation Program is to establish and promote a comprehensive mitigation policy and program to protect, from natural and manmade hazards, 1) the lives of citizens and workers within the City; 2) property and facilities of residents, businesses, institutions, and governmental agencies; and 3) infrastructure and the environment.

GOALS

1. Protect Life and Property

OBJECTIVES:

1A. Continue to identify natural and manmade hazards that threaten life and property in the City of Palmdale.

1B. Implement programs and projects that assist in protecting lives by making infrastructure, critical facilities, and other property more resistant to losses from all hazards.

1C. Maintain standards, codes, and construction practices that to assist in protecting life and property.

1D. Reduce losses and repetitive damages from repetitive hazard events, while promoting insurance coverage for catastrophic hazards.

1E. Continue to implement facility and/or retrofit projects in both the City's 10 year Capital Improvement Project Plan and in the City's annual budget plan. These projects will help reduce damage during either a natural or manmade hazard.

1F. Improve traffic circulation during floods and other events.

2. Increase Public Awareness

OBJECTIVES:

2A. Increase public awareness of existing threats and the means to reduce these threats by conducting educational and outreach programs to all the various community groups in the City of Palmdale.

2B. Develop informational material for distribution to the public regarding general emergency preparedness. Promote this material through the Palmdale newsletter, Channel 27 promotional announcement, and displays at community events.

3. Strengthen Partnerships

OBJECTIVES:

3A. Strengthen communications and coordinate participation between the City and public agencies, schools, non-profit organizations, business and industry to gain a vested interest in mitigation measures.

3B. Encourage and support leadership within the private sector, non-profit agencies and community based organizations to promote and implement local hazard mitigation activities.

3C. Forward development plans as appropriate to the Los Angeles County Fire Department, State Department of Mines and Geology and other agencies who evaluate potential hazards and ensure that the recommendations from these agencies are incorporated into the project design through required conditions of approval.

3D. Encourage property-owner self-protection measures.

4. Provide Responsive Emergency Services

OBJECTIVES:

4A. Establish policies to insure the implementation of mitigation programs and projects for critical facilities, services, and infrastructure.

4B. Continue to provide training and invest in equipment for City workers to address all identified hazards.

4C. Continue developing and strengthening inter-jurisdictional coordination and cooperation in the area of emergency services.

5. Promote Environmental Preservation

OBJECTIVES:

5A. Consider natural and manmade hazard mitigation in developing land use plans to protect life, property and the environment.

6. Provide Responsible Stewardship of Public Funds

OBJECTIVES:

6A. Prioritize mitigation projects, starting with sites facing the greatest threat to life, health, and property.

6B. Use public funding to protect public services and critical facilities.

6C. Maximize the use of outside funding sources.

4.4 Selecting and Prioritizing Hazard Mitigation Measures

Mitigation Strategies

In order to ensure that proposed mitigation actions were developed in a systematic fashion, the first step was to determine an overall strategic approach. The Hazard Mitigation Steering Committee developed the following mitigation strategies:

Enforcement. The City has previously adopted numerous ordinances and policies that relate to hazard mitigation. Among these are the building codes, specific plan requirements, and policies found in the General Plan. Existing regulations should be periodically reviewed and modified as necessary to take advantage of experience gained from hazard events and new technology.

Inter-Agency Coordination. By working with other agencies in the Antelope Valley, the City benefits from the resources and expertise that these agencies have to offer. Joint projects increase efficiency, can be extremely effective, avoid duplication, and stretch scarce resources.

Public Information and Education. Public information and education programs are a cost effective method to motivate individuals and institutions to implement hazard mitigation actions on their own.

Management. Effective hazard mitigation programs do not just happen; they are the result of management attention and direction. A management structure that includes designated responsibility and accountability for implementation of hazard mitigation actions is necessary for success.

Mitigation Projects. Mitigation projects may include measures to protect City facilities and critical infrastructure from damage, non-structural mitigation projects, and staff training.

Selection/Prioritization

The process of selecting and prioritizing mitigation actions began with each member of the Core Team developing a "wish list," that considered community planning assessment responses and included input from the Mitigation Planning Committee, as well as their own ideas. Individual

"wish lists" were then consolidated into a single list of several dozen projects. The Core Team determined that the list needed to contain no more than 25 projects, and preferably less. In order to select the measures/actions that should be part of this LMHMP, the Core Team initially used three criteria: **What actions had the most serious consequences if not implemented? What actions could be implemented by existing staff with funding resources available internally (or externally)? What actions responded to the primary concerns of the community?** After much discussion within the Core Team, a final list of 25 actions was developed, reviewed and approved by the full Committee. The actions were not prioritized, however. (**NB:** At the suggestion of FEMA, and with the consensus of the Committee, an additional action was added to this iteration of the LMHMP Plan that is aimed at protecting future buildings and infrastructure).

Once the projects had been selected, the Core Team established priorities. Establishment of priorities for hazard mitigation helps to assure that projects will be implemented in a systematic fashion. Priorities are intended as guidelines for action, not as a rigid requirement. The order that projects are listed in is not necessarily the order that they will be implemented; projects ranked High by the City are of the first priority. Many factors were taken into consideration in the development of hazard mitigation priorities. These factors included, but were not limited to:

- Percent of population at risk
- Frequency, intensity, and likelihood of hazard; repetitive loss areas
- Types/percent of land areas at risk; development pressure
- Cost effectiveness of measure; Sources of available funding

Benefit-Cost Analysis Requirements

The FY 2003 Pre Disaster Mitigation (PDM) program was established by Congress as a nationally competitive mitigation grant program. The benefit-cost ratio (BCR) of each mitigation project is a major factor in the evaluation of PDM projects. Mitigation projects with higher BCRs are more likely to be funded in the nationally competitive PDM program.

The Federal Office of Management and Budget OMB Circular A-94 describes the economic principles and methods by which most federal programs must determine the cost effectiveness (i.e., BCR) of funded projects. OMB A-94 states: *"Analyses should include comprehensive estimates of the expected benefits and costs to society based on established definitions and practices for program and policy evaluation. Social net benefits, and not the benefits and costs to the Federal Government, should be the basis for evaluating government programs or policies that have effects on private citizens or other levels of government."*

The benefits of mitigation projects can simply be the value of avoided damages, losses, and casualties. Other benefits generated could be environmental, economic, cultural, and societal in nature.

Examples of common benefits include avoided (or reduced):

- Damages to buildings, contents, or infrastructure

- Economic impacts of loss of function of buildings
- Displacement costs for temporary quarters
- Loss of public services
- Loss of net business income
- Economic impacts of loss of function of infrastructure
  - Road or bridge closures
  - Loss of utility services
- Deaths and injuries

While cost magnitude was a consideration in establishing hazard mitigation priorities, detailed cost-benefit analyses were not performed. A BCR will be calculated for any projects that are submitted for federal funding at the time of grant application preparation.

4.5 Recommended Mitigation Actions

This section provides proposed mitigation actions (in the form of recommendations) under the following six (6) categories: *Prevention; Property Protection; Public Education and Awareness; Natural Resource Protection; Emergency Services;* and *Structural Projects*.

The recommendations that follow are those that would have a long term, beneficial impact upon the entire city, neighboring communities, and participating districts. These recommendations will be made with the knowledge and consent of the entire Palmdale community by virtue of the formal adoption of this plan. The initial priorities were based upon the following criteria: *High, Medium, Low priority with regard to protection of life/property and risk. The City also evaluated per an approved FEMA method based upon the following levels.* See Table 4-1.

- *Level 1* - Requires human resources, but not necessarily financial resources
- *Level 2* - Can be accomplished primarily by City staff, but requires financial resources, internal or external
- *Level 3* - Requires external expertise/consultant and financial resources, internal or external
- *Level 4* - Requires multiple entity/agency participation, environmental reviews, and external human and financial resources.

Table 4-1
Mitigation Action Prioritization

ITEM	PROJECT	CATEGORY	RANKING (CITY)	RANKING (FEMA)
1	Risk Analysis & Potential losses from flooding	Prevention	Medium	3
2	Risk Analysis & Potential losses from wildfires	Prevention	Medium	3
3	Implement community based Nonstructural Mitigation program	Property Protection	High	3
4	T-Bar Seismic Bracing to City Facilities	Property Protection	Medium	2
5	Develop Seasonal Multi-Hazard Public Education Campaign	Property Protection	Medium	2
6	Earthquake Education Program	Property Protection	Low	2
7	Update the City's Master Plan of Drainage	Natural Resource Protection	High	3
8	**Upgrade existing City EOC	Emergency Services	High	3
9	**Develop 3-7 day shelter, food and water plan	Emergency Services	Medium	2
10	**Establish shelter	Emergency Services	Medium	4
11	Survey City for existing soft story construction	Emergency Services	Medium	3
12	**Purchase and training of Emergency Notification System	Emergency Services	High	3
13	Ongoing upgrades to Los Angeles Regional Image Acquisition Consortium	Emergency Services	High	3

Table 4-1 (cont'd)

ITEM	PROJECT	CATEGORY	RANKING (CITY)	RANKING (FEMA)
14	**Re-evaluate the City's evacuation routes	Emergency Services	High	2
15	**Create shelter and medication disbursement plan	Emergency Services	Low	3
16	Create additional emergency related GIS layers	Emergency Services	Low	2
17	Amargosa Creek Flood Control Improvement	Structural Projects	Medium	4
18	Anaverde Creek Regional Channel Improvements	Structural Projects	Medium	4
19	Anaverde Creek – Rayburn Rd & Avenue R Storm Drain	Structural Projects	Medium	4
20	Anaverde Detention Basin @ Pelona Vista Park	Structural Projects	Medium	4
21	Hunt Canyon Drainage Basin	Structural Projects	High	4
22	Avenue P Pearland Drainage Improvements	Structural Projects	Medium	4
23	Avenue S Pearland Drainage Improvements	Structural Projects	Low	4
24	Palmdale Blvd. Pearland Drainage Improvements	Structural Projects	Low	4
25	Avenue O Portal Ridge Drainage Improvements	Structural Projects	Low	4
26	Protect future buildings and/or infrastructure	Protection & Prevention	High	1
**	Preparedness/Response Activity			

Each of the recommended mitigation actions proposed by the City of Palmdale is described in the following pages. Each description contains:

- Project Title & Description
- Issue/Background Statement
- Other Alternatives Considered
- Responsible Office/Person
- Funding Source
- Cost
- Benefits
- Implementation Schedule
- Priority

PREVENTION

Recommended Action Item #1:

Project Title/Description: Risk Analysis and Estimate of Potential Losses from Flooding, Dam Failure, and Inundation

Goal Addressed: GOAL # 1 – Protect Life and Property; GOAL # 4 – Provide Responsive Emergency Services; GOAL # 5 – Promote Environmental Preservation; GOAL # 6 – Provide Responsible Stewardship of Public Funds

Objectives Involved: 1A; 1B; 1C; 1D; 4A; 5A; 6A

Issue/Background Statement: At the time of preparing the Hazard Mitigation Plan, the City did not have the resources to determine the risks from flooding, dam failure, and inundation. Gathering this data will expand existing risk analysis and allow the City to more accurately estimate potential losses from these hazards, and determine effective and realistic mitigation strategies.

Alternatives Considered: None

Responsible Offices/Persons: Public Works/City Consultant

Funding Source: City General Funds

Cost: $10,000-20,000

Benefit: Injury prevention and reduced property losses

Implementation Schedule: Project is dependent upon availability of funds.

Priority: Medium (3)

Recommended Action Item #2:

Project Title/Description: Risk Analysis and Estimate of Potential Losses from Wildfires

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 3 – Strengthen Partnerships: GOAL # 4 – Provide Responsive Emergency Services; GOAL # 5 – Promote Environmental Preservation; GOAL # 6 – Provide Responsible Stewardship of Public Funds

Objectives Involved: 1A; 1B; 1C; 1D; 3C; 3D; 4A; 5A; 6A

Issue/Background Statement: At the time of preparing the Hazard Mitigation Plan, the City did not have the resources to determine the risks from wildfires/urban interface fires. Gathering this data will expand existing risk analysis and allow the City to more accurately estimate potential losses from these hazards, and determine effective and realistic mitigation strategies.

Alternatives Considered: None

Responsible Offices/Persons: Public Works/City Consultant

Funding Source: City General Funds

Cost: $10,000-20,000

Benefit: Injury prevention and reduced property losses

Implementation Schedule: Project is dependent upon availability of funds.

Priority: Medium (3)

PROPERTY PROTECTION

Recommended Action #3:

Project Title/Description: Implement a community based Non-structural Mitigation Program.

Goal Addressed: GOAL # 1 – Protect Life and Property; GOAL # 2 – Increase Public Awareness; GOAL # 3 – Strengthen Partnerships; GOAL # 4 – Provide Responsive Emergency Services; Provide Responsible Stewardship of Public Funds

Objectives Involved: 1A; 1B; 1C; 1D; 1E; 2A; 2B; 3B; 3D; 4A; 6A; 6B

Issue/Background Statement: Securing non-structural elements may best be seen as an inherent part of local governments' responsibility to maintain a safe working environment for its employees. Non-structural mitigation actions can reduce earthquake-induced damage and injury and help maintain a satisfactory level of service following an earthquake event.

The program includes the identification of non-structural earthquake hazards in building spaces and the implementation of protection measures. Program issues related to necessary skills, safety, budgets, consistency, and liability generally require that City staff manage the non-structural protection program.

Guiding principles
The assumptions and philosophies behind the City Nonstructural Earthquake Protection Program are:

- Strong earthquake ground shaking will damage non-structural elements in buildings.
- City buildings on or near known faults are at great risk of being damaged by an earthquake; Palmdale, and all of Los Angeles County can be exposed to earthquake hazards capable of damaging nonstructural elements of the building.
- Maintenance of existing mechanical systems, bracing, and retrofitting of vulnerable non-structural elements of the facility will reduce damage and foster sustainability.

Other Alternatives Considered: Do nothing

Responsible Offices/Persons: Emergency Management/Building & Safety Dept.

Funding Source: City General Fund.

Cost: To be determined at a later date

Benefit: Life Safety, reduced losses, increased insurance coverage

Implementation Schedule: Ongoing. Begin FY 2009

Priority: High (3)

Recommended Action Item #4:

Project Title/Description: T-Bar Seismic Bracing to City Facilities

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 6 – Provide Responsible Stewardship of Public Funds

Objectives Involved: 1A; 1B; 1C; 1D; 1E; 6A; 6B

Issue/Background Statement: Upgrade T-Bar seismic bracing to all City facilities to mitigate against impact of an earthquake.

Alternatives Considered: None

Responsible Offices/Persons: Public Works/Building & Safety Dept.

Funding Source: Hazard Mitigation Grant/City General Funds

Cost: $250,000 – $300,000

Benefit: Prevention of injury or loss of life; prevention of facility damage.

Implementation Schedule: Project is dependent upon availability of funds.

Priority: Medium (2)

PUBLIC EDUCATION AND AWARENESS

Recommended Action Item #5:

Project Title/Description: Develop a Seasonal Multi-Hazard Public Education Campaign to be implemented annually.

Goal Addressed: GOAL # 1 – Protect Life and Property; GOAL # 2 – Increase Public Awareness; GOAL # 3 – Strengthen Partnerships

Objectives Involved: 1A; 1B; 1C; 1D; 1E; 1F; 2A; 2B; 3A; 3B; 3D

Issue/Background Statement: The planning team gathered important and interesting information regarding the hazards that pose a threat to the health and safety of City of Palmdale, the likely impacts of such hazards, and reasonable measures that can be undertaken by individuals and organizations to reduce the impact of such inevitable events. This information needs to be made public in a multifaceted approach that addresses the hazards when they occur and where they occur. Public Education is one of the primary mechanisms in reducing future hazard related losses, and one that is inexpensive in comparison to other mitigation projects. This effort should be coordinated between the many organizations that already have extensive and/or limited programs in place.

Other Alternatives Considered: Utilize other innovative outreach methods to get the public's attention.

Responsible Offices/Persons: Emergency Management

Funding Source: City General Fund

Cost: Incremental. A single citywide mailing to 43,000 residential units (at $.41 per mailing) would cost $17,630. This program should build on existing programs and agencies that are already incurring these costs, and explore other avenues of public outreach, schools, public utility newsletters, flyers, etc.

Benefit: Life Safety, reduced losses, increased insurance coverage

Implementation Schedule: Ongoing. Begin FY 2009

Priority: Medium (2)

Recommended Action Item #6:

Project Title/Description: Earthquake Education Program

Goal Addressed: GOAL # 2 – Increase Public Awareness, GOAL # 3 – Strengthen Partnerships

Issue/Background Statement: Hold public meetings to acquire information from homeowners on their specific needs, explain what resources are available and what procedures to take in the event of a major earthquake. Send literature to all homeowners addressing earthquake problems and what homeowners can do to reduce vulnerability.

Other Alternatives Considered: Utilize other innovative outreach methods to get the public's attention, including the City of Palmdale website.

Responsible Offices/Persons: Emergency Management

Funding Source: City General Fund.

Cost: Incremental. A single citywide mailing to 43,000 residential units (at $.41 per mailing) would cost $17,630. This program should build on existing programs and agencies that are already incurring these costs, and explore other avenues of public outreach, schools, public utility newsletters, flyers, etc.

Benefit: Life Safety, reduced losses, increased insurance coverage

Implementation Schedule: Ongoing. Begin FY 2009

Priority: Low (2)

NATURAL RESOURCE PROTECTION

Recommended Action Item #7:

Project Title/Description: Update the City's Drainage Master Plan.

Goal Addressed: GOAL # 1 - Protect Life and Property; GOAL #5 – Promote Environmental Preservation; GOAL #6 – Provide Responsible Stewardship of Public Funds

Issue/Background Statement: The City's Master Plan of Drainage is intended to provide the basis for making decisions regarding storm drainage and watershed management and to provide a funding mechanism for implementing such decisions. The current plan is well over a decade old and in need of updating, especially to address the latest requirements imposed by Federal and State authorities and other watershed issues.

Other Alternatives Considered: Continue use of existing Master Plan.

Responsible Offices/Persons: Public Works/City Consultant

Funding Source: City General Fund.

Cost: Costs are to be determined at a later date.

Benefit: Life Safety, reduced losses.

Implementation Schedule: Begin FY 2006

Priority: High (3)

EMERGENCY SERVICES

Recommended Action Item #8: Preparedness Activity

Project Title/Description: Upgrade existing City of Palmdale Emergency Operations Center (EOC) to meet current seismic standards and provide for better communication infrastructure, data implementation, and visual aids.
Goal Addressed: GOAL # 1 - Protect Life and Property

Issue/Background Statement: The City Emergency Management department and Steering Committee and the Public Works Department will gather necessary information and requirements to bring the existing City of Palmdale's EOC up to current seismic standards. The team will also work on providing up to date database information about City's critical facilities

via the City's GIS system to all departments involved in the EOC operation. Additional equipment for transmission of information between field EOC staff and administrative EOC staff will be necessary to allow for continues updates to the GIS database.

Other Alternatives Considered: Continue use of existing equipment and provide additional training for staff.

Responsible Offices/Persons: City Emergency Management/Steering Committee

Funding Source: City General Fund.

Cost: Costs are to be determined at a later date upon further research of the existing structural facility and necessary equipment.

Benefit: Life Safety, reduced losses, better response time

Implementation Schedule: Ongoing. Begin FY 2006

Priority: High (3)

Recommended Action Item #9: Preparedness Activity

Project Title/Description: Develop three to seven day shelter, food, and water plan for emergency workers. This would include isolating and use of specific grocery stores, water storage tanks, gas stations, hotels, etc.

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 3 – Strengthen Partnerships and GOAL # 4 – City Emergency Services

Issue/Background Statement: The Steering Committee is to implement a plan with local commercial services (i.e. housing, food, water, gas, etc) to provide specific services to emergency workers in the event of either a natural or manmade hazard.

Other Alternatives Considered: Utilize other innovative outreach methods to get the public's attention.

Responsible Offices/Persons: City Emergency Management offices.

Funding Source: City General Fund.

Cost: Cost cannot be determined at this time until negotiations and agreements with commercial services have been implemented.

Benefit: Life Safety, reduced losses

Implementation Schedule: Ongoing.

Priority: Medium (2)

Recommended Action Item #10: Preparedness Activity

Project Title/Description: Establish a shelter for use in a disaster.

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 3 – Strengthen Partnerships, GOAL # 4 – City Emergency Services

Issue/Background Statement: The City of Palmdale doesn't have many buildings that are categorized as emergency and/or evacuation shelters. In the event of a disaster, the City would be able to use existing park sites with rental tents. The City would look at demolishing an existing un-reinforced masonry facility, currently used as a youth center, and would build a 15,000 square foot shelter/community center in its place.

Other Alternatives Considered: Continue using the existing facilities.

Responsible Offices/Persons: City of Palmdale

Funding Source: Hazard Mitigation Grant/City General Fund/Park and Recreation

Cost: $5 million

Benefit: Life Safety, reduced losses

Implementation Schedule: When funding becomes available

Priority: Medium (4)

Recommended Action Item #11:

Project Title/Description: Survey city for existing soft story construction, hazard material storage, and develop mitigation methods.

Goal Addressed: GOAL # 1 - Protect Life and Property

Issue/Background Statement: The Steering Committee will investigate and survey the City for existing soft story construction and hazardous material storage site, developing data for the City's existing GIS system. Once information is required, Steering Committee will develop mitigation methods to either protect the facility in place and/or protect the surrounding areas in the event of either a natural or a man made hazard.

Other Alternatives Considered: Continue use of existing information.

Responsible Offices/Persons: Steering Committee, Building and Safety Department

Funding Source: City General Fund.

Cost: To be determined based upon scope of work; information gathering will be responsibility of City Staff.

Benefit: Improvement of Life Safety, reduced losses, increased database information in the City's GIS system.

Implementation Schedule: Ongoing.

Priority: Medium (3)

Recommended Action Item #12: Preparedness Activity

Project Title/Description: Purchase and train staff in the use of an Emergency Notification System

Goal Addressed: GOAL # 4 – City Emergency Services

Issue/Background Statement: To provide for the purchase and training of Emergency Response Software. This software will allow for the City's 1st responders to be better trained and equipped to handle a disaster.

Other Alternatives Considered: Continue following the existing guidelines of the City's Emergency Operations Plan.

Responsible Offices/Persons: Emergency Operations Center

Funding Source: Hazard Mitigation Grant/City General Funds

Cost: $115,000 annually

Benefit: Increases knowledge and training for the City's Emergency Operations, which will translate into more effective response during a disaster.

Implementation Schedule: Project is dependent upon availability of funds.

Priority: High (3)

Recommended Action Item #13:

Project Title/Description: Los Angeles County Aerial Consortium ongoing upgrades

Goal Addressed: GOAL # 4 – City Emergency Services

Issue/Background Statement: To provide for the purchase of Los Angeles County data to be used by the City's GIS system.

Other Alternatives Considered: Continue using existing aerial data that is not the most current in many instances.

Responsible Offices/Persons: GIS Department

Funding Source: Hazard Mitigation Grant/City General Funds

Cost: $75,000

Benefit: Expand the capacity of the City's existing GIS system.

Implementation Schedule: Project is dependent upon availability of funds.

Priority: High (3)

Recommended Action Item #14: Preparedness Activity

Project Title/Description: Re-evaluate the City's Evacuation Routes and create new GIS layer for EOC purposes

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services

Issue/Background Statement: City needs additional information to determine evacuation routes out of the City, should an emergency be declared.

Other Alternatives Considered: Continue following the existing evacuation route data

Responsible Offices/Persons: GIS Section

Funding Source: Hazard Mitigation Grant/City General Funds

Cost: $75,000

Benefit: Increased emergency response effectiveness, expansion of GIS system data

Implementation Schedule: Project is dependent upon availability of funds
Priority: High (2)

Recommended Action Item #15: Preparedness Activity

Project Title/Description: Create a comprehensive emergency shelter and medication disbursement plan for EOC purposes

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services

Issue/Background Statement: A comprehensive plan for the disbursement of medication and shelter provision during and after a disaster does not exist.

Other Alternatives Considered: Continue following existing EOC plan which may not have most current information

Responsible Offices/Persons: Emergency Operations Center

Funding Source: Hazard Mitigation Grant/City General Funds

Cost: $75,000

Benefit: Increase in the effectiveness of 1st responders and EOC staff and protection of health and safety.

Implementation Schedule: Project is dependent upon availability of funds

Priority: Low (3)

Recommended Action Item #16:

Project Title/Description: Create several other Emergency Related GIS layers as identified and needed by the City

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services

Issue/Background Statement: Additional information is needed to increase efficiency of Emergency Operations and 1st responders.

Other Alternatives Considered: Continue using the existing GIS data

Responsible Offices/Persons: GIS Section

Funding Source: Hazard Mitigation Grant/City General Funds

Cost: $25,000 to $30,000/per layer

Benefit: Increase information to provide to the City's existing GIS system.

Implementation Schedule: Project is dependent upon availability of funds

Priority: Low (2)

STRUCTURAL PROJECTS

Recommended Action Item #17:

Project Title/Description: Amargosa Creek Flood Control Improvements

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: Construction of improvements to the Amargosa Creek between Avenue O and Avenue M, including channelization of the ephemeral creek, the upgrade of the existing box culverts at Avenue O and Avenue M, and the installation of a box culvert at Avenue "N".

Other Alternatives Considered: Continue allowing water to travel its natural course and continually install traffic closures and repair of intersections due to floodwater.

Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $6.5 million

Benefit: Reduce flood damage to street intersections, provide for safer travel for citizens, reduce costs for pavement and channel repair.

Implementation Schedule: Project is currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Medium (4)

Recommended Action Item #18:

Project Title/Description: Anaverde Creek Regional Channel Improvements

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: Regional improvements to the ephemeral creek and its tributaries, within the area bounded by Avenue Q, Rancho Vista Blvd, State Highway 14 and 15th Street East, including channelization, storm drain piping and box culverts, including the Detention Basin at Rancho Vista Blvd & 10th St. East (Lockheed Property).

Other Alternatives Considered: Continue allowing water to travel its natural course and continually install traffic closures and repair of intersections due to floodwater.
Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $30.0 million

Benefit: Reduce flood damage to street intersections, provide for safer travel for citizens, reduce costs for pavement and channel repair.

Implementation Schedule: Project is composed of several individual projects currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Medium (4)

Recommended Action Item #19:

Project Title/Description: Anaverde Creek - Rayburn Rd. and Avenue R Storm Drain

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: To provide for the construction of a 10' x 7' box culvert along Avenue R downstream from the proposed Anaverde Basin (which is located southwest of Rayburn Rd and the A.V. Freeway) from the basin outlet to the SPRR tracks near Sierra Highway.

Other Alternatives Considered: Continue allowing water to travel its natural course and continually install traffic closures and repair of intersections due to floodwater.

Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $22 million

Benefit: Reduce flood damage to street intersections, provide for safer travel for citizens, reduce costs for pavement and channel repair.

Implementation Schedule: Project is currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Medium (4)

Recommended Action Item #20:

Project Title/Description: Anaverde Detention Basin, Dam & Spillway @ Pelona Vista Park

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: Construction of Pelona Vista Dam to include grading, inlet/outlet structures, spillway and storm drain piping. This dam is located on the west side of Hwy 14, south of Rayburn Road.

Other Alternatives Considered: Continue to allow water to travel its natural course/spend funds to upgrade existing underground storm drain systems.

Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $21 million
Benefit: Reduce flood damage to adjacent critical facilities

Implementation Schedule: Project is currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Medium (4)

Recommended Action Item #21:

Project Title/Description: Hunt Canyon Drainage Basin

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: Acquisition and construction of a 3000-acre foot regional detention basin, south of Pearblossom Hwy. at 47th Street East.

Other Alternatives Considered: Continue to allow water to travel its natural course/spend funds to upgrade existing underground storm drain systems.

Responsible Offices/Persons: City of Palmdale

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $35.5 million

Benefit: Reduce flood damage to downstream critical facilities

Implementation Schedule: Project is currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: High (4)

Recommended Action Item #22:

Project Title/Description: Avenue P Pearland Drainage Improvements

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: To provide for the construction of storm drain piping, box culverts and detention basins within the Pearland Watershed, south of Avenue P and north of Palmdale Blvd, including the Q-West Basin, Q-East Basin.

Other Alternatives Considered: Continue allowing water to travel its natural course and continually install traffic closures and repair of intersections due to floodwater.

Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $32.0 million

Benefit: Reduce flood damage to street intersections, provide for safer travel for citizens, reduce costs for pavement and channel repair.

Implementation Schedule: Project is currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Medium (4)

Recommended Action Item #23:

Project Title/Description: Avenue S Pearland Drainage Improvements

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: To provide for the construction of storm drain piping, box culverts and detention basins within the Pearland Watershed, south of Avenue S and north of Pearblossom Highway, including the Barrel Springs Basin.

Other Alternatives Considered: Continue allowing water to travel its natural course and continually install traffic closures and repair of intersections due to flood water, and spend funds to upgrade existing underground storm drain systems.

Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $29.4 million

Benefit: Reduce flood damage to street intersections, provide safer travel for citizens, reduce costs for pavement and channel repair, reduced impact to downstream properties.

Implementation Schedule: Project is composed of several individual projects budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Low (4)

Recommended Action Item #24:

Project Title/Description: Palmdale Blvd Pearland Drainage Improvements

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: To provide for the construction of storm drain piping, box culverts and detention basins within the Pearland Watershed, south of Palmdale Blvd and north of Avenue S, including the 25th St. East Basin

Other Alternatives Considered: Continue allowing water to travel its natural course and continually install traffic closures and repair of intersections due to flood water, including State Highway 138.

Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $14.9 million

Benefit: Reduce flood damage to street intersections, provide for safer travel for citizens, reduce costs for pavement and channel repair.

Implementation Schedule: Project is currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Low (4)

Recommended Action Item #25:

Project Title/Description: Avenue O Portal Ridge Drainage Improvements

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 4 – City Emergency Services, GOAL # 5 – Environmental Preservation

Issue/Background Statement: To provide for the construction of storm drain piping, box culverts and detention basins within the Portal Ridge Watershed, south of Avenue O, including the Fulham Basin.

Other Alternatives Considered: Continue allowing water to travel its natural course and continually install traffic closures and repair of intersections due to flood water.

Responsible Offices/Persons: Public Works

Funding Source: Hazard Mitigation Grant/City Drainage Funds

Cost: $4.3 million

Benefit: Reduce flood damage to street intersections, provide for safer travel for citizens, reduce costs for pavement and channel repair.

Implementation Schedule: Project is currently budgeted in the City of Palmdale's 10-year Capital Improvement program. Project is dependent upon availability of funds.

Priority: Low (4)

Recommended Action Item #26:

Project Title/Description: Protect Future Buildings/Infrastructure

Goal Addressed: GOAL # 1 – Protect Life and Property, GOAL # 3 – Strengthen Partnerships, GOAL # 5 – Environmental Preservation

Issue/Background Statement: Implement annual review process to assure that the mitigation goals and objectives of the LMHMP are compatible with the land use development and land planning goals and objectives of the General Plan.

Other Alternatives Considered: None

Responsible Offices/Persons: Public Works

Funding Source: Existing Operating Budget

Cost: NA

Benefit/Implementation Schedule: Provides comprehensive approach to assuring hazard mitigation is part of all plans for future development; will be implemented as part of the annual LMHMP review.

Priority: High (1)

4.6 COMMUNITY PLANNING PRIORITIES – Survey Results

Planning Priorities

As part of the community survey, respondents were asked what they thought the mitigation planning priorities should be for the City of Palmdale and which priority was the most important.

Their responses were taken into account as goals, objectives, and actions were developed. The figures on the following pages reflect 2004 and 2008 responses. If there were significant differences in priorities between the two surveys, those differences are noted in the narrative following the figures.

Almost 90% of the combined respondents from both groups felt that protecting critical facilities was a very important priority and 72% felt the same about strengthening emergency services. Additionally, about 50% felt that protecting private property should be very important priority. Preventing development in hazard prone areas and protecting the environment were viewed only as somewhat important by about 20+% of the combined respondents. While there were slight variations in percentages between both groups, overall, the planning concerns of the community remained the same between 2004 and 2008.

Figure 4.1 – Planning Priorities

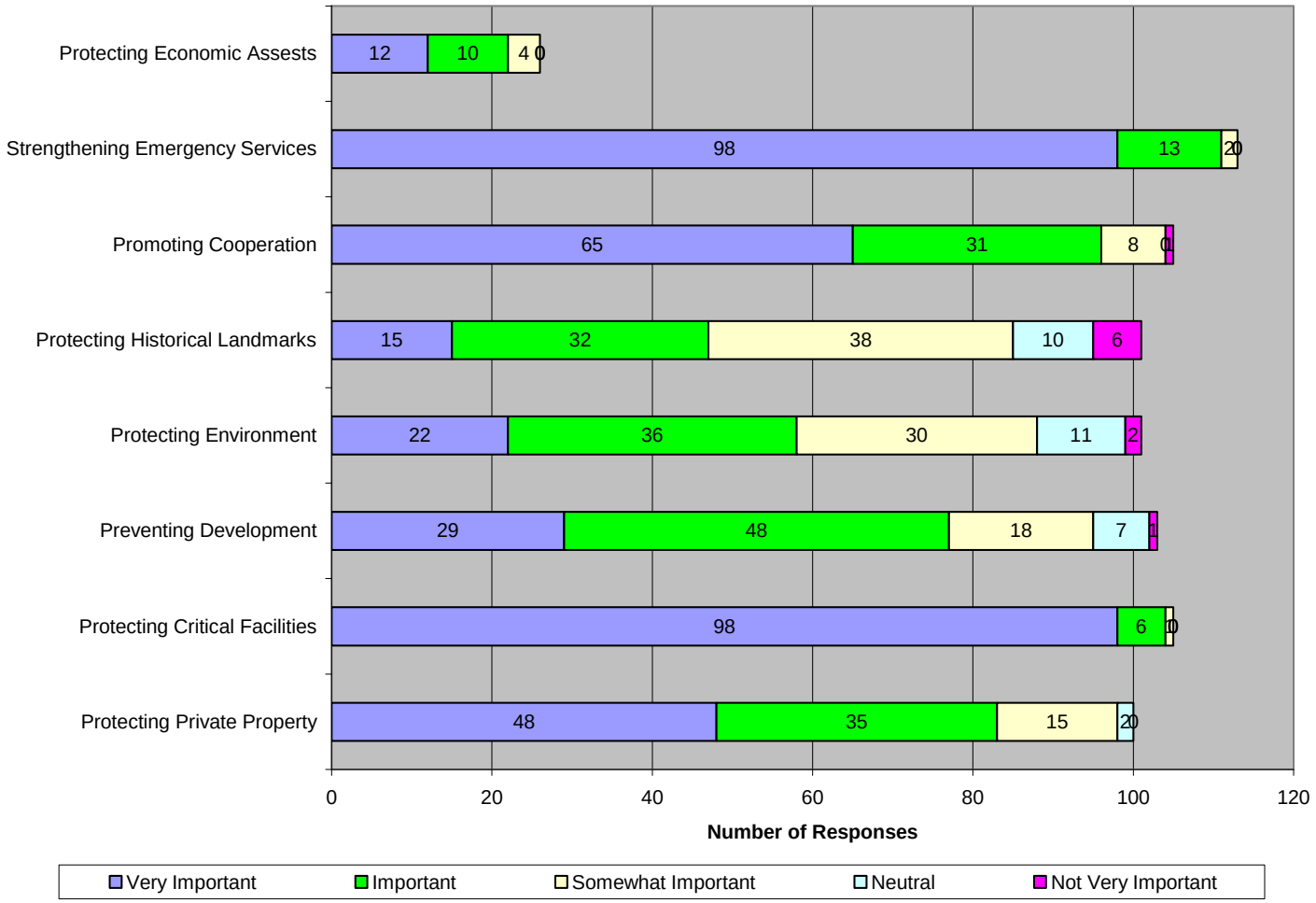
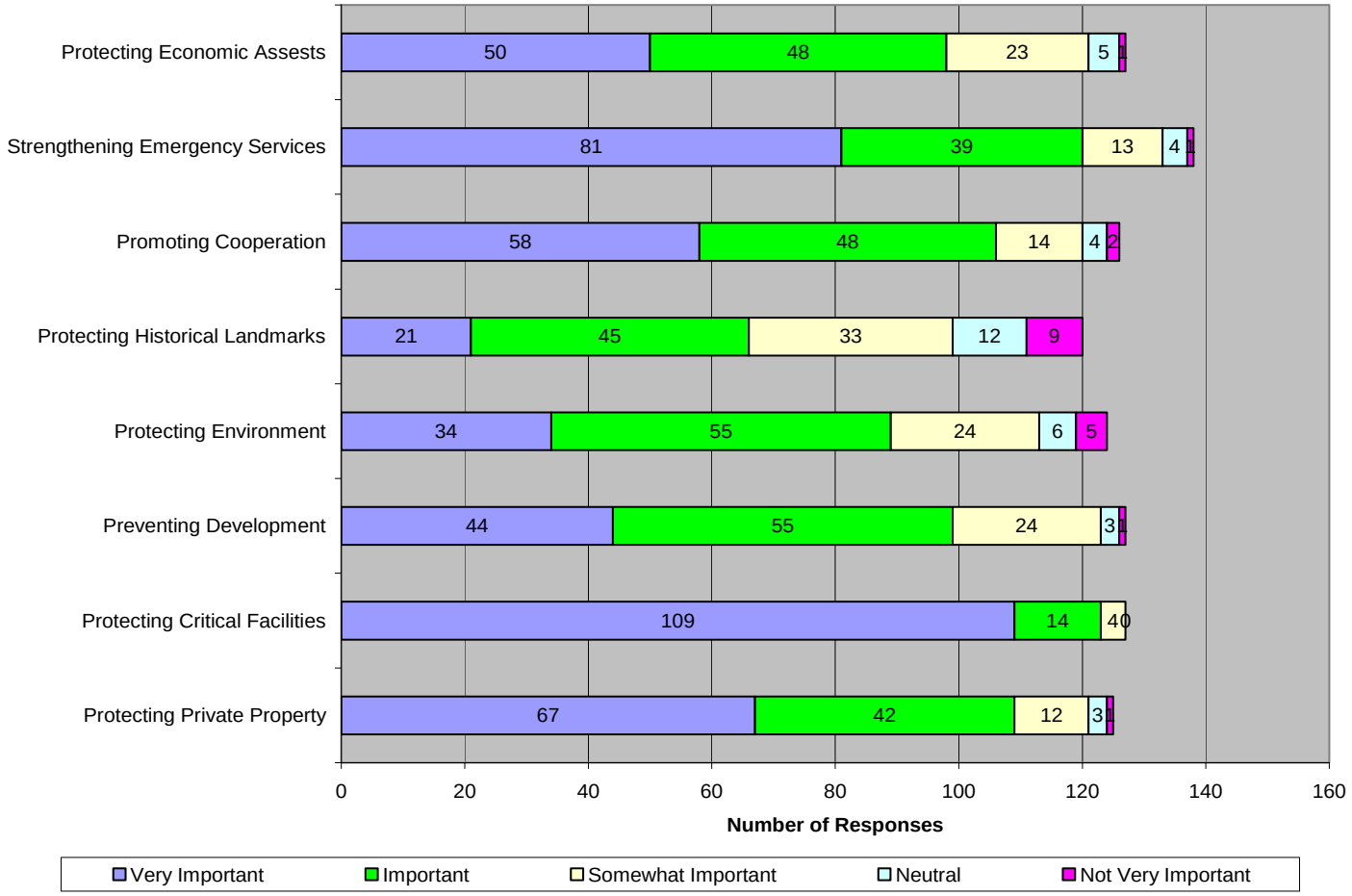


Figure 4.1A – Planning Priorities



Figures 4.2 and 4.2A on the following pages are graphic representations of what respondents felt should be the most important planning priority for the City. Overall, protecting critical facilities and strengthening emergency services remain the community's primary mitigation planning priority. A greater percentage of respondents in 2008 felt that protecting the environment should be a very important planning priority and fewer respondents in 2004 than in 2008 thought that protecting economic assets should be a very important planning priority.

Figure 4.2 – Most Important Planning Priorities

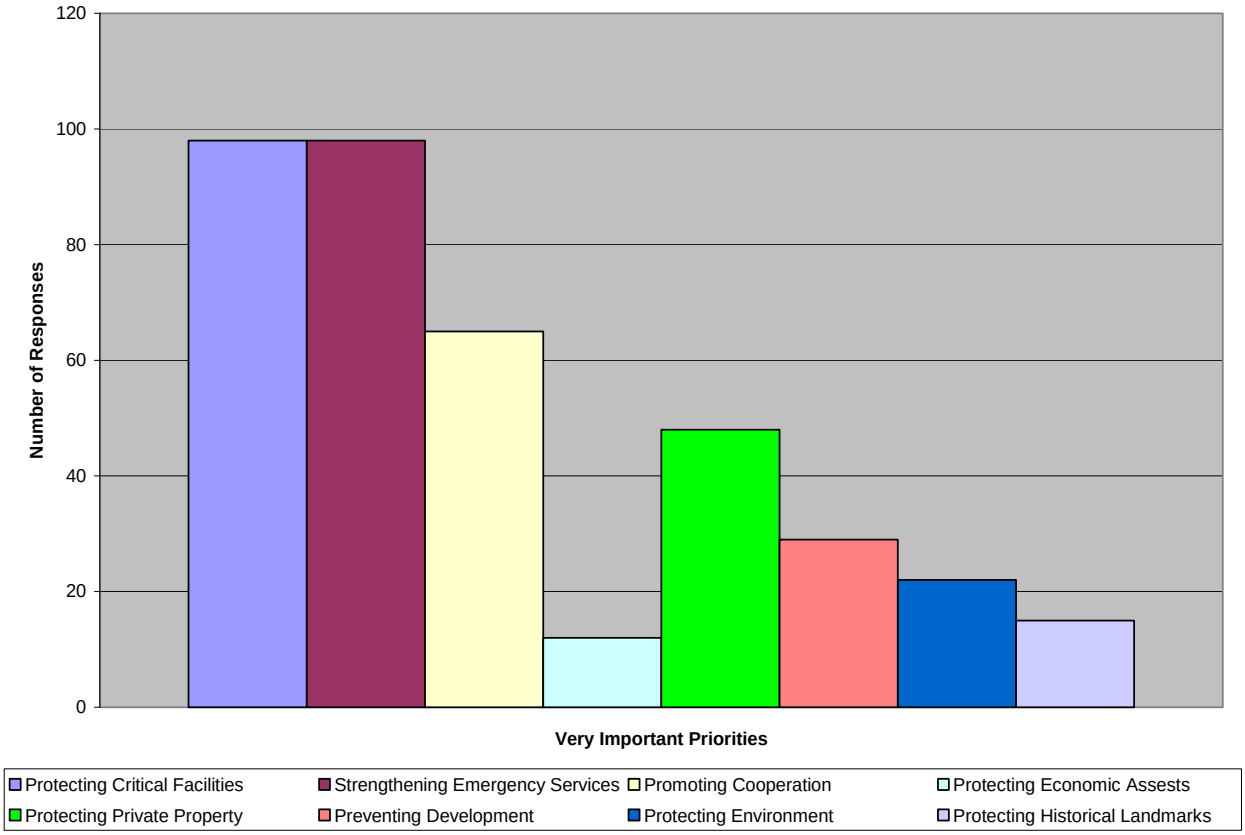
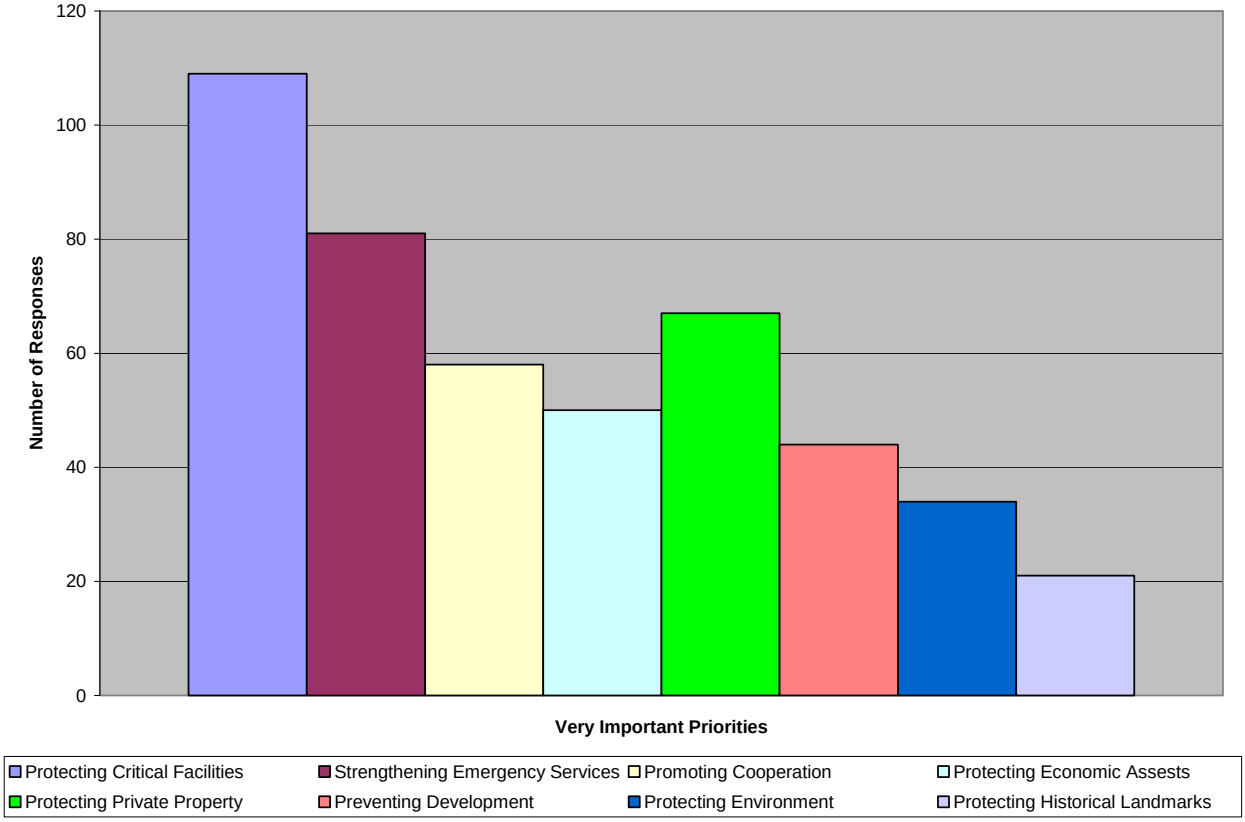


Figure 4.2A – Most Important Planning Priorities



SECTION FIVE

PLAN MAINTENANCE PROCEDURES

SECTION FIVE – PLAN MAINTENANCE PROCEDURES

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.*

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.*

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.*

OVERVIEW

As indicated previously, the mitigation plan process includes four broad tasks:

- **Organize Resources**
- **Assess Risks**
- **Develop Mitigation Plan**
- **Implement the Plan and Monitor Progress**

The final step in the development of a local hazard mitigation plan is to define and set forth procedures for the following:

- Monitoring, Evaluating, and Updating the Plan;
- Implementing the Plan; Potential for Incorporation into Other Agency or Jurisdictional Planning Mechanisms; and
- Continued Public Participation

It is important to remember that the hazard mitigation plan being developed is not intended to be a static, one-time document, but rather a "living" document with regularly scheduled monitoring and evaluation. Per DMA2K, a local hazard mitigation plan must be reviewed annually and updated at least every five (5) years. Lynn Glidden, City of Palmdale, Department of Public Works will be responsible for coordinating the annual LMHMP maintenance and evaluation. She can be reached at (661) 267-5300 or lglidden@cityofpalmdale.org. She will work closely with the Planning Team, who will review and evaluate the LMHMP.

5.1 Monitoring and Evaluation

At a minimum, the evaluation process will assess if goals and objectives still reflect current or anticipated conditions, whether the nature or magnitude of risks has changed, if current resources are sufficient to implement the LMHMP, and if outcomes are as expected.

- **Schedule.** The LMHMP will be reviewed and evaluated on an annual basis, during the month of June or July; it will also be reviewed following a disaster. A brief report or memorandum documenting the review findings will be prepared and included as an Appendix to the plan. Each review shall include an evaluation of the following:
    - **Public Involvement.** Public involvement successes and challenges should be reviewed and noted, with any recommendations for changes.
    - **Risk Assessment.** The identified hazards and associated risks should be evaluated with respect to the previous year's events, and any significant differences should be noted.
    - **Mitigation Actions.** The proposed Projects should be reviewed and updated regarding status and implementation (e.g. "proposed project is now fully complete"). Any changes should be noted, along with the successes and/or challenges associated with the implementation.
    - **Responsibility.** The assignments of responsibilities to individuals and departments should be reviewed and updated as necessary. This includes the department/person responsible for coordinating the annual plan maintenance. Information should, at a minimum, include a name, position, department or agency, address, contact phone numbers, and e-mail.

Another tool in establishing a plan maintenance mechanism is to institutionalize hazard mitigation planning as a regular part of the community's governmental services. This goal could be accomplished by the following:

- Update department work plans, policy, and procedural changes to include hazard mitigation concepts and activities.

- Change job descriptions of government and/or partner organization staff to include mitigation-related duties – provide appropriate training, workload, and salary.

- Governing body or local government executive can issue resolutions, orders, ordinances, or other directives, to order local departments and agencies to carry out hazard mitigation activities, such as providing progress reports.

5.2 Plan Implementation

LMHMP Implementation

The first step is to officially adopt and "promulgate" the LMHMP. This official adoption demonstrates the City's commitment to hazard mitigation and legitimizes the hazard mitigation planning effort. In addition, potential opportunities for incorporation of the hazard mitigation plan into other existing planning mechanisms should be investigated.

At a Project level, projects may be incorporated into capital improvement projects, annual operational budgets, and applications for Federal and state grants, as deemed appropriate.

Upon adoption, the plan faces the truest test of its worth: implementation. Implementation implies two concepts: action and priority. These are closely related.

While this LMHMP puts forth many worthwhile recommendations, the decision of which action(s) to undertake initially will be the first issue that the City faces. There are two essential elements in that decision-making process. First, there are the priorities established in the plan, and second, the availability of funding. At face value, pursuing low or no-cost high-priority recommendations will have the greatest likelihood of success.

It will be important to monitor funding opportunities that can be leveraged to implement some of the more costly recommended actions. This can include creating and maintaining a bank of ideas on how any required local match or participation requirement can be met.

Then, when funding does become available, Palmdale will be in a position to capitalize upon the opportunity. Funding opportunities that can be monitored include special pre- and post-disaster funds, special district budgeted funds, state or federal ear-marked funds, and grant programs, including those that can serve or support multi-objective applications.

With adoption of this plan, the City of Palmdale commits to:

- Pursuing the implementation of the high priority, low/no-cost Recommended Actions.
- Maintaining a vigilant monitoring of multi-objective, cost-share opportunities to assist in implementing the recommended actions of LMHMP.

It is envisioned that the Steering Committee will continue as an ongoing body with the responsibility for monitoring plan implementation issues. At the minimum, they will:

- Act as a forum for hazard mitigation issues;
- Monitor implementation of this Plan;
- Report on progress and recommended changes to the City Manager and Council, as appropriate; and
- Inform and solicit input from the public.

5.3 Continued Public Involvement

Keeping the public informed of hazard mitigation planning is an important way to garner continued public support for the planning process. The following is a brief list of public information recommendations:

- Provide periodic summary updates of hazard mitigation measures, hazard mitigation projects under construction, and most importantly, hazard mitigation success stories (following a disaster event), using local media and posted on City web site.

- Hold periodic public meetings, workshops, and "open house" events to present hazard mitigation planning elements.

- Participate in annual community events.

5.4 Plan Maintenance

Plan maintenance is the ongoing effort to monitor and evaluate the implementation of the LMHMP and to update the LMHMP as progress, roadblocks, or changing circumstances are recognized.

This monitoring and updating will take place through an annual review by the Steering Committee, at the minimum and a 5 year written update to be submitted to the state and FEMA Region IX, unless a disaster or other circumstances (e.g., changing regulations) lead to a different time frame.

When the Committee reconvenes for the review, they will coordinate with all stakeholders interested in participating in the planning process to update and revise the plan. Public notice will be given and public participation will be invited, at a minimum, through available web-postings and press releases to local media outlets, primarily newspapers and radio stations.

The Committee will not have any powers over City staff; it will be purely an advisory body. Its primary duty is to see the Plan successfully carried out and to report to the City Manager and City Council the status of Plan Implementation and mitigation opportunities. Other responsibilities include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, and passing the concerns on to the appropriate entities.

The evaluation of the progress can be achieved by monitoring changes in the vulnerability identified in the plan. Changes in vulnerability can be identified by noting:

- Lessened vulnerability as a result of implementing Recommended Actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or,
- Increased vulnerability as a result of new development (and/or annexation).

5.5 Coordinating Mitigation Planning Activities

As part of the annual plan review process, the Hazard Mitigation Steering Committee will evaluate the opportunities to coordinate and include hazard mitigation planning with other planning efforts in the City. A high priority mitigation project is the development and implementation of a formal process that can help assure this occurs. Work has already begun on developing those mechanisms that will facilitate the process. The Public Works Department will take the lead, and will assume overall responsibility for assuring that the LMHMP planning process, risk assessment, mitigation strategy, plan update process, and mitigation priorities are coordinated with the goals and

objectives of the General Plan. In addition, other plans that will be coordinated with the Hazard Mitigation Plan may include, but are not necessarily limited to:

Specific Plans
Special purpose plans such as the Drainage Master Plan and Hazardous Materials Plan
Emergency Operations Plan

All new ordinances affecting land development will be reviewed by the Core Mitigation Team to assure that mitigation measure are always part of land development planning.

Recommended actions that will result in the coordination of the LMHMP with other planning activities will be developed by the Core Team, reviewed by the Hazard Mitigation Steering Committee, and forwarded to the appropriate department or agency for consideration and action.

In an ideal situation, Palmdale would be part of the Los Angeles County Multi-Jurisdictional Hazard Mitigation Plan. We will continue to work with LA County to try and make the ideal a reality.

5.6 Assurances

The City of Palmdale will comply with all applicable Federal statutes and regulations during the periods for which it receives federal grant funding.

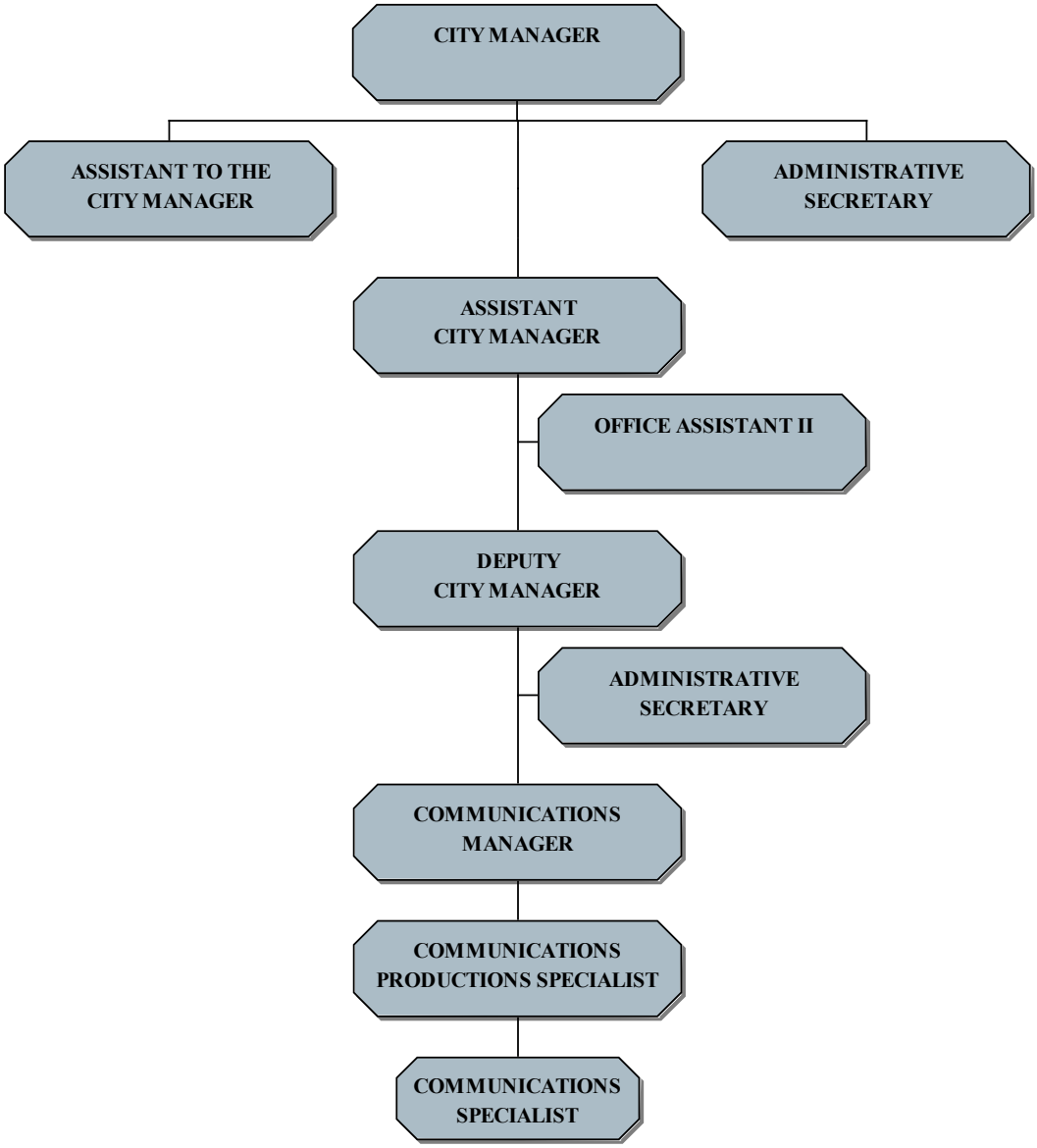
In addition, the City will amend this LMHMP, and/or the implementation strategies for this LMHMP, to reflect new or revised Federal (and State) regulations or statutes, policy, or government operations. Any such amendments will be added to the LMHMP as they are developed. They will be incorporated upon formal updating of the LMHMP and submitted to FEMA.

APPENDIX

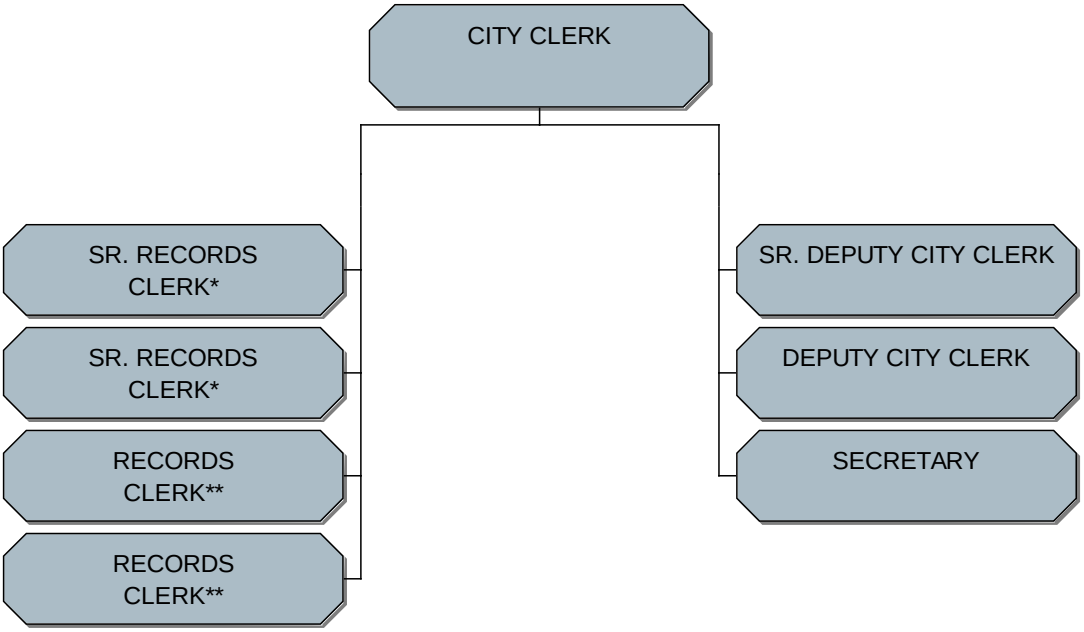
A

CITY ORGANIZATION CHARTS

CITY MANAGER

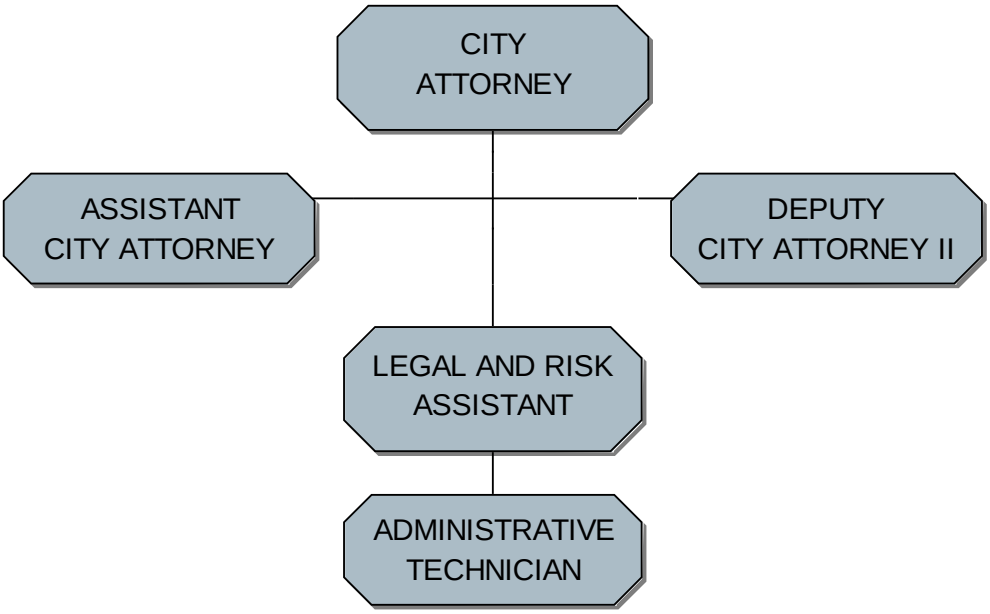


CITY CLERK

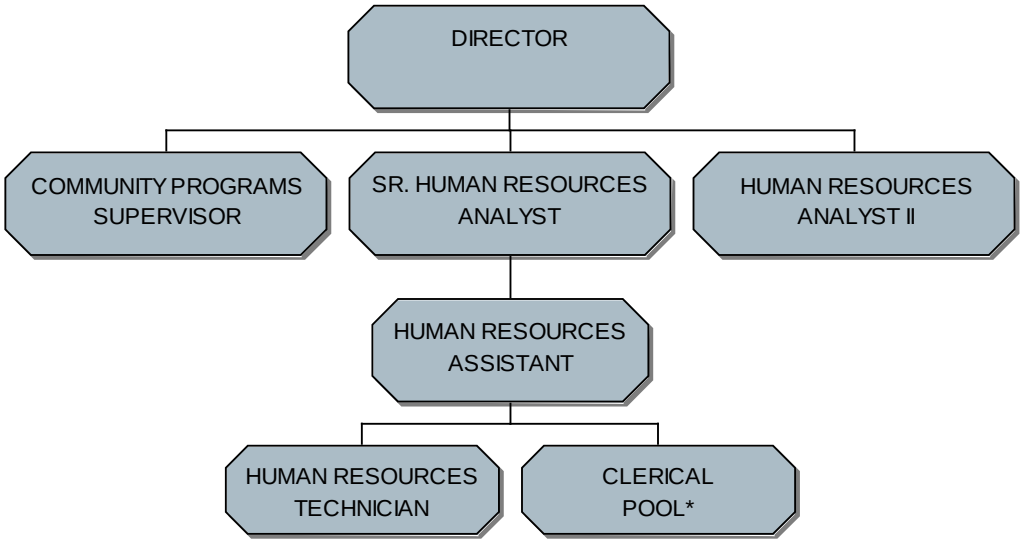


*REGULAR PART TIME
**TEMPORARY PART TIME

CITY ATTORNEY

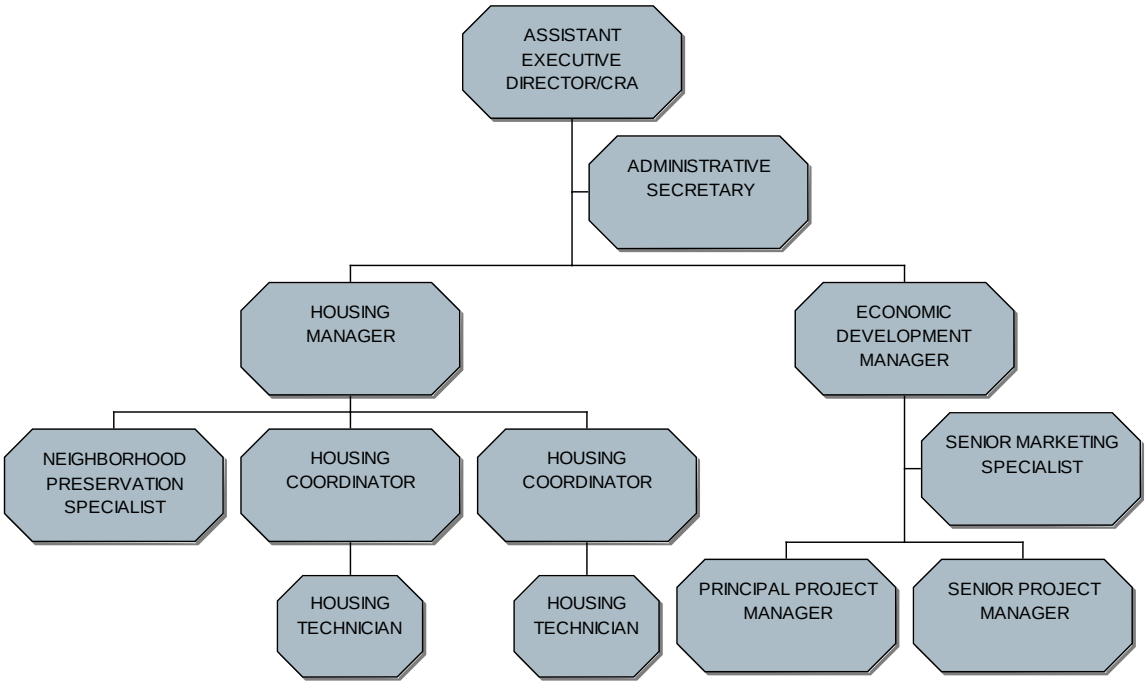


HUMAN RESOURCES



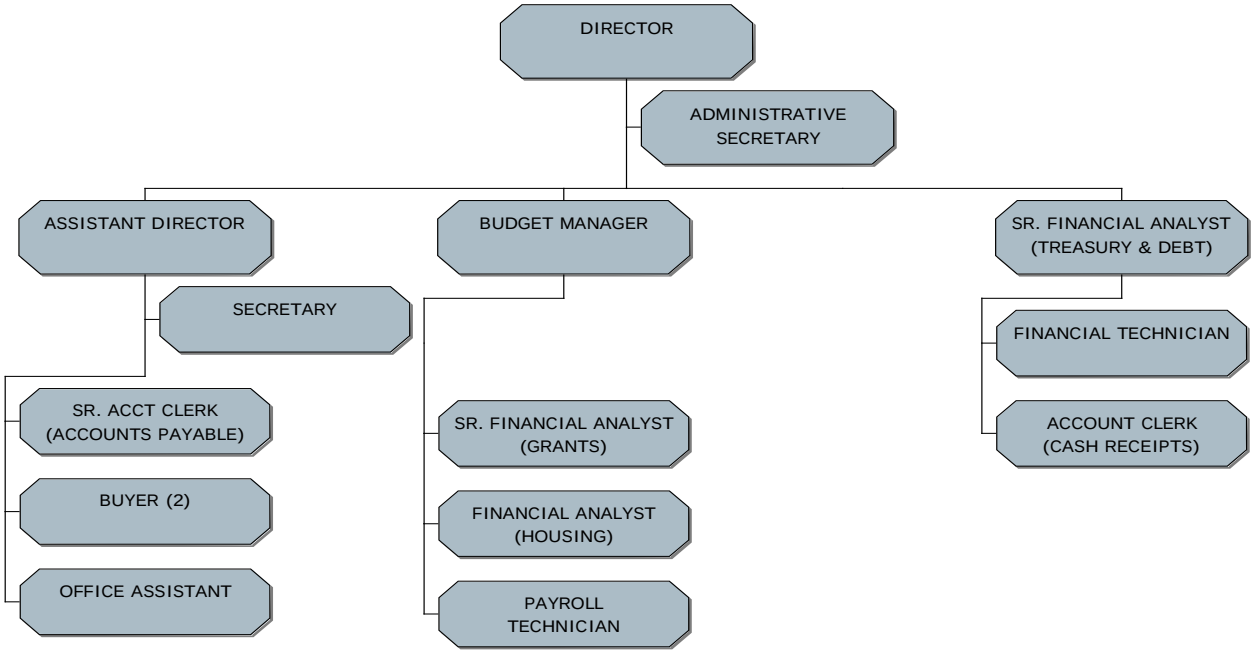
*Temporary Part-time

COMMUNITY REDEVELOPMENT AGENCY

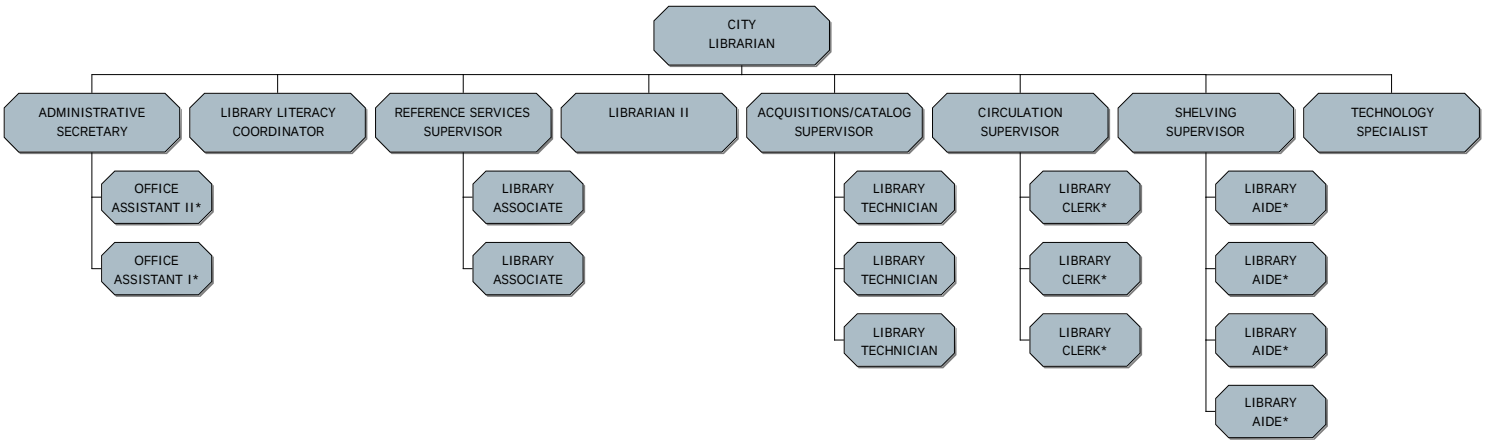


The Housing Division funds four Code Enforcement Officers who report directly to the Senior Code Enforcement Officer in the Planning Department and are shown on that chart

FINANCE


DIRECTOR
ADMINISTRATIVE SECRETARY
ASSISTANT DIRECTOR
BUDGET MANAGER
SR. FINANCIAL ANALYST (TREASURY & DEBT)
SECRETARY
FINANCIAL TECHNICIAN
SR. ACCT CLERK (ACCOUNTS PAYABLE)
SR. FINANCIAL ANALYST (GRANTS)
ACCOUNT CLERK (CASH RECEIPTS)
BUYER (2)
FINANCIAL ANALYST (HOUSING)
OFFICE ASSISTANT
PAYROLL TECHNICIAN

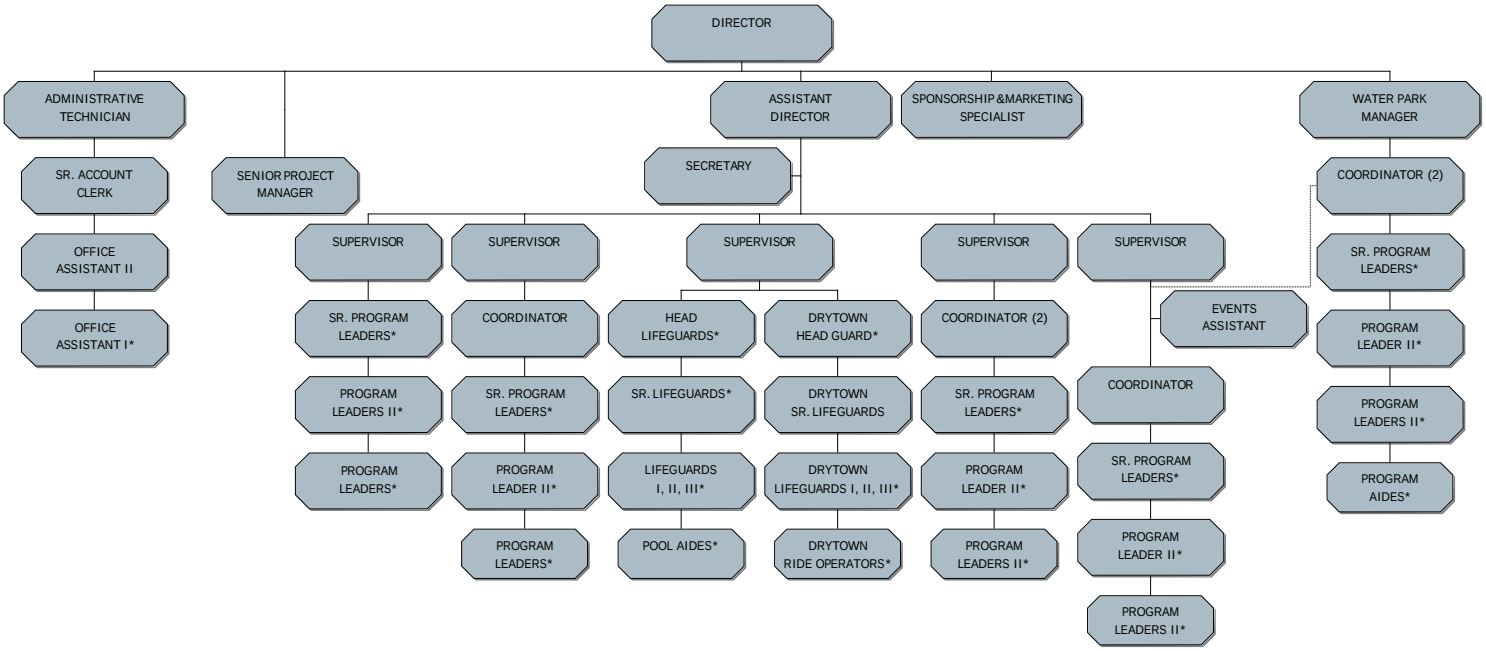
LIBRARY



THE LIBRARY FUNDS THE FULL TIME EQUIVALENT OF 1.2 PARK RANGERS. THESE EMPLOYEES REPORT DIRECTLY TO THE PUBLIC SAFETY DEPARTMENT AND ARE NOT SHOWN ON THIS CHART.

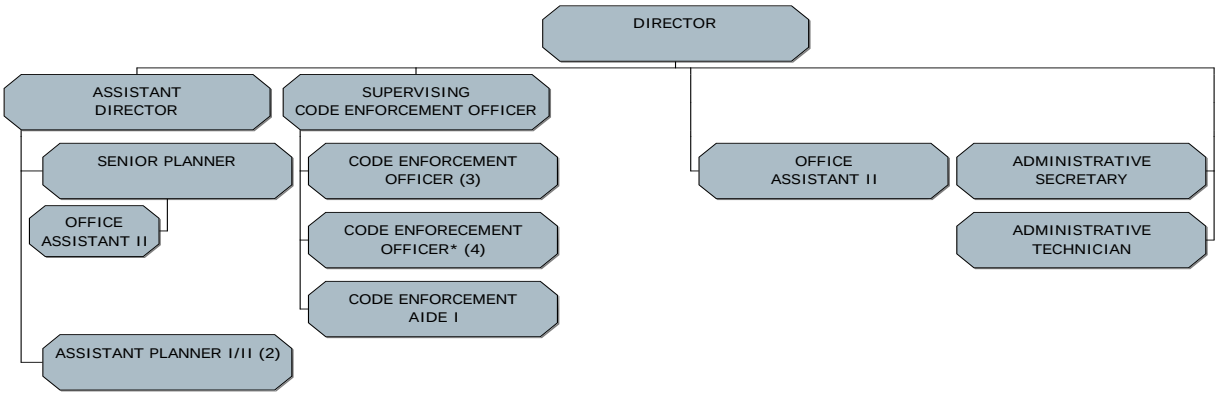
* REGULAR PART TIME

PARKS AND RECREATION

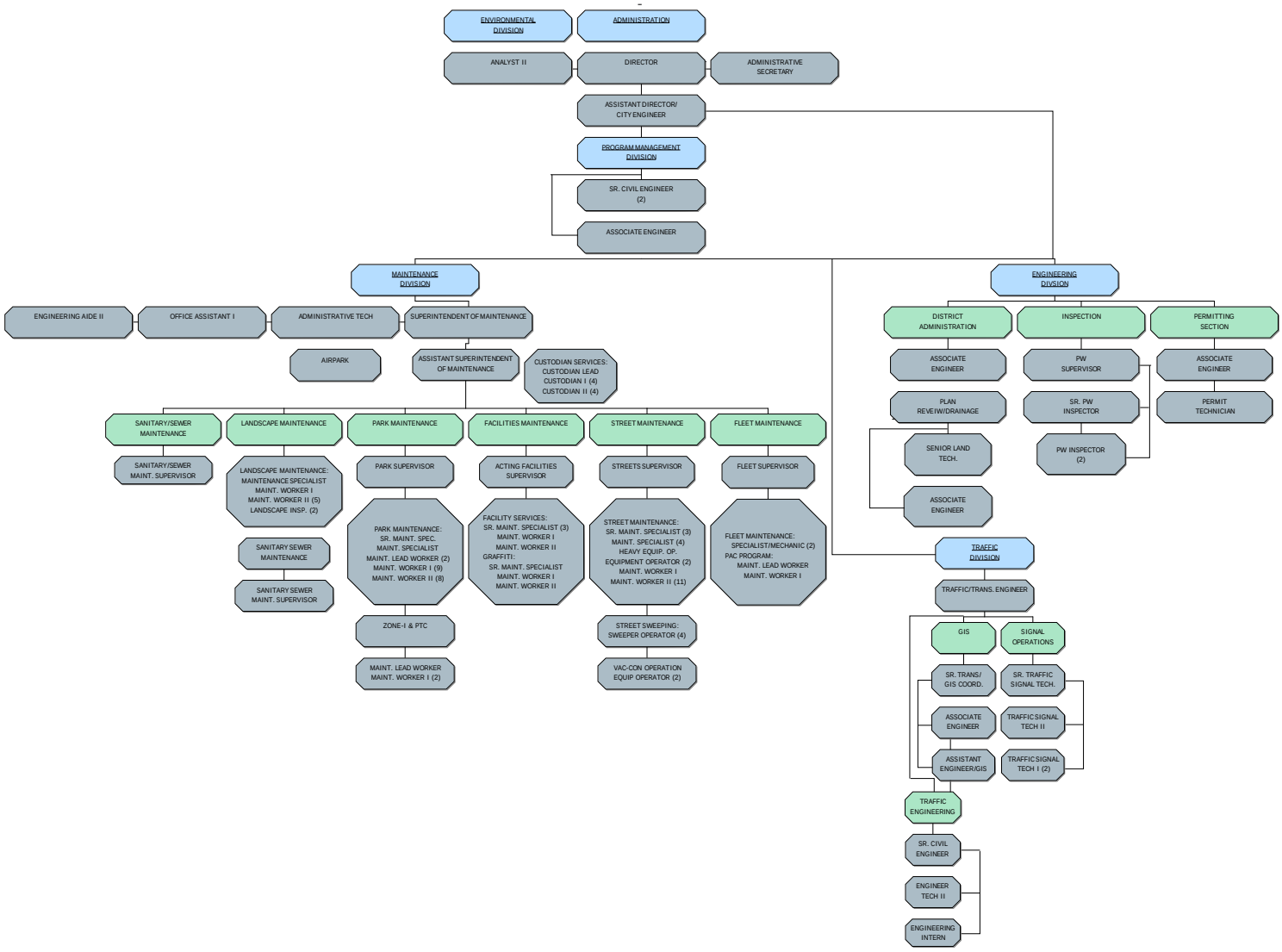


* Part Time

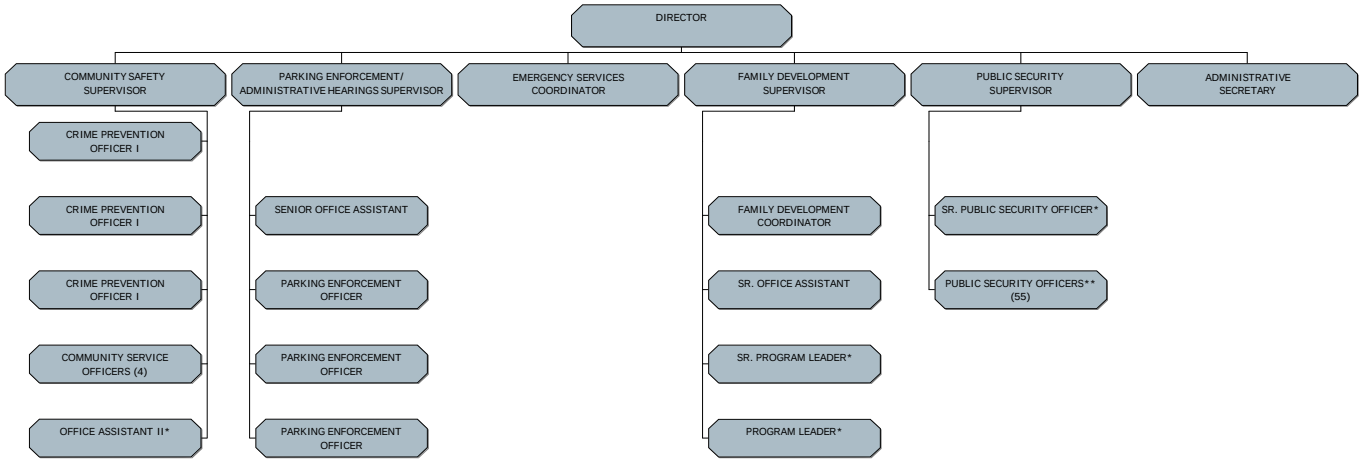
PLANNING


DIRECTOR
ASSISTANT DIRECTOR
SUPERVISING CODE ENFORCEMENT OFFICER
SENIOR PLANNER
OFFICE ASSISTANT II
ASSISTANT PLANNER I/II (2)
CODE ENFORCEMENT OFFICER (3)
CODE ENFORECEMENT OFFICER* (4)
CODE ENFORCEMENT AIDE I
OFFICE ASSISTANT II
ADMINISTRATIVE SECRETARY
ADMINISTRATIVE TECHNICIAN

PUBLIC WORKS



PUBLIC SAFETY & COMMUNITY RELATIONS



* Regular Part Time
** Temporary Part Time

APPENDIX

B

SAMPLE PLANNING SURVEYS, PLANNING MEETINGS, and AGENDAS

CITY OF PALMDALE
Local Hazard Mitigation Planning Assessment Survey

The purpose of this survey is to receive community input in identifying and prioritizing potential disasters that threaten the City of Palmdale. Results from this survey will be used to aid in the creation of the City of Palmdale's Local Hazard Mitigation Plan which is intended to better prepare the City and the surrounding community in the event of a disaster. If you have any questions please contact Lynn Glidden at (661) 267-5300.

1. I am representing a (select one only):

   1 Community Member 1 City Employee 1 Government Agency 1 Business

   1 Utility 1 Hospital 1 Other: _____

2. How concerned are you about the following disasters affecting your community. Please circle the corresponding number for each disaster.

Potential Disasters	Not Concerned	Somewhat Concerned	Mode4ratly Concerned	Very Concerned	If you marked VERY CONCERNED and would like to explain the most destructive consequence of this disaster, please use this space to do so:
Natural:	1	2	3	4	
Earthquakes	1	2	3	4	
Flooding	1	2	3	4	
Liquefaction/Landslide	1	2	3	4	
Severe Weather/Winter Storms	1	2	3	4	
Wildland Brush Fire	1	2	3	4	
Urban Fire	1	2	3	4	
Drought	1	2	3	4	
High Winds	1	2	3	4	
Health Alert/Mass Disease	1	2	3	4	
Human Caused:	1	2	3	4	
Civil Unrest	1	2	3	4	
Hazardous Material Spill	1	2	3	4	
Terrorism	1	2	3	4	
Disruption of Mass Transit	1	2	3	4	
Power/Utility Failure	1	2	3	4	
Other:	1	2	3	4	

3. Among the disasters above, which do you think is the **highest threat** to your community?: (write in only one disaster from above)_____

4. Have you taken any actions to make your home, business, or facility more resistant to disasters? (please circle) **YES** **NO**
   If yes, please explain:_____
   _____

5. In your opinion, what are some steps that the City of Palmdale could take to reduce or eliminate the risk of damage from the disaster you selected_____
   _____

6. For any disasters not mentioned in this survey or for comments regarding disaster mitigation planning please use the following lines. If more space is needed, please use the back of this survey sheet _____
   _____

7. Who would you most trust to provide you with information about how to make your home, business, or facility safer from natural or human-caused disasters: (Please check all that apply)

News Media	Government Agency	Insurance Agent or Company	Utility Company	University or Research Institution	American Red Cross	Church/religious Organization	Other non-profit Organization	Other

8. Natural and human-caused disasters can have a significant impact on a community but planning for these events can help lessen the impact. The following statements will help us determine community priorities for planning for those hazards. Please check the appropriate box for how important each one is to you.

Planning Priorities	Very Important	Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property						
Protecting critical facilities (hospitals, transportation networks, fire stations)						
Preventing development in hazard areas						
Protecting the natural environment						
Protecting historical and cultural landmarks						
Promoting cooperation among public agencies, citizens, and businesses						
Strengthening emergency services (police, fire, ambulance)						
Protection of economic assets						

9. Please invite me to future meetings to assist in the creation of a Local Hazard Mitigation Plan for the City of Palmdale (please circle) **YES** **NO**

If yes, please complete: Name_____Phone_____

Address_____ City/State/Zip_____

E-mail Address _____

Please return this survey by October 15, 2004 to Lynn Glidden, Public Works Department, City of Palmdale, 38250 Sierra Highway, Palmdale, CA 93550. Thank you!

CITY OF PALMDALE
Local Hazard Mitigation Planning Assessment Survey

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Wildland Brush Fire	1	2	3	4	
Urban Fire	1	2	3	4	
Drought	1	2	3	4	
High Winds	1	2	3	4	
Health Alert/Mass Disease	1	2	3	4	
Human Caused:					
Civil Unrest	1	2	3	4	
Hazardous Material Spill	1	2	3	4	
Terrorism	1	2	3	4	
Disruption of Mass Transit	1	2	3	4	
Power/Utility Failure	1	2	3	4	
Other:	1	2	3	4	

3. Among the disasters above, which do you think is the **highest threat** to your community?: (write in only one disaster from above)_____

4. Have you taken any actions to make your home, business, or facility more resistant to disasters? (please circle) **YES** **NO**
   If yes, please explain:_____
   _____

5. In your opinion, what are some steps that the City of Palmdale could take to reduce or eliminate the risk of damage from the disaster you selected_____
   _____

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   _____

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Protecting the natural environment						
Protecting historical and cultural landmarks						
Promoting cooperation among public agencies, citizens, and businesses						
Strengthening emergency services (police, fire, ambulance)						
Protection of economic assets						

9. Please invite me to future meetings to assist in the updating of the Local Hazard Mitigation Plan for the City of Palmdale (please circle) **YES** **NO**

If yes, please complete: Name_____Phone_____

Address_____City/State/Zip_____
E-mail Address _____

Please return this survey by March 12, 2008 to Lynn Glidden, Public Works Department, City of Palmdale, 38250 Sierra Highway, Palmdale, CA 93550. Thank you!

History of the Plan Participation/Plan Development Process

Date	Invited Attendees	Meeting Purpose
08/11/04	Key City Staff	Explain DMA 2000, organize plan approach
09/23/04	Stakeholders	Explain DMA 2000 & plan process
09/23/04	Community partners	Explain DMA 2000 & plan process; distribute questionnaires
10/05/04	Public meeting	Explain DMA 2000 & plan process; distribute questionnaires
11/03/04	Key City staff	Plan requirements
12/16/04	Department heads	Describe plan process
01/27/05	Key City staff	Review preliminary information
04/7/05	Key City staff	Distribute Administrative Draft, discuss information required in all sections of the plan
09/14/05	Key City staff	Distribute revised Administrative Draft and review sections City needs to address
03/22/06	Key City Staff	Distribute Final Administrative Draft to City Staff for Comments
1/28/08	Key City Staff	Distribute Final Draft to City Staff for Project Prioritization
2/6/08	Key City Staff	City Meets to Prioritize Projects
3/1/08	City Staff Stakeholders Community partners & public	Update of survey form
3/25/08	Public Meeting	Explain DMA 2000 & plan process, review Local Hazard Mitigation Plan, Receive Public Input

CITY OF PALMDALE

INITIAL LOCAL HAZARD MITIGATION PLANNING MEETING AGENDA

August 11, 2004

1. **INTRODUCTION**

   A. **Hazard Mitigation Process vs. Plan**

   B. **Big Picture / Hazard Maps**

2. **MULTI-JURISDICTIONAL PLAN**

   A. **Review Adoption Process**

3. **ASSESS ROLES & RESPONSIBILITIES**

   A. **JT&A**

      1. **Coordinate with Agencies and Organizations**
      2. **Document Planning Activities**
      3. **Conduct Pre-Draft Meeting**
      4. **Review Existing Documents Provided by City**
      5. **Coordinate Meetings**
      6. **Prepare Public and Team Formation Announcements**
      7. **Produce Power Point Presentations / Videos / DVDs**

CITY OF PALMDALE

Local Hazard Mitigation Planning Meeting Minutes

AUGUST 11, 2004

1. Time of Meeting: 11:00 A.M.
2. Persons attending meeting:
   A. Terry Connell – Palmdale Deputy Director Public Works
   B. Lynn Glidden – Palmdale Senior Civil Engineer
   C. Anne Ambrose – Palmdale Public Safety Administrator
   D. James Thernes – James Thernes & Associates (Consultant)
   E. Chris Adams – James Thernes & Associates (Consultant)

3. Topics of Discussion: Introduction of Phase I of LHMP
4. Support Materials: Agenda, Hazard Maps

Notes:

A. Initiated meeting with discussion of desire to create a "process" rather than a "plan".
B. Discussed "Big Picture" and reviewed Palmdale Hazard Maps from California State OES.
C. Discussed the concept that process would parallel the "scope of work" for this project, introduced Phase I of the plan and the intent to outline balance of process at our next meeting.
D. Reviewed the adoption process to be used for Multi-Jurisdictional Plans, and discussed differences between being the lead jurisdiction versus a cooperating participant.
E. Discussed roles and responsibilities of the City of Palmdale and the consultant (JT&A).
F. Discussed staffing; City announced that Mike Behn is the city GIS person.
G. Were informed that Anne Ambrose will be on vacation August 24-27 and Lynn Glidden from September 1-5.
H. Discussed the formation of the Local Hazard Mitigation Team – discussed the critical participants, role of City Council member and City manager's office. Also discussed which departments within the City should be included.
I. Reviewed a document from the "Hazardous Waste and Substance Sites", talked about getting the file electronically. Their number (916)323-3400.
J. Discussed "awareness mapping" by DWR.
K. Discussed the City's role in the process and identified "things to do" to move the LHMP process along.
L. JT&A offered to introduce the current State of California General Plan Guidance which incorporates Hazard Mitigation language for use by locals.

Action Items:

1. Terry Connell to check on NFIP status.
2. City to get layers of hazard maps to Mike Behen.
3. Terry Connell to get copy of Ritter Specific Plan.

Meeting adjourned

CITY OF PALMDALE

INITIAL LOCAL HAZARD MITIGATION PLANNING MEETING

August 11, 2004

ATTENDEES

Name	Organization	Phone #	e-mail
Terry Connell	COP	661-267-5310	tconnell@ city of palmdale.org
Anne Ambrose	COP	661-267-5569	aambrose@ cityofpalmdale.org
Lynn Glidden	COP	661-267-5315	lglidden@ cityofpalmdale.org
Chris Adams	STA	(916) 425-5936	chrisdadams@ EARTHLINK.NET
JAMES THERNES	JT&A	(818)548-9395	Jthernes@earthlink.net

CITY OF PALMDALE

LOCAL HAZARD MITIGATION PLANNING MEETING AGENDA

September 23, 2004

1. INTRODUCTION

A. Hazard Mitigation Process vs. Plan
- **Public Participation**

B. Big Picture / Hazard Maps

2. MULTI-JURISDICTIONAL PLAN

A. Who should be part of the hazard mitigation planning team (3-meetings plus yearly update)?

3. LOCAL HAZARD MITIGATION PLANNING PROCESS

A. Risk and Vulnerability Assessment

- **Hazard Identification/Risk Identification**
  - **What are your known hazards/risks?**

- **Hazard Events Profile**
  - **Disaster history (previous occurrences)?**
  - **Map hazard areas**

- **Vulnerability Assessment**
  - **Analyze expected outcomes from vulnerability to hazards**
    - **What problems can affect your services?**
    - **What known hazard mitigation actions has your agency implemented?**

- **Asset Inventory – Prepare an inventory of assets**

- **Risk Assessment/Loss Estimate – Prepare damage estimates for each facility**

- **Analyze Development Trends – Describe vulnerability in terms of providing general description of land uses and development trends**

B. Assessment of Alternative Mitigation Measures

- **Develop Goals and Objectives**

- **Describe mitigation goals and objectives and how they address vulnerabilities**

- **Research Mitigation Alternatives – Identify possible actions and objectives**

- **Local Mitigation Capabilities – Review and analyze local programs, policies, regulations, etc…, which facilitate or hinder mitigation**

- **Evaluate Mitigation Measures**
  - **Evaluate if existing and potential alternative mitigation actions fulfill objectives and are appropriate**
  - **Describe how the mitigation actions and projects will be prioritized, implemented, administered, and funded.**

- **Mitigation Recommendations – Summarize and document recommended mitigation actions**

- **Conduct a Regional Evaluation – Identify any significant positive or negative practices**

C. Development of Implementation Strategy

- **Mitigation Action Plan**
  - **Identify state, federal, and private sector partners and resources**
  - **Explore various approaches of how mitigation actions will be implemented**
  - **Describe the public participation throughout the planning process**

D. Plan Maintenance Procedures

- **Plan Evaluation – Prepare schedule for monitoring, evaluating, and updating the plan**
- **Public Participation – Describe public participation throughout the plan maintenance process**
- **Implementation Through Existing Programs – Describe process by which requirements of the LHMP will be incorporated into other planning mechanisms**

E. Adoption of the Local Hazard Mitigation Plan – Adoption by City Council/District Board

PALMDALE LOCAL HAZARD MITIGATION PLANNING PROCESS

MEETING MINUTES
SEPTEMBER 23, 2004

12:00PM – UTILITIES GROUP
2:00PM – COMMUNITY PARTNERS GROUP

Overview

The City conducted two meetings – first with the local utilities as part of their quarterly utility coordination meeting and the second with specific community partners who had been invited to participate in the Palmdale local hazard mitigation planning process (LHMP).

At both meetings, public safety administrator Anne Ambrose introduced James Thernes and Chris Adams of Thernes and Associates, the City's consultants on this project.

Chris provided an overview of the LHMP. The Federal Disaster Mitigation Act of 2000 (Public Law 106-390) requires that all local agencies must have a local natural disaster mitigation plan in place to be eligible for both pre and post disaster federal funding. The Federal government is no longer willing to pay for repetitive disaster damage or damage that can easily be averted by pre-event actions. The LHMP places emphasis on reducing risks and ensuing effects from natural hazards through pre-event risk identification, assessment, and mitigation. This process shifts much of the emphasis from the typical public safety oriented disaster response approach to a community development (planning, building, engineering, etc.) oriented disaster mitigation approach.

Chris provided examples of maps that will be utilized as part of the City's assessment of its natural hazards (fault zones, shake maps, fire hazards, etc.)

Each participant was given a Local Hazard Mitigation Planning Assessment Survey, which queried their level of concern for various natural and human-caused disasters; what they have done to make their home/business/facility more resistant to disasters; asked their opinion about what the City should be doing to reduce or eliminate the risk of damage from various disasters; and asked them to identify the community priorities for planning for specific hazards.

Attendees were invited to sign up to participate on a planning task force to complete the LHMP

The LHMP will be completed by late December for presentation to the City Council for approval in early January.

Utilities Meeting – Issues Discussed

Due to heightened security concerns post 9-11, utilities will not be able to provide any maps, lists, documents that identify specifically where their facilities are. Will be able to share information about their security plans; emergency response plans; how their staffs are trained and what their level of preparedness is to respond to various disasters.

The utility companies' present expressed willingness to participate in this process.

Terry Cornell, assistant director of public works, expressed the need for there to be communication with the utility companies for the City to properly set mitigation priorities.

Community Partners Meeting – Issues Discussed

Question from AV High School District about whether their plan would be an addendum to ours or whether they do a separate plan. Chris discussed the benefits of them and other governmental agencies participating in the City's plan.

Question from AV Transit Authority – they fall under three jurisdictions – who's plan do they participate in? It was suggested that they participate in the Palmdale plan.

CITY OF PALMDALE

LOCAL HAZARD MITIGATION PLANNING MEETING

September 23, 2004

ATTENDEES

Name	Organization	Phone #	e-mail
Cesar Bertaud	Palmdale City Att'ys Ofc.	(661) 267-5108	cbertaud@cityofpalmdale.org
Terry Connell	"	267-5300	tconnell@ " "
GRETCHEN GUTIERREZ	AVBIA	949-6857	AVBIA@earthlink.net
Fran Stewart	Red Cross	267-0650	AVRedCross@Hotmail.
JOHN PETERMAN	RED CROSS	273-2621	prsjobs@SBCGlobal.net
Shirley Ramirez	L.A. Co Public Health	723-4503	sramirez@ladhs.ca.
Becky Kiess	City Clerk City of Palmdale	267-5151	cclerk@cityofpalmdale.org
Hamed Jones	Finance - City of Palmdale	267-5433	hjones@cityofpalmdale.org
DANNY ROBERTS	CITY OF PALMDALE	267-5125	droberts@cityofpalmdale.org
DAVID SAUER	LASD - PLM	267-4300	
BRIAN JONES	LA SHERIFF - PLM	2674300	
DAVID MRSTIK	ANTELOPE VALLEY TRANSIT AUTHORITY	729-2246	davidmrstik@avta.com
Nancy Quelland	City of Palmdale	267-5622	nquelland@cityofpalmdale.org
JON BOBIGIAN	AVEK WATER AGENCY	943-3201	GSAVEKWA@aol.com
Michael Flood	Palmdale Water District	947-4111	MFLOOD@PALMDALEWATER.ORG
Bob Stahlhober	Antelope Valley Hospital	949-5043	Bob.Stahlhober@AVHospital.org

CITY OF PALMDALE

LOCAL HAZARD MITIGATION PLANNING MEETING

September 23, 2004

ATTENDEES

Name	Organization	Phone #	e-mail
Norm Hicklin	LA.Co. Supervisor Antonovich, Deputy	661-726-3600	nhicklin@bos.co.la.ca.us
Carolyn Dias	Palmdale School District	661-947-7191	cdias@psd.k12.ca.us
Jill Hilder	Antelope Valley Union High School District	661-948-7655 x292	jhilder@avhsd.org

CITY OF PALMDALE

LOCAL HAZARD MITIGATION PLAN PUBLIC WORKSHOP AGENDA

October 5, 2004
7:00 P.M.

1) **INTRODUCTION**

2) **HAZARD MITIGATION OVERVIEW**

3) **LOCAL HAZARD MITIGATION PLANNING PROCESS**

4) **TASK FORCE FORMATION**

FOR IMMEDIATE RELEASE

CITY OF PALMDALE

NEWS RELEASE

CONTACT: Barbara La Fata
PHONE: 661/267-5115
DATE: September 29, 2004

Public Input Requested for City's Hazard Mitigation Plan

PALMDALE –The City of Palmdale is conducting an open forum on Tuesday, October 5 from 7 to 9 pm in the City Council Chamber, 38300 Sierra Highway, Suite B, to solicit public participation in the development of a natural hazard mitigation plan.

In accordance with the Federal Disaster Mitigation Act of 2000, all local government agencies must have a local natural disaster mitigation plan in place to be eligible for federal funding in the event of a large-scale disaster such as an earthquake, flood or fire. The City anticipates completing this planning process by late December.

The public may also provide input by completing the Local Hazard Mitigation Planning Assessment Survey available on the City's Web site and at the City Hall and Development Services lobbies. The survey asks questions about what types of natural disasters concern the public the most and what the City should do to reduce or eliminate the risk of damage from these disasters. Surveys must be returned no later than October 15.

For more information, contact Lynn Glidden at 661/267-5300 or visit www.cityofpalmdale.org.

-30-

Public Information Office • 38300 Sierra Highway • Palmdale, CA 93550

CITY OF PALMDALE

LOCAL HAZARD MITIGATION PLANNING MEETING

OCTOBER 5, 2004

ATTENDEES

NAME	ORGANIZATION	PHONE#	E-MAIL
Judy Morris	JT&A	951 242 0855	
JAMES THERNES	JT&A	818 548-9395	
Chris Adams	JT&A	(916)425-8936	
Lynn Shell	COP	661 267-5385	

CITY OF PALMDALE

LOCAL HAZARD MITIGATION PLANNING MEETING AGENDA
November 3, 2004

1. REVIEW OF PROCESS TO DATE

Adjustment to current HMP schedule

- **Calendar Review**

Big Picture – 7 ½% vs 20% HMGP

- **Standard versus Enhanced Plan - criteria?**

2. MULTI-JURISDICTIONAL PLAN

A. LA County HMP

B. City taking lead? What would that mean ……. Costs/Benefits?

- **Who or What are the "other" jurisdictions we should contact**
- **What other "community" efforts can be vehicles for the mitigation message.**

3. HAZARD MITIGATION TASK FORCE

A. Who should be part of the hazard mitigation planning team (minimum of 3-meetings plus yearly update)?

- **This "team" must be made up people who can commit their respective resources and leaders in their respective arenas, public and private.**
- **Chronicle mitigation actions, identify needs, across the board. Not just a pre or post disaster scenario – anything that will make the community perform better.**

3. CONSULTANT CATCH-UP

A. Request meetings with critical staff, departments and/or individuals in City

- **Planning**
  - **Review codes, standards and ordinances**
  - **Highlight those which advocate or implement "mitigation"**

- **Review introduction of "mitigation" and "fire" in the Palmdale General Plan with recent changes in State General Plan/OPR.**

➢ **GIS**
- **Link Hazards to traditional mapping elements**
- **Introduce State GIS resources – HAZUS**

➢ **Community Development**
- **Building Department/ City Owned Building Inventory**

REVIEW EMERGENCY OPERATIONS PLAN

A. Integrate with mitigation where possible.

B. Who in Palmdale responsible for Homeland Security Grants?

5. NEXT MEETING

NOTES FROM 11/03 PALMDALE MEETING

Research Needs
Review General Plan
Review Web Site
Identify all Utility Providers
Review County LHMP for relevant items
Review 2 specific plans
Review emergency ops plans

Questions for specific Departments
Planning: other specific plans? Any plan overlay districts? Future development patterns?

Finance/Risk Management: Valuations of city infrastructure? Existing risk management programs/policies related hazard mitigation.

GIS: existing base map? Catalogue of layers? Systems (arcview, etc). If local base map, what is projection.

Questions for all:
Specific plans, projects, ordinances, policies, programs related to hazard mitigation?
Ongoing haz mit programs? Completed haz mit programs? Planned haz mit programs?
History and impacts of previous events

Role of Task Force and Steering Committee
Develop mission statement
Identify and rank hazards
Prioritize hazards
Set planning priorities
Develop Goals and objectives
Identify critical facilities/infrastructure
Develop and prioritize hazard mitigation projects

Next Steps for JTA
Complete research (see above)
Meet individually with key staff
Prepare plan outline
With Lynn, set first meeting of Task Force
With Lynn, determine what additional public input (three stages: plan development, review of draft, on-going public participation)
Prepare agenda and presentation materials for first TF meeting

CITY OF PALMDALE

LOCAL HAZARD MITIGATION PLAN STEERING COMMITTEE WORKSHOP AGENDA

December 16, 2004
10:00 A.M.

1) INTRODUCTION

a. Who's who?
b. What is YOUR greatest natural or technological concern?
c. What has been done about it?

2) HAZARD MITIGATION OVERVIEW

a. Northridge EQ – 10 years – Memory Lane
b. What has changed?
c. Project Impact – James Lee Witt
d. DMA2K

3) LOCAL HAZARD MITIGATION PLANNING PROCESS

a. Re-establish timeframes for balance of process.
b. Discuss ramifications of PDM-C 2005 – Review Letter
c. Briefly discuss FEMA e-grant requirements

4) STEERING COMMITTEE

a. Formally recognize the Steering Committee
    1. Any critical players missing?
b. Tasks
    1. Develop a Mitigation Strategy
    2. Develop LHMP Goals and Objectives
    3. Review Section One – Please comment by 1-15-05
    4. Suggestions for additional data or analysis
    5. Identify Mitigation Actions that will be recommended
    6. Prioritize the Mitigation actions/projects – identify methods used.
c. Identify Role of Steering Committee in Plan Maintenance

5) TASK FORCE FORMATION

a. Review task force membership and participation
b. Recommendation for additional contacts
c. Discuss public meeting schedule (2 meetings?)

City of Palmdale

Local HMP Steering Committee Workshop

December 16, 2004

Attendees: City Department Heads or their representatives

1. Introduction of individuals, review of the agenda, discussion of expected outcomes.
2. Presentation of power point presentation on the "Northridge Earthquake" – 10 years
3. Discusses what has changed for Palmdale since then – positive/negative
4. Discussed the timeframes and reviewed progress to date
5. Provided numerous handouts – background material for newcomers, and copies of the proposed Mitigation Strategy and Planning Process overview for each department head.
6. Specific topics addressed:
    a. City owned Mobile Home Parks (3) as part of the "affordable" housing efforts in the City.
    b. City Department heads to review existing contracts with a mind towards ensuring that these services will be provided in Post-EQ environment.
    c. Discussed possible Mitigation Projects that can be implemented at all, and requested departments to identify Mitigation Actions any that have already been completed.
7. Each department head was asked his or her concerns regarding hazards.
8. The role of the "task force" and "steering committee" were discussed, and the plan implementation and maintenance requirements were outlined.
9. Additional city contacts that should be here was discussed, members were encouraged to recruit critical players who might be missing.
10. Section One of the plan was submitted for review this date.

The next meeting dates were discussed, and the meeting adjourned – 12:20 P.M.

CITY OF PALMDALE

STEERING COMMITTEE LOCAL HAZARD MITIGATION PLANNING MEETING

December 16, 2004
10:00 A.M.

ATTENDEES

Name	Department	Phone #	e-mail
Shane Walter	Building + Safety	661-267-5353	swalter@cityofpalmdale.org
Michael Adams	Housing	267-5148	madams@cityofpalmdale.org
Rod Holtz	P.W. Maint.	267-5338	R Holtz@ City of Palmdale.org
Jason Finch	P.W. Traffic	267-5321	jfinch@cityofpalmdale.org
Danny Roberts	Econ. Dev.	267-5125	droberts@cityofpalmdale.org
Earnestine Hall	Finance	267-5444	ehall@cityofpalmdale.org
Hamed Jones	Finance	267-5433	hjones@cityofpalmdale.org
Laurie Lile	Planning	5211	llile@cityofpalmdale.org
Russ Bird	Parks & Rec	5611	rbird@cityofpalmdale.org
Lynn Glidden	Public Work	5315	lglidden@cityofpalmdale.org
George Upegui	Public Works	5345	Gupegui@City of Palmdale.org
Anne Onuhne	P. S.	5569	

HAZARD MITIGATION PLANNING PROCESS MEETING AGENDA
City of Palmdale
January 27, 2005 – 11:00 A.M.

1. **Review notes from last meeting**

2. **Status of the LHMP**

3. **LHMP Requests for Information from the City:**
   a. Community Profile
   b. Develop Goals and Objectives
   c. Prioritize Hazards and Mitigation Projects
   d. NFIP/CRS Status (these also relate to the planning grant application)
   e. Public Outreach
   f. Interagency Participation
   g. Plan Maintenance
   h. Identification of Staff Resources
   i. Identify Building Inventory/Critical Facilities/Infrastructure
   j. Provide Demographics

4. **Status of GIS – Local Involvement**
   a. Do we have GIS Specific Plan Boundaries?

5. **Potential Mitigation Projects List**
   a. Review Palmdale Staff Hazard Mitigation Project List
   b. Geographic Isolation Issue
   c. Wildland Urban Interface
   d. 100 and 500 Year Floodplain
   e. Alquist Priolo Earthquake Zones

6. **Project Applications?**

7. **Planning Application Status**
   a. Review of information needed from the City
   b. Review of Planning Application
   c. Budget Rationale
   d. Review Planning Application Process/Schedule
   e. Input data into Planning Application

8. **Next Steps**

9. **Next Scheduled Meeting**

10. **Adjourn**

City of Palmdale
Hazard Mitigation Planning Process Meeting
AGENDA
April 7, 2005 – 10:00 A.M.

1. **Meeting comes to order – meeting timeframe?**

2. **Review Agenda** ***[Handout]***

3. **Distribute Administrative Draft Plan** ***[Handout]***

4. **Additional LHMP Requests for Information from City**
   - See – List of LHMP Requests for Information **[Handout]**

5. **Status of GIS**
   - List of maps generated to date, discuss any issues, or needs.

6. **Vulnerability of Existing Buildings and Infrastructure to Hazards**
   - Need the number of residential and commercial structures in the hazard zone. Identification of specific city-owned facilities in the hazard zone. Identification of any critical infrastructure/facilities in the hazard zone.

7. **Estimates of Potential Losses**
   - Add table showing potential dollar losses to residential/commercial structures, city facilities, and critical infrastructure and facilities. Also describe methodology used to develop estimates.

8. **Estimated Population Impacted**
   - Use 2000 Census Tract data overlaid by Identified Hazard Zones

9. **Potential Mitigation Projects List**
   - What if 's– plan today for most cost effective repair and reconstruction – whole system, parts of system, utilize available loss estimation programs (RAMP), - correct problems, long term vs. short term – ascribe true costs to damage - not just the cost to repair.

11. **Mitigation Education**
   - Have a better understanding of "avoided losses", benefit-cost, codes and standards, sustainable community and common sense.

12. **Geographic Isolation Issue**
   - Mitigation Actions - **Shelters** – see "Transportation"

13. **Wildland Urban Interface**
   - Specific Plans/Parcel Map

14. <u>100 and 500 Year Floodplain</u>

- Inventory?

15. <u>Alquist Priolo Earthquake Zones</u> <u>(parcel overlay GIS)</u>

12. <u>Next Steps</u>

- HMSC Members - Review Administrative Draft
- All Steering Committee Members - **PLEASE**:
  i. Identify the (Departments) role in this plan.
  ii. Clarify "authority" to commit mitigation.
  iii. Identify potential "partners" who can get the job done.
  iv. Develop projects designed to address the problem.
  v. Identify past or current successful mitigation projects.

13. <u>Next Scheduled Meeting</u>

14. <u>Adjourn</u>

CITY OF PALMDALE

LHMP MEETING

4-7-05

NAME	ORGANIZATION
JAMES THERNES	ITA
Lynn Glidden	City of Palmdale
Chris Adams	ST & A
Anne Ambrose	City of Palmdale

AGENDA
LOCAL HAZARD MITIGATION PLAN
9-14-05

1. Review attached mission statement and bylaws
2. Review and provide goals and objectives for LHMP
3. Review and provide Mitigation Strategy
4. Provide Mitigation Actions (past and future)
5. Plan Maintenance - steering committee needs to review Section 5.2-5.5 to ensure that the adopted plan maintenance/update/public involvement procedures represent the appropriate level of commitment for the City of Palmdale.

6. NFIP/CRS Status
   a. Need City of Palmdale's perspective on purpose of participation, number of NFIP insured homes, number of repetitive damage claims. The last NFIP flood map was generated in 1998. This did not account for upstream development. California DWR has an "Awareness Mapping" program that starts where FEMA left off and extends to previously unmapped areas. Lancaster Area (QUAD) has had awareness maps developed - Palmdale has not.

7. Community Profile
   a. Make sure data is up to date
   b. List recent exercises with locals, LA County, State, OES
   c. Has Palmdale experienced any pollution of wells or subsurface pools that required reverting to the importation of water, along with the cost of the infrastructure required to capture and deliver it?
   d. Are there any City Codes that specifically address hazard mitigation?
   e. Any above ground HAZMAT storage facilities at Plant 42 or at the Airport?
   f. Any specific weather incidents that should be mentioned?

8. Re-vitalization of Hazard Mitigation Planning Process - Public Outreach
   a. Revise timeline for completion of process
   b. Possible Mitigation Action - Public Outreach
   c. Letter to members of steering committee bringing them up to date (in process). Kick-off declaration City Manager/City Council - resolution establishing the program and recognition that there will be a five year commitment with (annual, quarterly, monthly etc) meetings to ensure that plan relevancy is maintained, etc.
   d. Public meetings, web posting, newspaper, public TV channel
   e. Other outreach possibilities - ?

9. Interagency Participation
   a. This section needs to be expressed for each department, the resources it sues, public or private to sustain its programs integrity, regulatory partnerships and any MOU's or contractual services to provide pre or post disaster mitigation services.

10. Plan Maintenance
    a. City must establish procedures for long-term implementation and plan maintenance, maintain steering committee to ensure critical updates are captured, and prepare policies and practices that will result in the required five year update.

11. Identification of Staff Resources
    a. Needs information
    b. Details of who will do what - this speaks to the level of commitment to this planning process.

LOCAL HAZARD MITIGATION PROGRAM
9-14-05

NAME	DEPARTMENT	EXTENSION
LAURIE LILE	PLANNING	5211
ROD HOLTZ	MAINT	5349
Tony Colombo	MAINT.	5318
MIKE SHAHBAKHTI	ENGINEERING	5258
DANNY ROBERTS	ECON DEV.	5125
Anne Ambrox	Public Safety	5569
Shane Walter	B+F.	5362.
EARNESTINE HALL	FINANCE	5445
VAUNELD ADAMS	FINANCE	5413
Mike Behan	Traffic / GIS	5337
TIM HUGHES	PUBLIC WORKS	5319
JAMES THERNES	JT&A	(818)406-4356
Ann Glidden	Public Works	5315
Russ Bird	P+R	5612

LHMP TASK FORCE MTG 2/6/08
(STEERING)

NAME	DEPT
Tim Hughes	PUBLIC WORKS
LAURIE LILE	ADMIN
EARNESTINE HALL	FINANCE/PURCHASING
Anne Ambrose	Public Safety
Mike Rieben	Traffic / GIS
Lynn Glidden	Public Works
BILL PADILLA	TRAFFIC DIVISION - DPW
Russ Bird	Parks & Rec
DANNY ROBERTS	ECON. DEV.

Project prioritizing

FOR IMMEDIATE RELEASE

CITY OF PALMDALE

NEWS RELEASE

CONTACT: Barbara Vilardo
PHONE: 661/267-5115
DATE: March 6, 2008

Public Input Requested for City's Hazard Mitigation Plan

PALMDALE –The City of Palmdale will conduct an open forum on Tuesday, March 25 from 7 to 8 pm in the City Council Chamber, 38300 Sierra Highway, Suite B, to solicit public participation in the development of a natural hazard mitigation plan.

In accordance with the Federal Disaster Mitigation Act of 2000, all local government agencies must have a local natural disaster mitigation plan in place to be eligible for federal funding in the event of a large-scale disaster such as an earthquake, flood or fire. The City anticipates completing this process by late August.

The public may also provide input by completing the Local Hazard Mitigation Planning Assessment Survey available on the City's Web site and at the City Hall and Development Services lobbies. The survey asks questions about what types of natural disasters concern the public the most and what the City should do to reduce or eliminate the risk of damage from these disasters. Surveys must be returned no later than March 12.

-30-

Communications Department • 38300 Sierra Highway • Palmdale, CA 93550
www.cityofpalmdale.org

PALMDALE LOCAL HAZARD MITIGATION PUBLIC MEETING

AGENDA

MARCH 25, 2008

Overview

Reason for a LHMP: The Federal Disaster Mitigation Act of 2000 (Public Law 106-390) requires that all local agencies must have a local natural disaster mitigation plan in place to be eligible for both pre and post disaster federal funding. The Federal government is no longer willing to pay for repetitive disaster damage or damage that can easily be averted by pre-event actions. The LHMP places emphasis on reducing risks and ensuing effects from natural hazards through pre-event risk identification, assessment, and mitigation. This process shifts much of the emphasis from the typical public safety oriented disaster response approach to a community development (planning, building, engineering, etc.) oriented disaster mitigation approach.

Local Hazard Mitigation Planning Assessment Survey: which queries their level of concern for various natural and human-caused disasters; what they have done to make their home/business/facility more resistant to disasters; asked their opinion about what the City should be doing to reduce or eliminate the risk of damage from various disasters; and asked them to identify the community priorities for planning for specific hazards.

Attendees were invited to sign up to participate on a planning task force to complete the LHMP

The LHMP will be completed by mid April for review by FEMA and OES and for approval by City Council in August 2008.

PALMDALE LOCAL HAZARD MITIGATION PUBLIC MEETING

MEETING MINUTES

MARCH 25, 2008 @ 7:30 p.m.

Overview

Meeting started with introductions by Tim Hughes, Deputy Director of Public Works and Lynn Glidden, Senior Civil Engineering. Tim explained the reason for the need of a Local Hazard Mitigation Plan as per the agenda that was handed out. The public also received copies of the City of Palmdale Hazard Mitigation Goals & Objectives, Section 4.3

Tim Hughes requested that all persons fill out the Planning Assessment Survey. After filling out the survey, the meeting was open to questions from the public.

Question #1: Rubin Rosas was happy to see that the City was going forward with the plan, but would like to see there be more community programs and training for disaster listed under the project category. Tim Hughes explained that the projects listed consist of work that will mitigate damages in the future. These projects would be put in the 10 year CIP for consideration. Tim also explained that there are other public agencies that do training in the event of disasters and that he should talk with Anne Ambrose regarding the City's Disaster Program which is currently being updated.

Question #2: Charles Lesiecki was concerned that the projects listed under earthquake preparedness were not ranked as a high priority and wondered why. Tim explained that the purpose of the plan is to mitigate areas of concern to help prevent facility damage and loss of life in the event of a disaster.

Question #3: Chris Roberts wondered why Hunt Canyon Drainage Basin was considered a high priority. Tim stated that due to previous studies done by both the City of Palmdale and the Army Corp of Engineers, this area is seen as a major flooding area and a potential problem. Since the Army Corp of Engineers considers this an issue, the City does too.

Meeting was adjourned at 8:30 p.m.

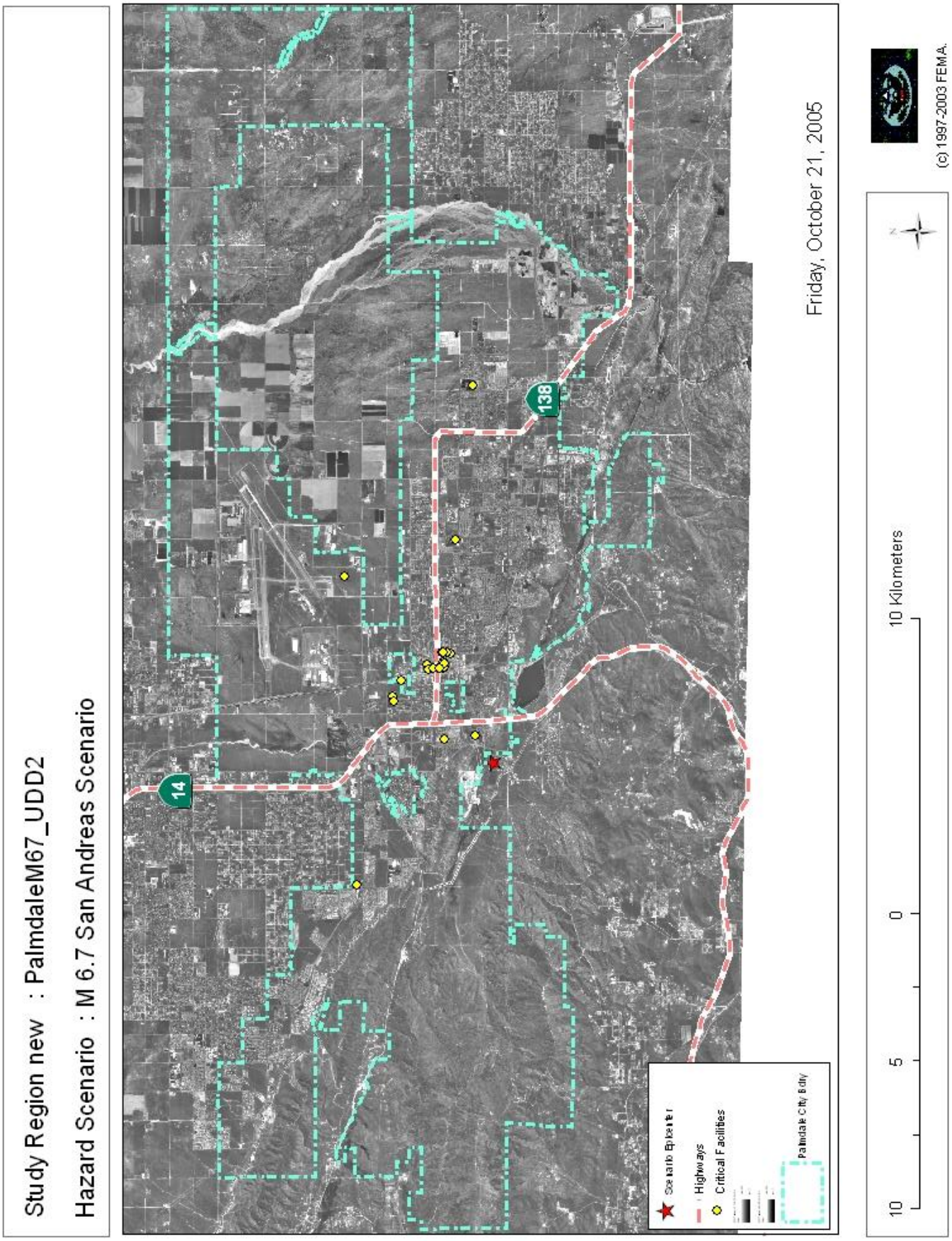
LOCAL HAZARD MITITGATION PROGRAM
PUBLIC INFORMATION MEETING
3/25/08

NAME	PHONE NUMBER	EMAIL
Lynn Glidden	267-5300	lglidden@cityofpalmdale.org
Rubin Rosas	317-2653	rubinrosas@sbcglobal.net
Charles Lesiecki	433-6364	westcoast73552@yahoo.com
MARLA STARK	713-5425	aucert@hotmail.com marzbarz@legalKix.com
CHRIS ROBERTS (AV REACT)	661 433-6020	CHRISTOPHER.ROBERTS@QWEST.COM
Mary Cooper (AV REACT)	661 466-9367	billmaronthehill@roadrunner.com
William Rini AV REACT	661-466-9232	SAME
RICHARD WELLS	661 285-9355	

APPENDIX

C

HAZUS REPORT & MAPS



Scenario Epicenter

HAZUS-MH: Earthquake Event Report

Region Name: *PalmdaleM67_UDD2*

Earthquake Scenario: *Palmdale M6.7 on San Andreas Fault*

Print Date: *October 24, 2005*

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 139.20 square miles and contains 26 census tracts. There are over 36 thousand households in the region and has a total population of 124,915 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 35 thousand buildings in the region with a total building replacement value (excluding contents) of 6 ,533 (millions of dollars). Approximately 99.00 % of the buildings (and 91.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 1,308 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 35 thousand buildings in the region which have an aggregate total replacement value of 6, 533 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 93% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 33 schools, 0 fire stations, 2 police stations and 1 emergency operation facilities. With respect to HPL facilities, there are 1 dams identified within the region. Of these, 1 of the dams are classified as 'high hazard'. The inventory also includes 1 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 2 and 3.

The total value of the lifeline inventory is over 1,308.00 (millions of dollars). This inventory includes over 345 kilometers of highways, 31 bridges, 2,288 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	31	44.10
	Segments	16	1,113.40
	Tunnels	0	0.00
		Subtotal	**1,157.50**
Railways	Bridges	3	0.60
	Facilities	1	2.60
	Segments	3	68.60
	Tunnels	0	0.00
		Subtotal	**71.70**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	1	6.40
	Runways	2	73.30
		Subtotal	**79.80**
		Total	**1,309.00**

Table 3: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	22.90
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	22.90
Waste Water	Distribution Lines	NA	13.70
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	13.70
Natural Gas	Distribution Lines	NA	9.20
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	9.20
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	0.00
Electrical Power	Facilities	0	0.00
		Subtotal	0.00
Communication	Facilities	0	0.00
		Subtotal	0.00
		Total	45.80

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Palmdale M6.7 on San Andreas Fault
Type of Earthquake	Source
Fault Name	Mojave
Historical Epicenter ID #	9
Probabilistic Return Period	NA
Longitude of Epicenter	-118.14
Latitude of Epicenter	34.56
Earthquake Magnitude	6.70
Depth (Km)	0.00
Rupture Length (Km)	25.59
Rupture Orientation (degrees)	0.00
Attenuation Function	WUS Shallow Crustal Event - Extensional

Building Damage

Building Damage

HAZUS estimates that about 13,992 buildings will be at least moderately damaged. This is over 39.00 % of the total number of buildings in the region. There are an estimated 729 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.01	0	0.00
Commercial	25	0.35	38	0.26	61	0.55	38	1.75	15	2.10
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	4	0.05	6	0.04	10	0.09	7	0.31	3	0.40
Industrial	5	0.07	6	0.04	8	0.08	4	0.19	1	0.17
Other Residential	118	1.64	341	2.32	754	6.81	721	32.77	294	40.34
Religion	1	0.02	2	0.01	2	0.02	1	0.05	0	0.04
Single Family	7,060	97.87	14,298	97.33	10,227	92.44	1,429	64.93	415	56.94
Total	**7,214**		**14,691**		**11,063**		**2,200**		**730**	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	7,073	98.05	14376	97.86	10,209	92.28	1,360	61.82	404	55.34
Steel	10	0.14	14	0.09	29	0.27	20	0.93	8	1.03
Concrete	10	0.14	18	0.12	24	0.22	15	0.69	6	0.82
Precast	4	0.05	6	0.04	12	0.11	8	0.38	3	0.43
RM	69	0.96	76	0.52	149	1.35	103	4.69	22	3.06
URM	2	0.02	4	0.02	8	0.07	6	0.28	5	0.68
MH	46	0.64	197	1.34	632	5.71	687	31.21	282	38.64
Total	**7,214**		**14,691**		**11,063**		**2,200**		**730**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 6: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	33	0	0	0
EOCs	1	0	0	0
PoliceStations	2	0	0	0
FireStations	0	0	0	0

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	16	0	0	16	16
	Bridges	31	2	0	30	31
	Tunnels	0	0	0	0	0
Railways	Segments	3	0	0	3	3
	Bridges	3	0	0	3	3
	Tunnels	0	0	0	0	0
	Facilities	1	1	0	0	1
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	0	0	1	1
	Runways	2	0	0	2	2

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 9 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	1,144	302	76
Waste Water	686	239	60
Natural Gas	458	255	64
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	36,997	6,225	0	0	0	0
Electric Power		26,783	16,758	7,005	1,387	37

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 11 ignitions that will burn about 0.09 sq. mi 0.06 % of the region's total area.) The model also estimates that the fires will displace about 405 people and burn about 20 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 47.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates (1, 050 households to be displaced due to the earthquake. Of these, 312 people (out of a total population of 124,915 will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	3	1	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	1	0	0	0
	Industrial	5	1	0	0
	Other-Residential	116	26	3	5
	Single Family	207	32	2	3
	Total	**331**	**61**	**5**	**8**
2 PM	Commercial	212	59	9	18
	Commuting	0	0	1	0
	Educational	62	16	3	5
	Hotels	0	0	0	0
	Industrial	36	9	1	3
	Other-Residential	27	6	1	1
	Single Family	43	7	0	1
	Total	**381**	**98**	**15**	**28**
5 PM	Commercial	232	63	10	19
	Commuting	7	10	15	3
	Educational	5	1	0	0
	Hotels	0	0	0	0
	Industrial	23	6	1	2
	Other-Residential	43	10	1	2
	Single Family	81	13	1	1
	Total	**390**	**103**	**29**	**27**

Economic Loss

The total economic loss estimated for the earthquake is 985.23 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 972.88 (millions of dollars); 7 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 81 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.54	16.42	0.65	1.03	18.64
	Capital-Related	0.00	0.23	13.92	0.39	0.15	14.68
	Rental	16.90	8.13	7.71	0.26	0.63	33.64
	Relocation	1.79	0.23	0.41	0.02	0.11	2.56
	Subtotal	**18.69**	**9.13**	**38.45**	**1.32**	**1.92**	**69.52**
Capital Stock Loses							
	Structural	90.69	13.79	18.98	3.01	3.58	130.05
	Non_Structural	435.21	76.98	54.92	10.42	12.02	589.56
	Content	126.62	17.55	25.76	7.10	4.21	181.24
	Inventory	0.00	0.00	0.98	1.52	0.03	2.52
	Subtotal	**652.52**	**108.32**	**100.63**	**22.05**	**19.84**	**903.36**
	Total	**671.21**	**117.45**	**139.09**	**23.37**	**21.76**	**972.88**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1,113.35	$0.00	0.00
	Bridges	44.12	$5.38	12.20
	Tunnels	0.00	$0.00	0.00
	Subtotal	**1157.50**	**5.40**	
Railways	Segments	68.56	$0.00	0.00
	Bridges	0.59	$0.06	10.51
	Tunnels	0.00	$0.00	0.00
	Facilities	2.57	$1.20	46.68
	Subtotal	**71.70**	**1.30**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	6.43	$2.12	32.96
	Runways	73.35	$0.00	0.00
	Subtotal	**79.80**	**2.10**	
	Total	**1309.00**	**8.80**	

Table 14: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Line	22.90	$1.36	5.94
	Subtotal	**22.88**	**$1.36**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Line	13.70	$1.08	7.83
	Subtotal	**13.73**	**$1.08**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Line	9.20	$1.15	12.56
	Subtotal	**9.15**	**$1.15**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
	Total	**45.77**	**$3.58**	

Table 15. Indirect Economic Impact with outside aid
(Employment as # of people and Income in millions of $)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	(9)	-0.45
Second Year			
	Employment Impact	0	0.00
	Income Impact	(26)	-1.38
Third Year			
	Employment Impact	0	0.00
	Income Impact	(34)	-1.78
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	(34)	-1.78
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	(34)	-1.78
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(34)	-1.78

Appendix A: County Listing for the Region

Los Angeles,CA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California					
	Los Angeles	124,915	5,949	583	6,533
Total State		124,915	5,949	583	6,533
Total Region		124,915	5,949	583	6,533

Building Stock Exposure By General Occupancy

October 24, 2005

All values are in thousands of dollars

	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
California								
Los Angeles	5,949,712	400,241	96,128	3,102	29,085	38,888	16,338	6,533,494
Total State	5,949,712	400,241	96,128	3,102	29,085	38,888	16,338	6,533,494
Total Study Region	5,949,712	400,241	96,128	3,102	29,085	38,888	16,338	6,533,494

Study Region : PalmdaleM67_UDD2

Scenario : Palmdale M6.7 on San Andreas Fault

Casualties Summary Report

October 24, 2005

	Injury Severity Level				
	Severity 1	Severity 2	Severity 3	Severity 4	Total
California					
Los Angeles					
Casualties - 2am					
Commuting	0	0	0	0	0
Commercial	3	1	0	0	4
Educational	0	0	0	0	0
Hotels	1	0	0	0	2
Industrial	5	1	0	0	7
Other-Residential	116	26	3	5	149
Single Family	207	32	2	3	243
Total Casualties - 2am	**331**	**61**	**5**	**8**	**405**
Casualties - 2pm					
Commuting	0	0	1	0	2
Commercial	212	59	9	18	299
Educational	62	16	3	5	86
Hotels	0	0	0	0	0
Industrial	36	9	1	3	49
Other-Residential	27	6	1	1	35
Single Family	43	7	0	1	51
Total Casualties - 2pm	**381**	**98**	**15**	**28**	**523**
Casualties - 5pm					
Commuting	7	10	15	3	35
Commercial	232	63	10	19	324
Educational	5	1	0	0	6
Hotels	0	0	0	0	0
Industrial	23	6	1	2	31
Other-Residential	43	10	1	2	56
Single Family	81	13	1	1	95
Total Casualties - 5pm	**390**	**103**	**29**	**27**	**548**
Total Study Region	NA	NA	NA	NA	NA

Study Region : PalmdaleM67_UDD2
Scenario : Palmdale M6.7 on San Andreas Fault

Page : 1 of 1

Earthquake Hazard Report

HAZUS-MH Loss Estimation

Estimated Economic Loss ($ Billions)

Category	Description	Range
General Building Stock	Building Damage	0.40 - 1.40
	Building Contents	< 0.1
	Business Interruption	0.00 - 0.10
Infrastructure	Lifelines Damage	
	Total	0.50 - 1.90

Estimated Building Damage(Thousands of Buildings)

Description	Residential	Commercial	Other	Total
Minor	12 - 50	< 1.0	< 1.0	12 - 50
Major	1 - 5	< 1.0	< 1.0	1 - 5
Total	14 - 60	< 1.0	< 1.0	14 - 60

Estimated Casualties : Night Time

Severity Level	Description	# Persons
Level 1	Medical Aid	170 - 700
Level 2	Hospital Care	30 - 120
Level 3	Life-threatening	< 20
Level 4	Fatalities	< 20

Estimated Shelter Needs

Type	Households	People
Displaced Households	500 - 2,000	
Public Shelter		160 - 600

Comments :

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, goetechnical, and observed ground motion data.

Earthquake Information

Location :

Origin Time:

Magnitude : 6.70

Epicenter Latitude/Longitude :
34.56 / -118.14

Depth & Type :0.00/S

Fault Name :
Mojave

Maximum PGA : 1.00

Ground Motion /Attenuation : WUS
Shallow Crustal Event - Extensional

Information Sources:

Comments :

Population and Building Exposure (2002 D&B) (2000 Census)

Population: 124,915

Building Exposure : ($ Millions)

Residential	5,949
Commerical	400
Other	183
Total	6,532

State:

Counties :
- Los Angeles,CA

Major Metro Area :

2:00 AM Scenario

HAZUS-MH Loss Estimation

Estimated Economic Loss ($ Billions)

Category	Description	Range
General Building Stock	Building Damage	0.40 - 1.40
	Building Contents	< 0.1
	Business Interruption	0.00 - 0.10
Infrastructure	Lifelines Damage	
	Total	0.50 - 1.90

Estimated Building Damage(Thousands of Buildings)

Description	Residential	Commercial	Other	Total
Minor	12 - 50	< 1.0	< 1.0	12 - 50
Major	1 - 5	< 1.0	< 1.0	1 - 5
Total	14 - 60	< 1.0	< 1.0	14 - 60

Estimated Casualties : Day Time

Severity Level	Description	# Persons
Level 1	Medical Aid	190 - 800
Level 2	Hospital Care	50 - 200
Level 3	Life-threatening	10 - 30
Level 4	Fatalities	10 - 60

Estimated Shelter Needs

Type	Households	People
Displaced Households	500 - 2,000	
Public Shelter		160 - 600

Comments :

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, goetechnical, and observed ground motion data.

Earthquake Information

Location :

Origin Time:

Magnitude : 6.70

Epicenter Latitude/Longitude :
34.56 / -118.14

Depth & Type :0.00/S

Fault Name :
Mojave

Maximum PGA : 1.00

Ground Motion /Attenuation : WUS Shallow Crustal Event - Extensional

Information Sources:

Comments :

Population and Building Exposure (2002 D&B) (2000 Census)

Population: 124,915

Building Exposure : ($ Millions)

Residential	5,949
Commerical	400
Other	183
Total	6,532

State:

Counties :
- Los Angeles,CA

Major Metro Area :

2:00 PM Scenario

HAZUS-MH Loss Estimation

Estimated Economic Loss ($ Billions)

Category	Description	Range
General Building Stock	Building Damage	0.40 - 1.40
	Building Contents	< 0.1
	Business Interruption	0.00 - 0.10
Infrastructure	Lifelines Damage	
	Total	0.50 - 1.90

Estimated Building Damage(Thousands of Buildings)

Description	Residential	Commercial	Other	Total
Minor	12 - 50	< 1.0	< 1.0	12 - 50
Major	1 - 5	< 1.0	< 1.0	1 - 5
Total	14 - 60	< 1.0	< 1.0	14 - 60

Estimated Casualties : Commute Time

Severity Level	Description	# Persons
Level 1	Medical Aid	200 - 800
Level 2	Hospital Care	50 - 200
Level 3	Life-threatening	10 - 60
Level 4	Fatalities	10 - 50

Estimated Shelter Needs

Type	Households	People
Displaced Households	500 - 2,000	
Public Shelter		160 - 600

Comments :

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, goetechnical, and observed ground motion data.

Earthquake Information

Location :

Origin Time:

Magnitude : 6.70

Epicenter Latitude/Longitude :
34.56 / -118.14

Depth & Type :0.00/S

Fault Name :
Mojave

Maximum PGA : 1.00

Ground Motion /Attenuation : WUS
Shallow Crustal Event - Extensional

Information Sources:

Comments :

Population and Building Exposure (2002 D&B) (2000 Census)

Population: 124,915

Building Exposure : ($ Millions)

Residential	5,949
Commerical	400
Other	183
Total	6,532

State:

Counties :
- Los Angeles,CA

Major Metro Area :

5:00 PM Scenario

Shelter Summary Report

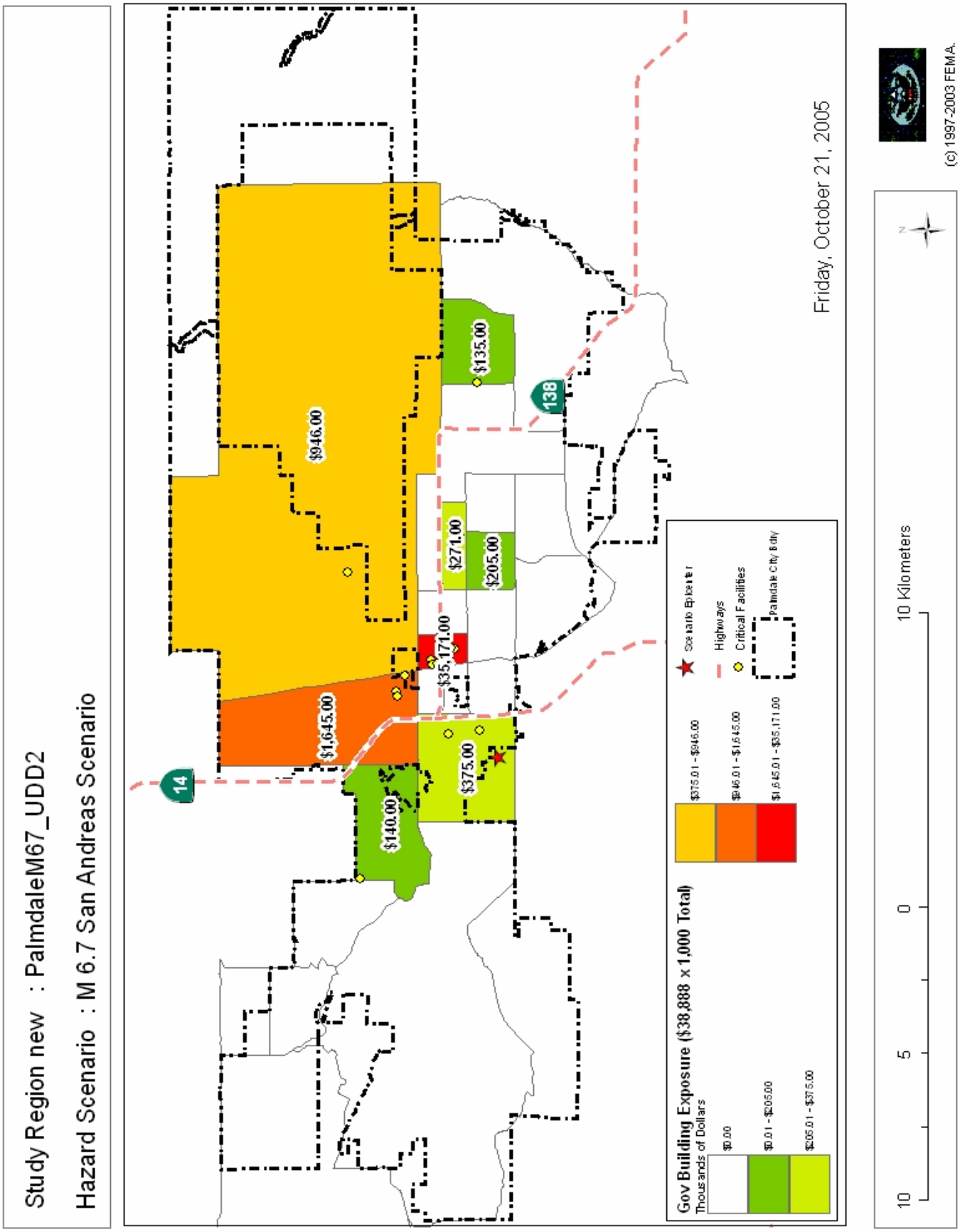
October 24, 2005

	# of Displaced Households	# of People Needing Short Term Shelter
California		
Los Angeles	1,050	313
Total State	1,050	313
Study Region Total	1,050	313

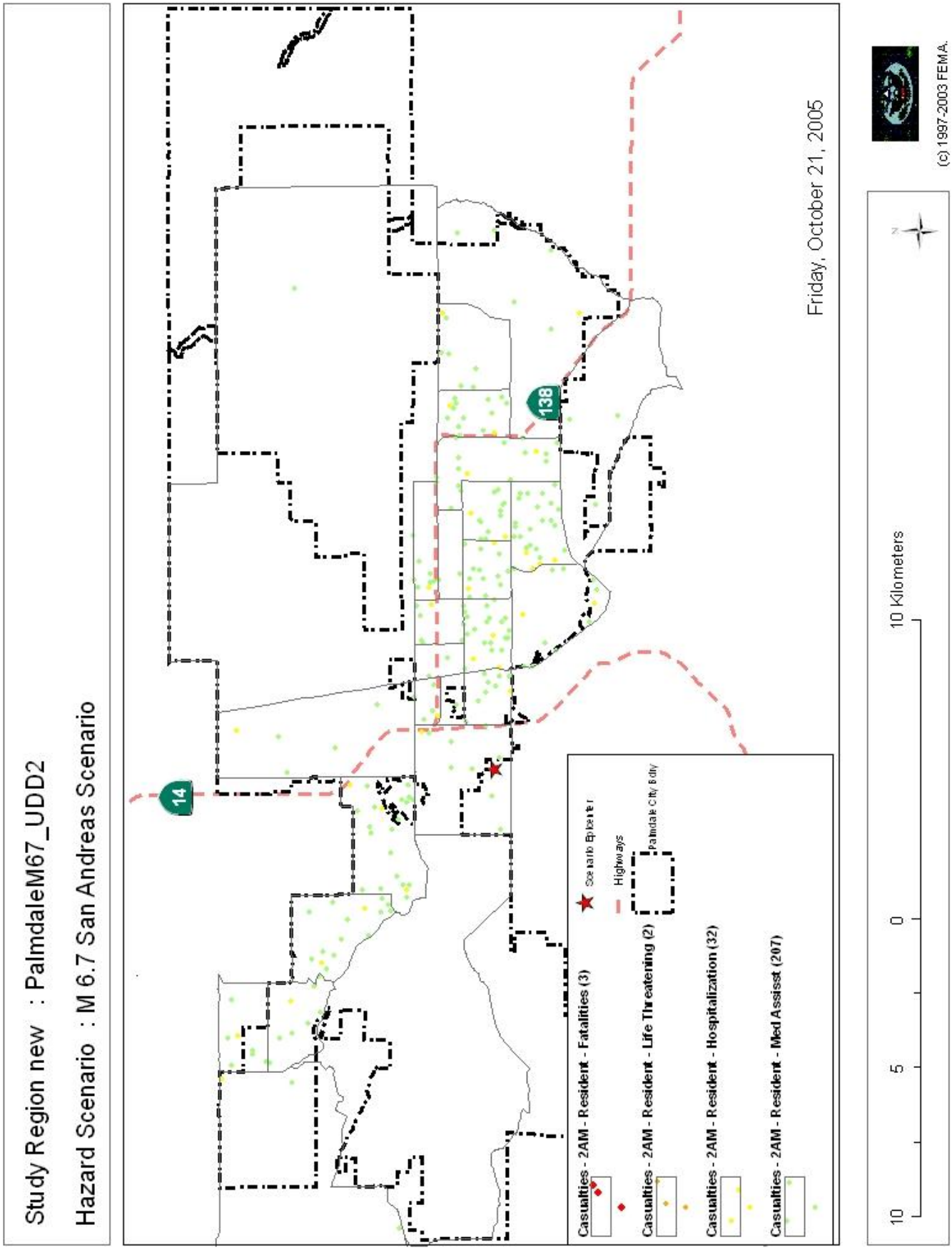
Study Region : PalmdaleM67_UDD2
Scenario : Palmdale M6.7 on San Andreas Fault

Page : 1 of 1

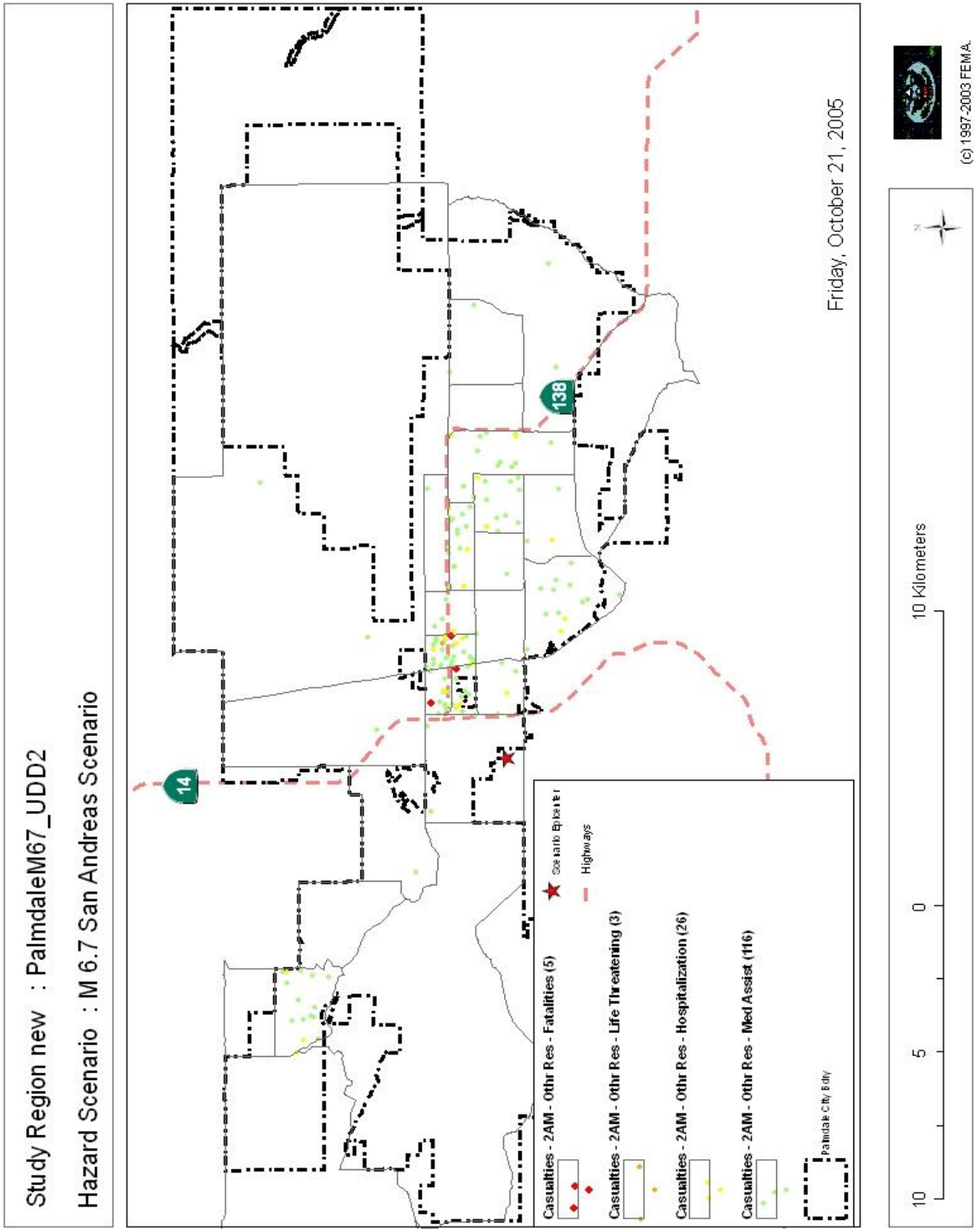
Earthquake Hazard Report



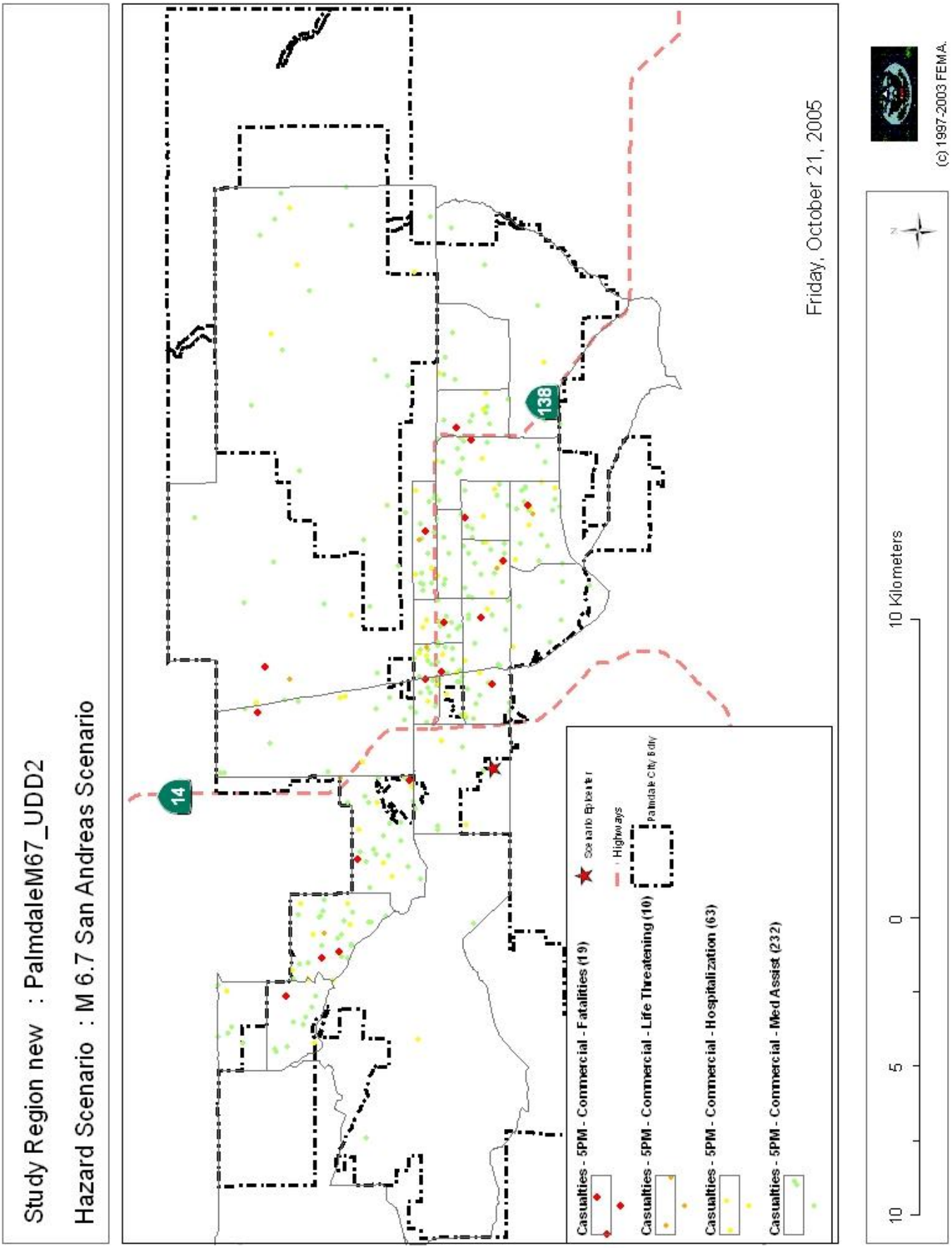
Government Building Exposure



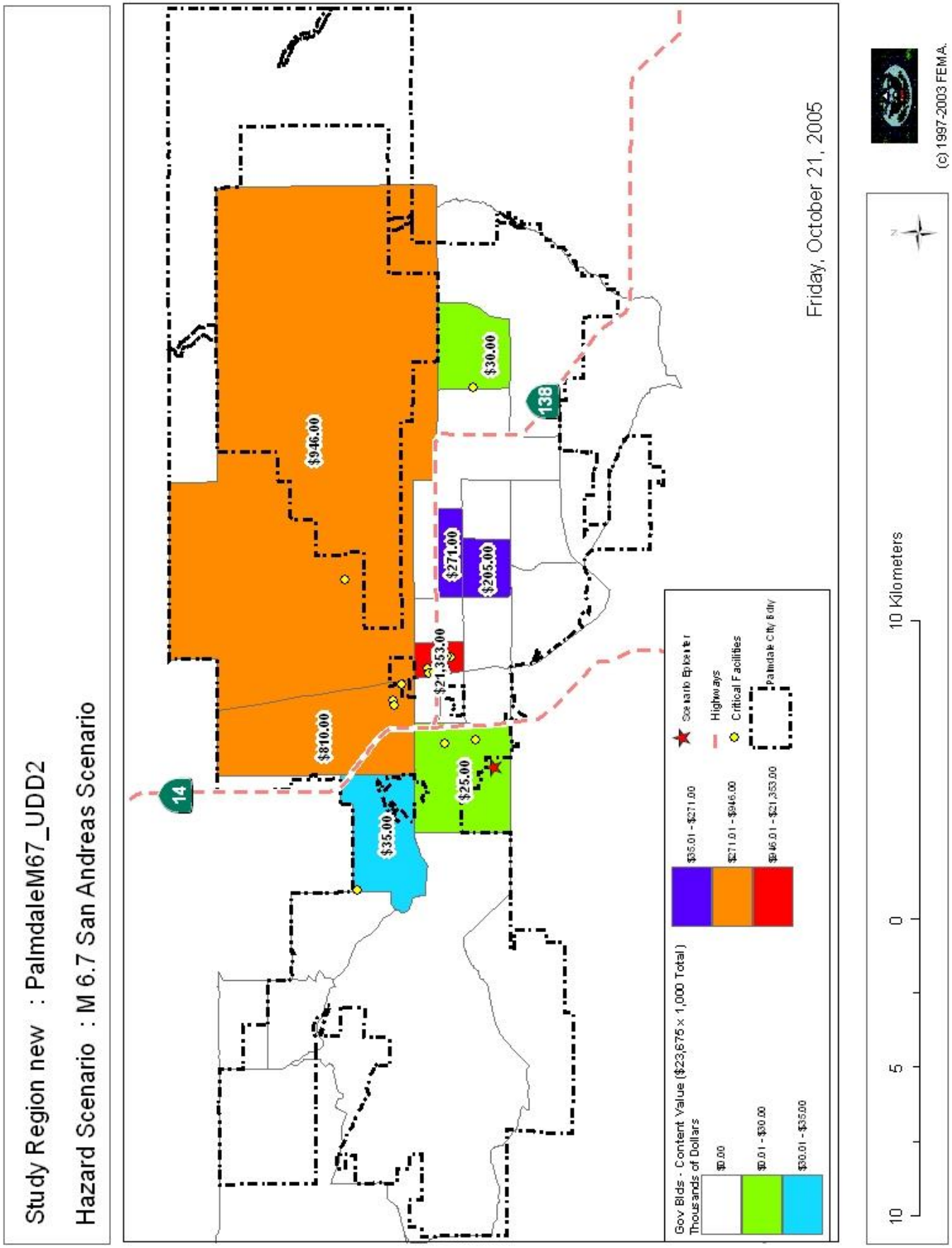
Casualties at 2:00 AM (Residential)



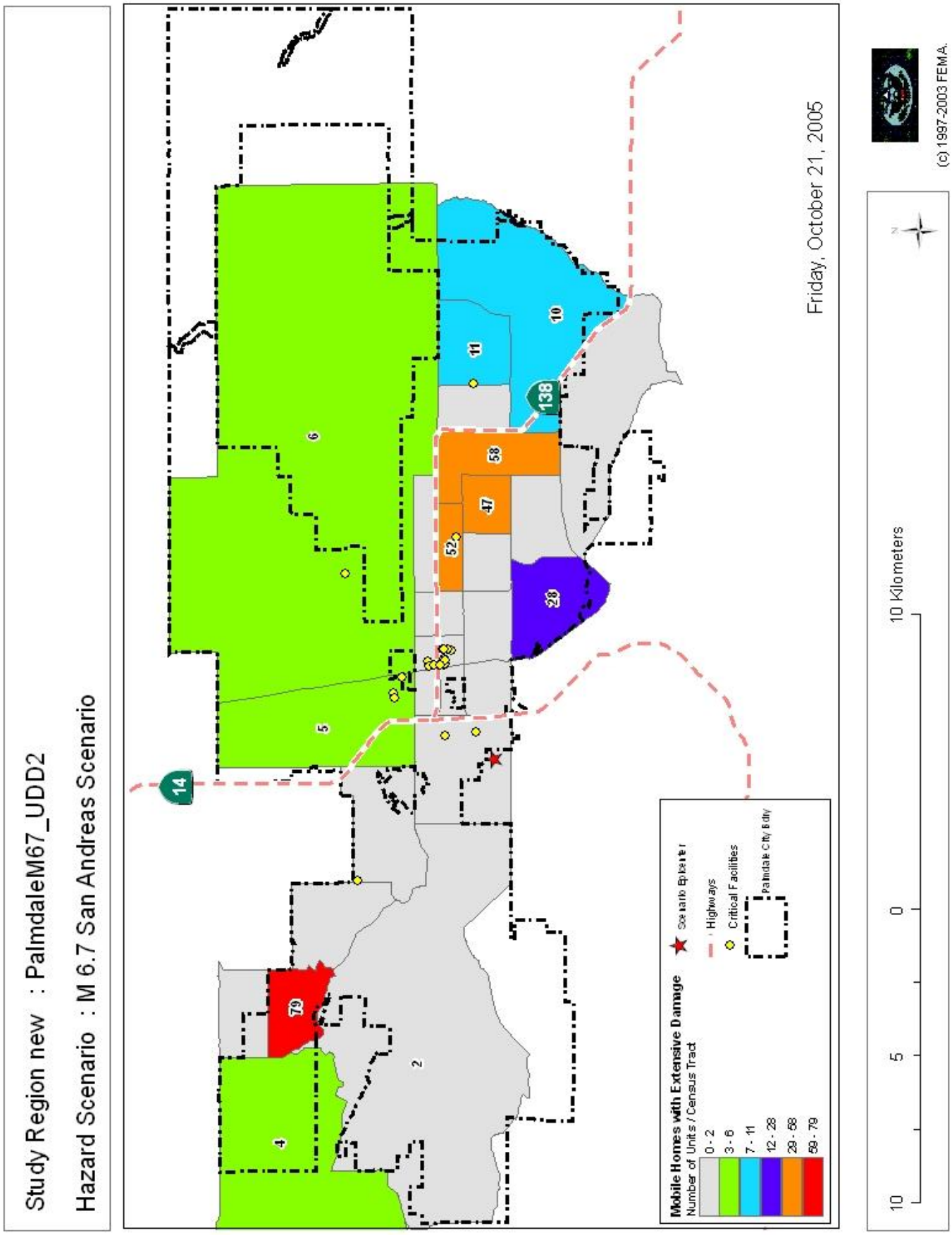
Casualties at 2:00 PM (Residential)



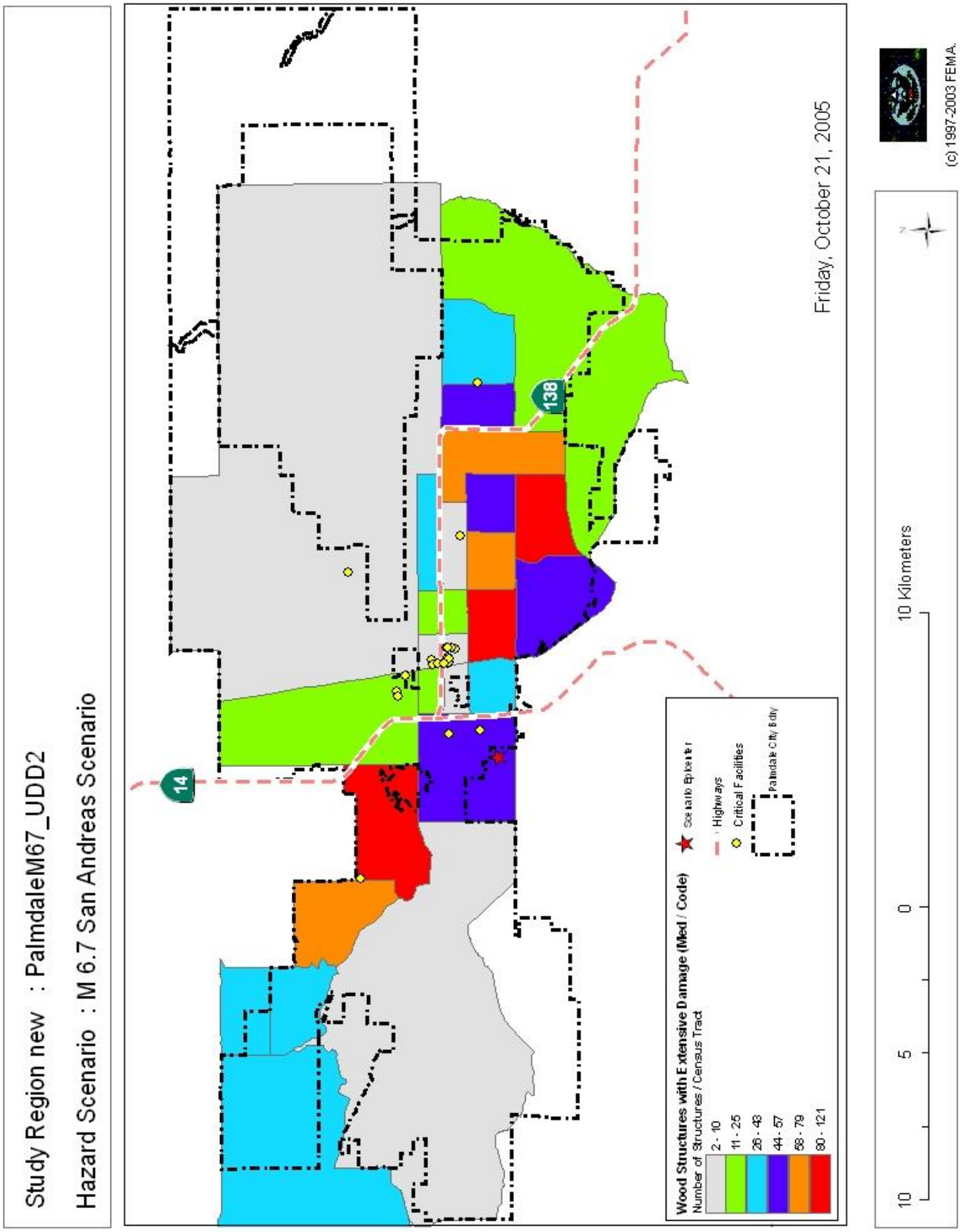
Casualties at 5:00 PM (Commercial)



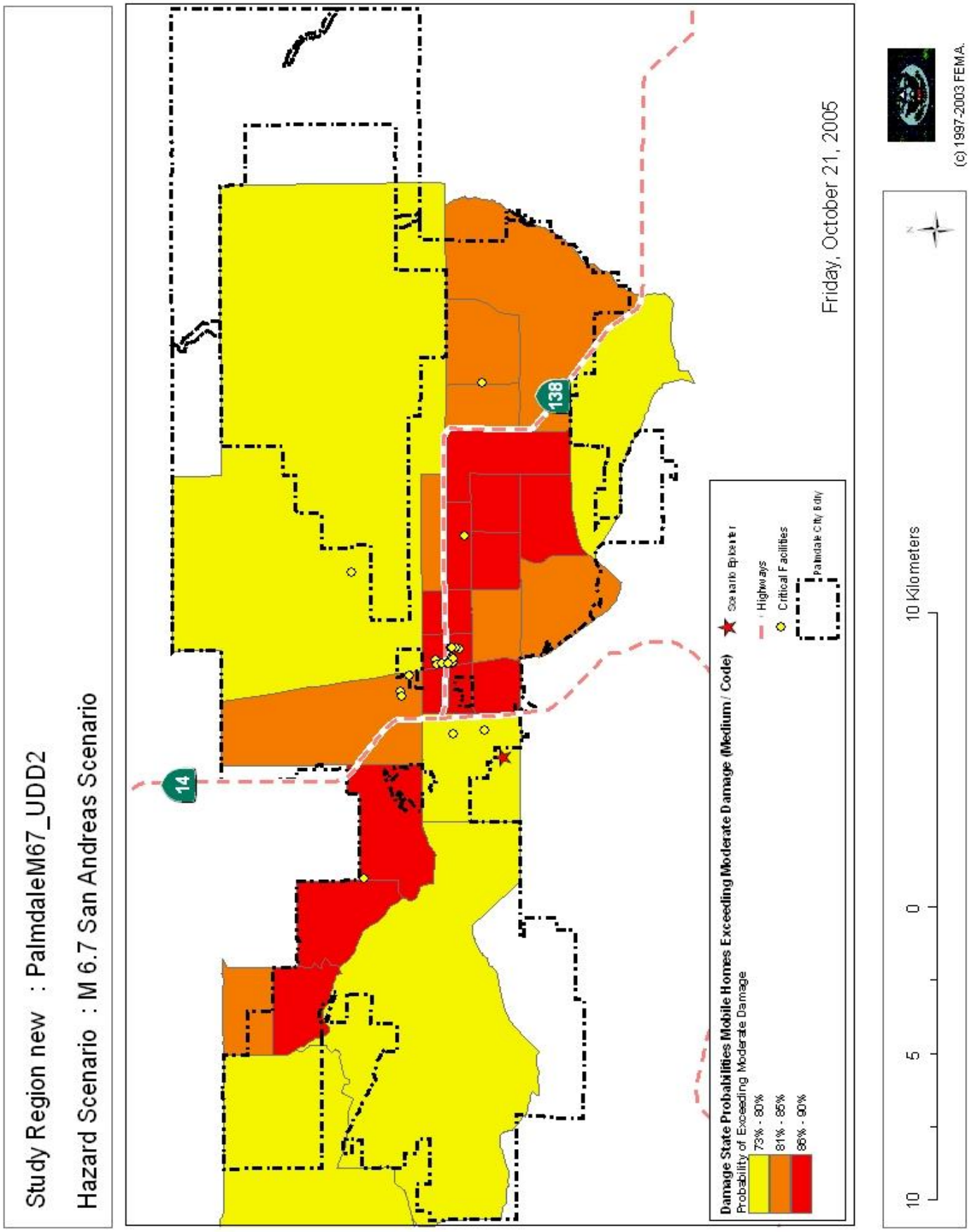
Government Buildings Content Value



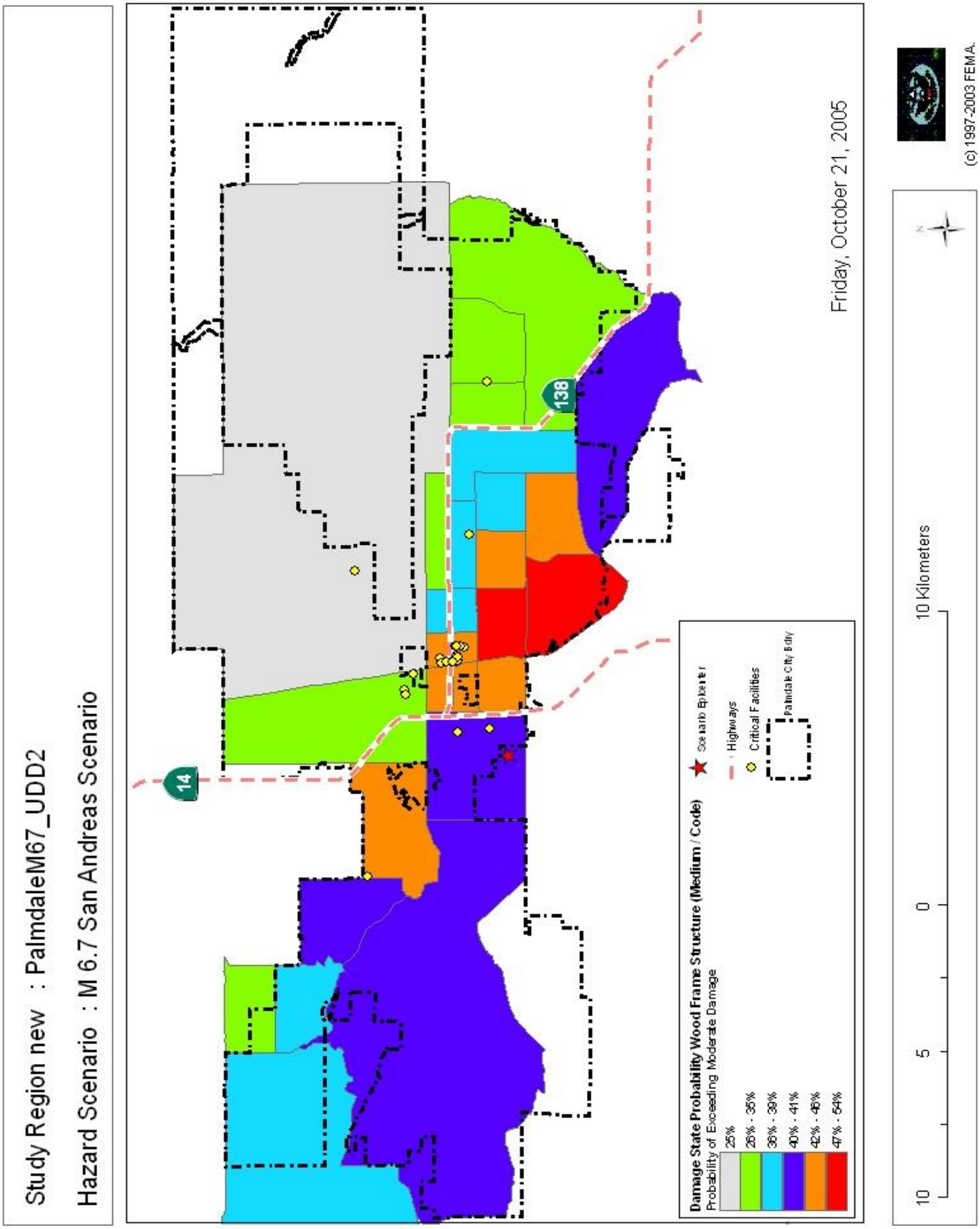
Mobile Homes with Extensive Damage



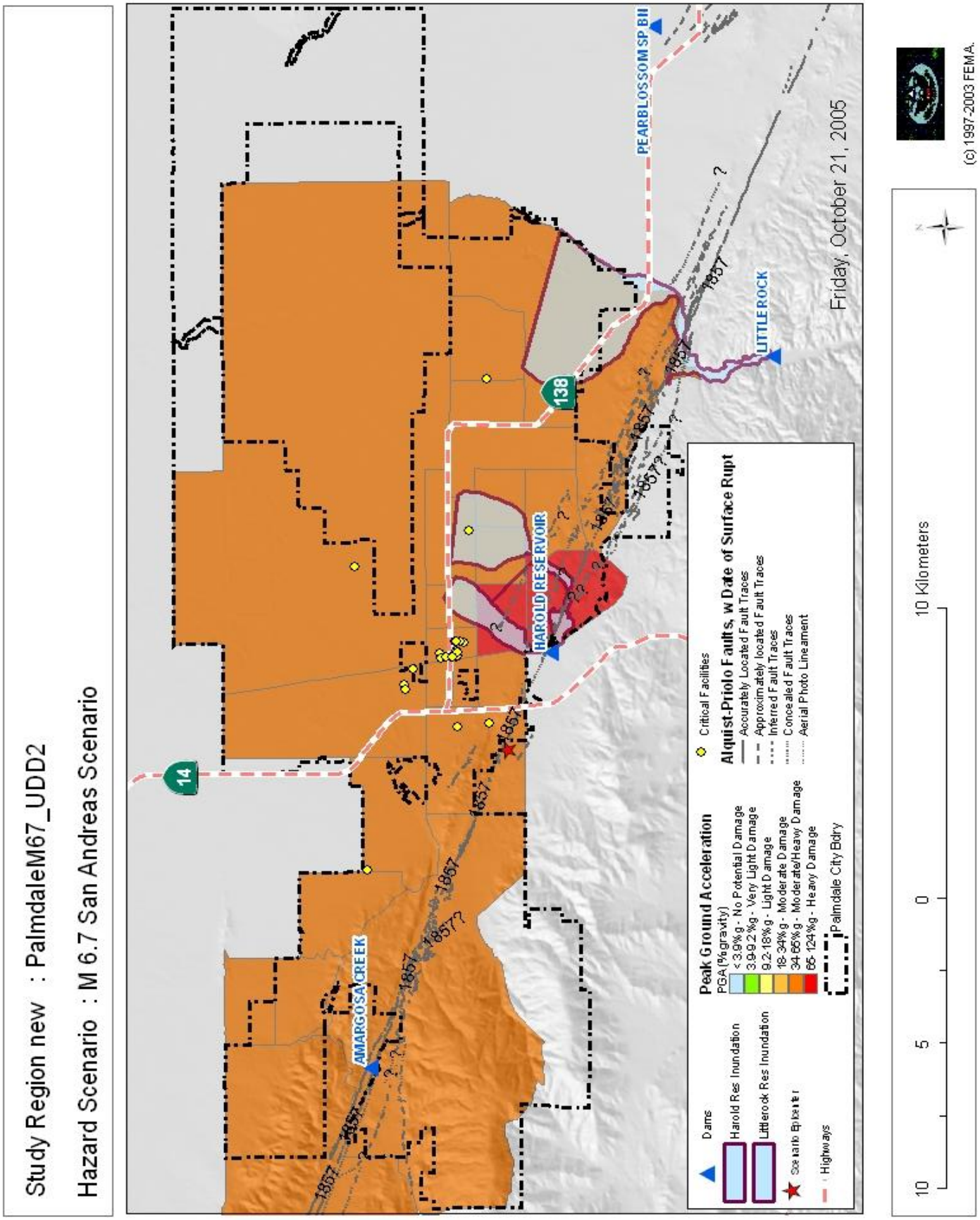
Wood Structures with Extensive e Damage



Damage State Probabilities Mobile Homes Exceeding Moderate Damage



Damage State Probability Wood Frame Structure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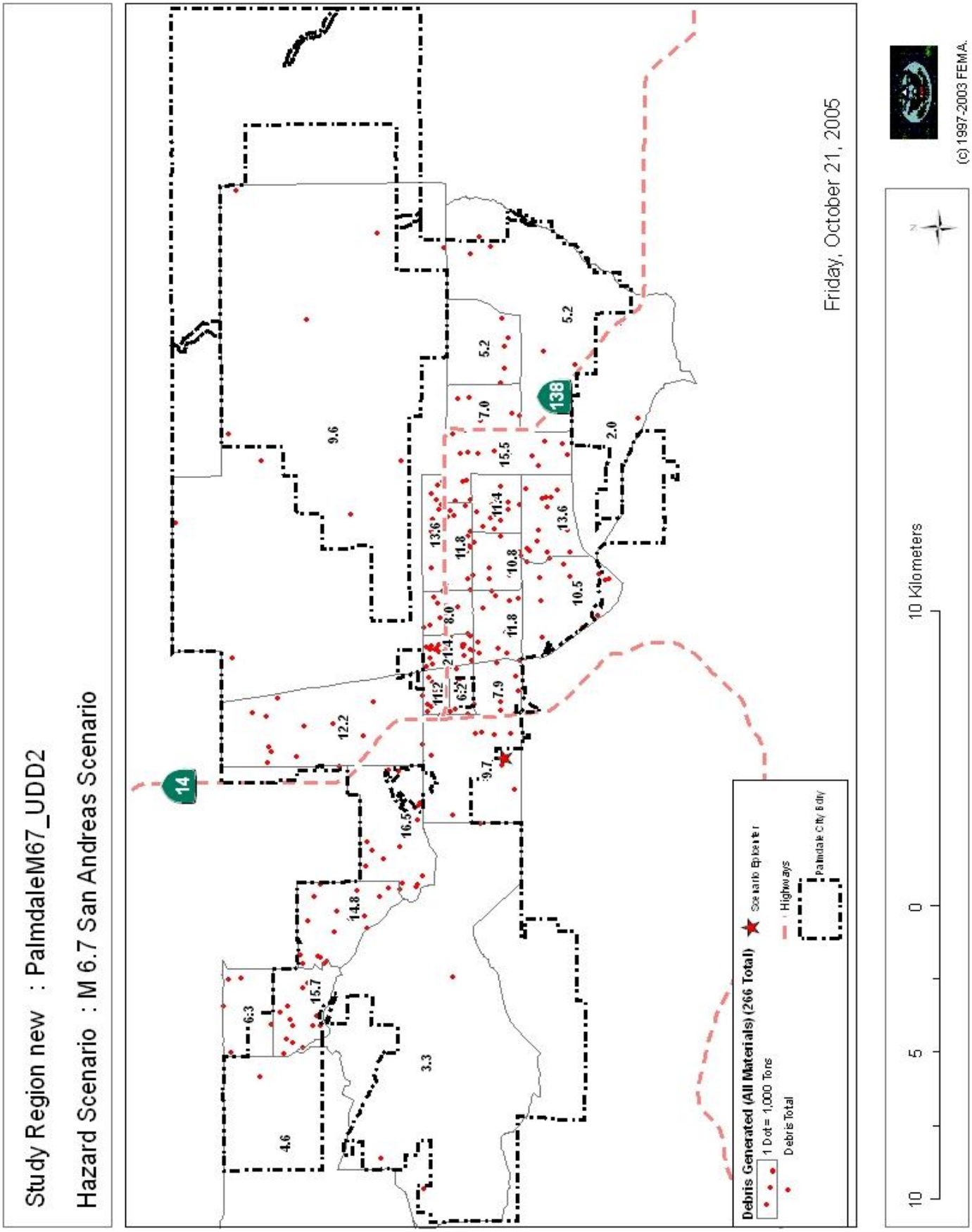
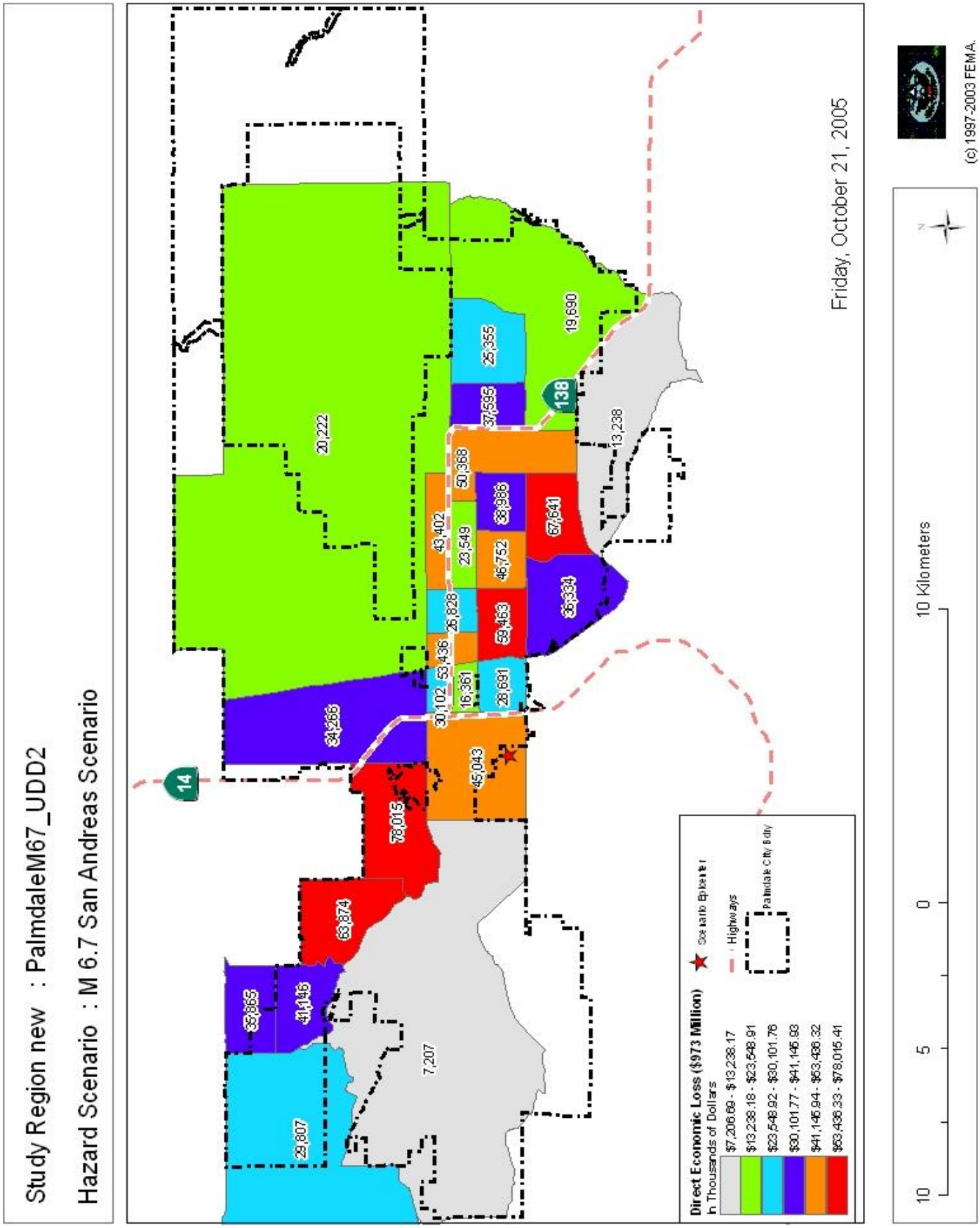
Hazard Scenario : M 6.7 San Andreas Scenario
Friday, October 21, 2005
PEARBLOSSOM SP BII
LITTLE ROCK
HAROLD RESERVOIR
AMARGOSA CREEK
14
138
1857
Dams
Harold Res Inundation
Littlerock Res Inundation
Scenario Epicenter
Highways
Peak Ground Acceleration
PGA (%gravity)
<3.9%g - No Potential Damage
3.9-9.2%g - Very Light Damage
9.2-18%g - Light Damage
18-34%g - Moderate Damage
34-65%g - Moderate/Heavy Damage
65-124%g - Heavy Damage
Palmdale City Bdry
Critical Facilities
Alquist-Priolo Faults, w Date of Surface Rupt
Accurately Located Fault Traces
Approximately located Fault Traces
Inferred Fault Traces
Concealed Fault Traces
Aerial Photo Lineament
10 Kilometers
(c) 1997-2003 FEMA

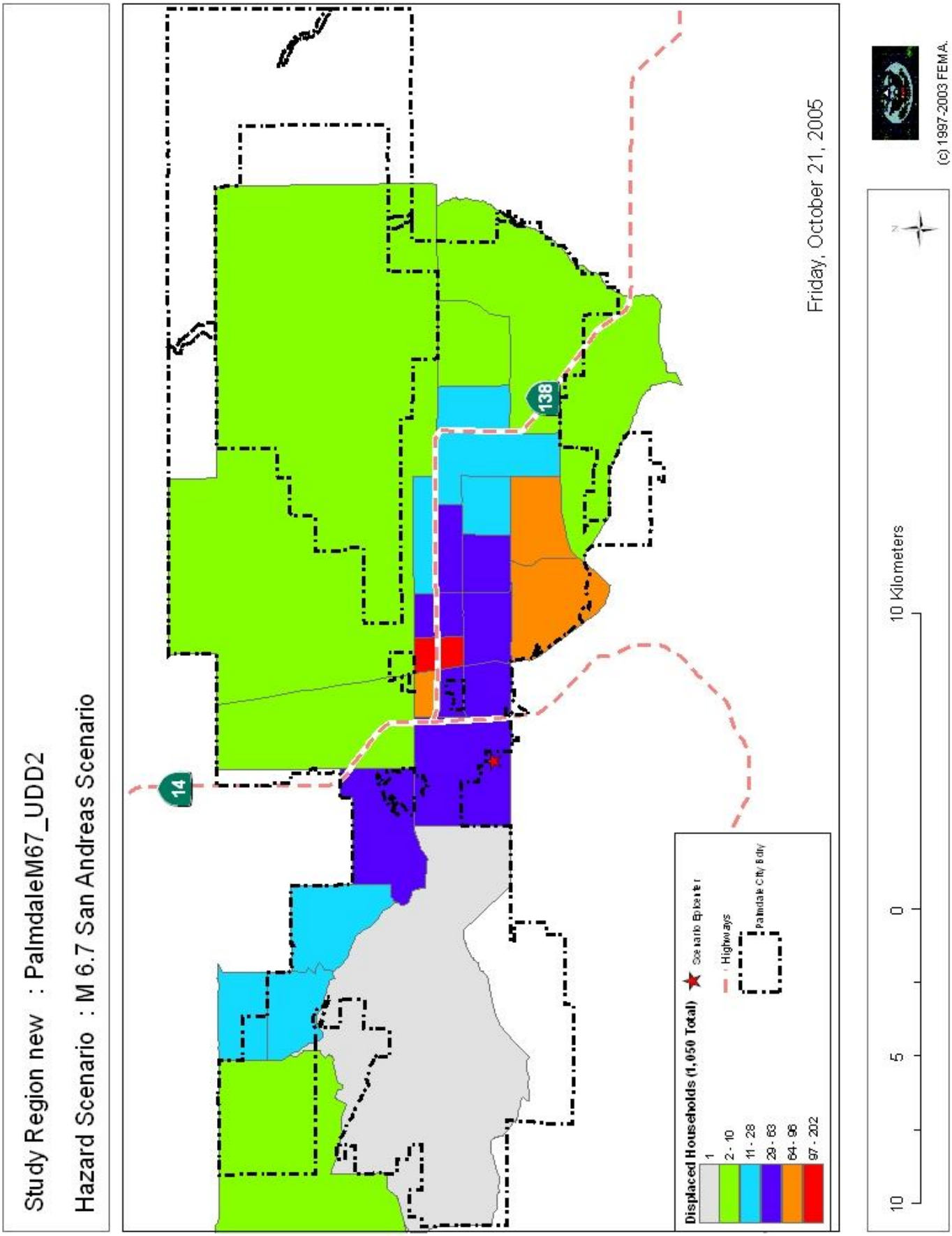
Dams



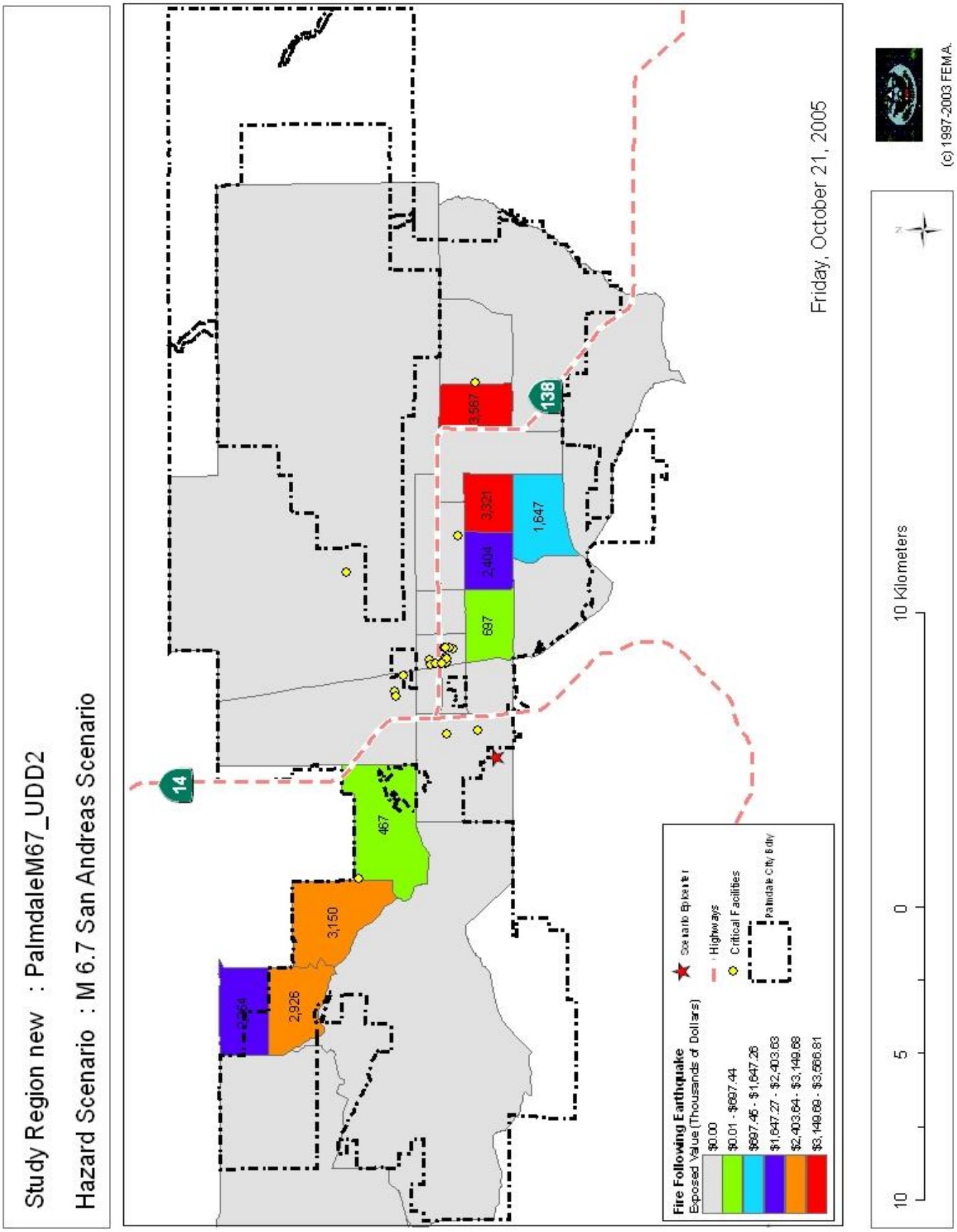
Debris Generated (All Materials)



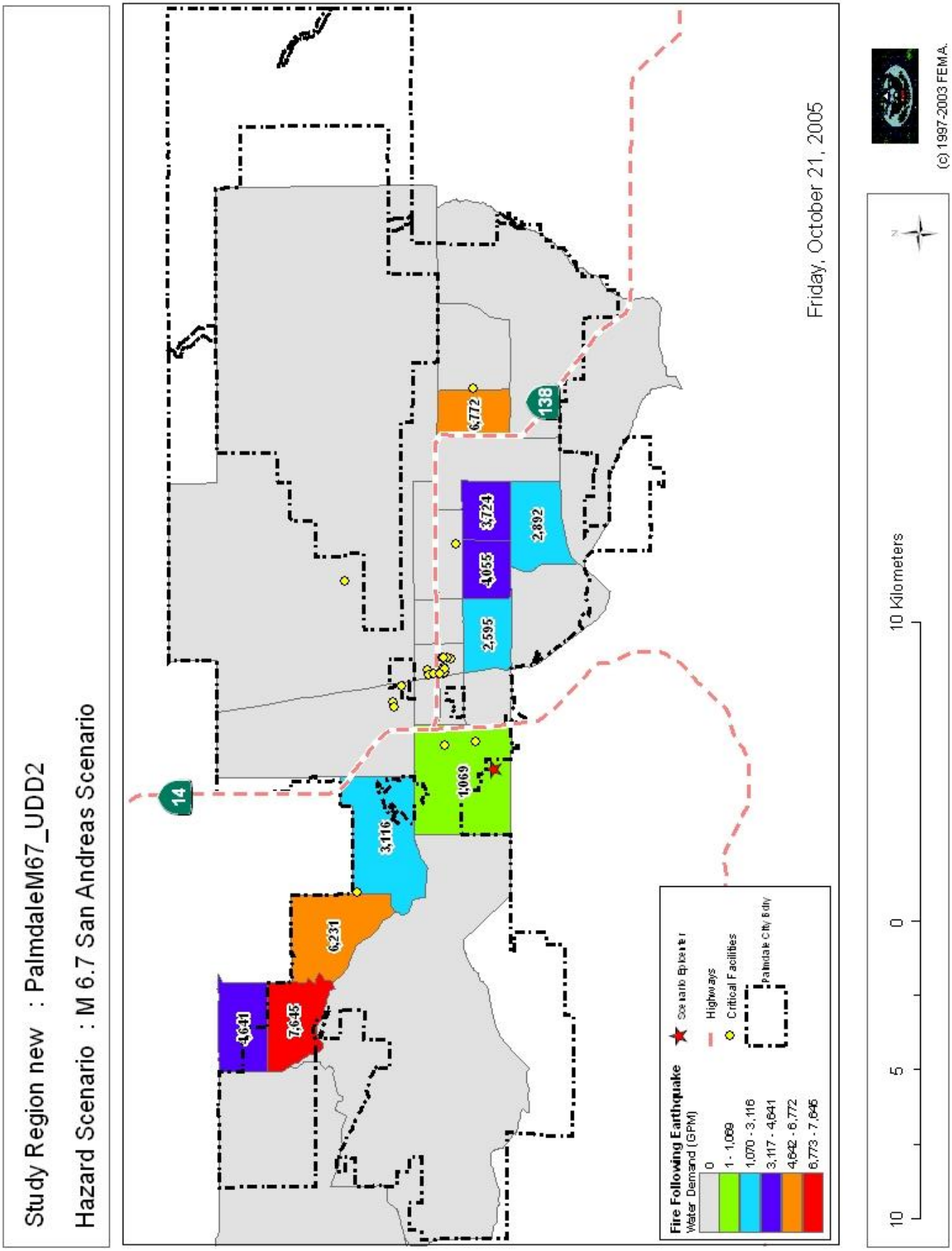
Direct Economic Loss ($973 Million)



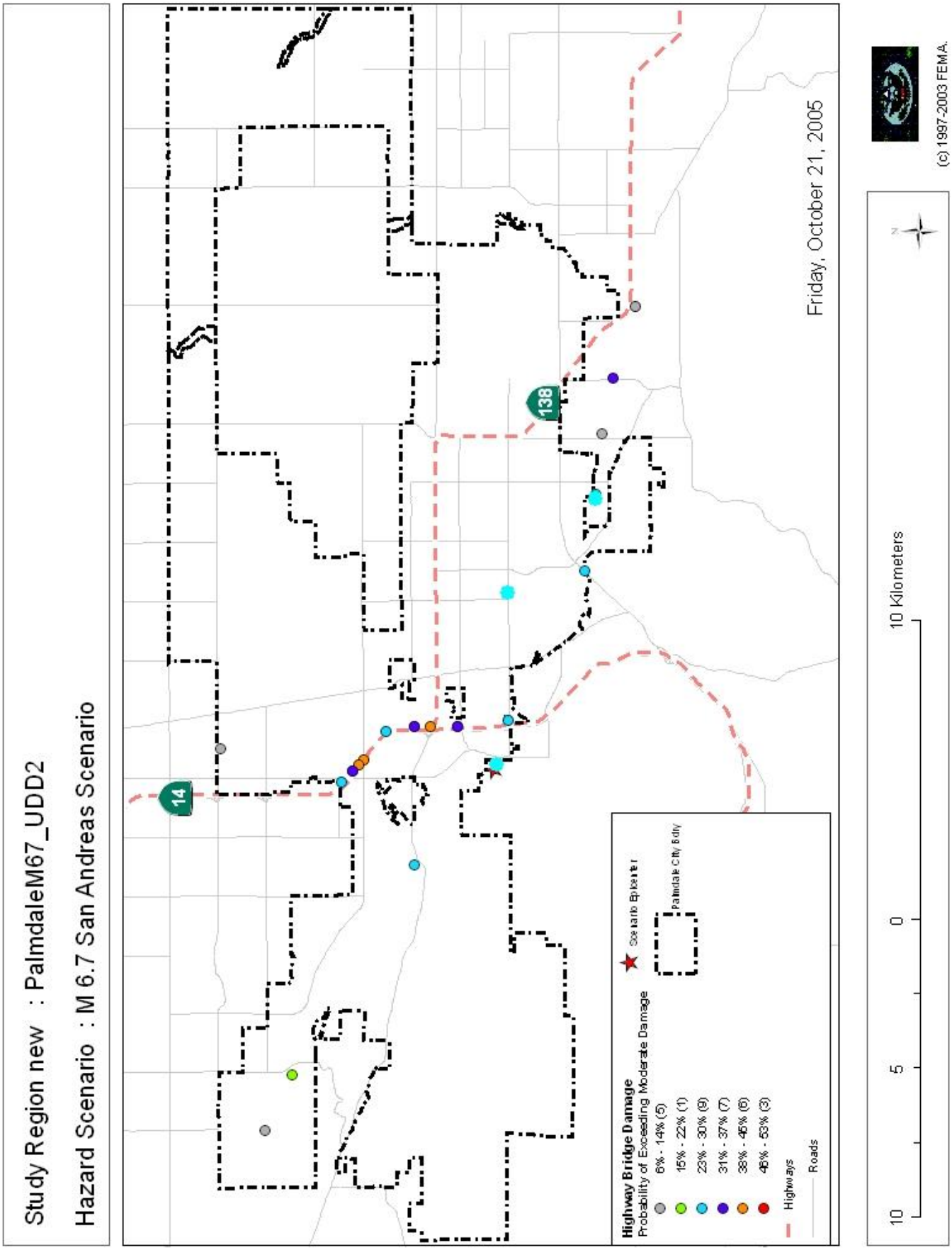
Displaced Households (1,050 Total)



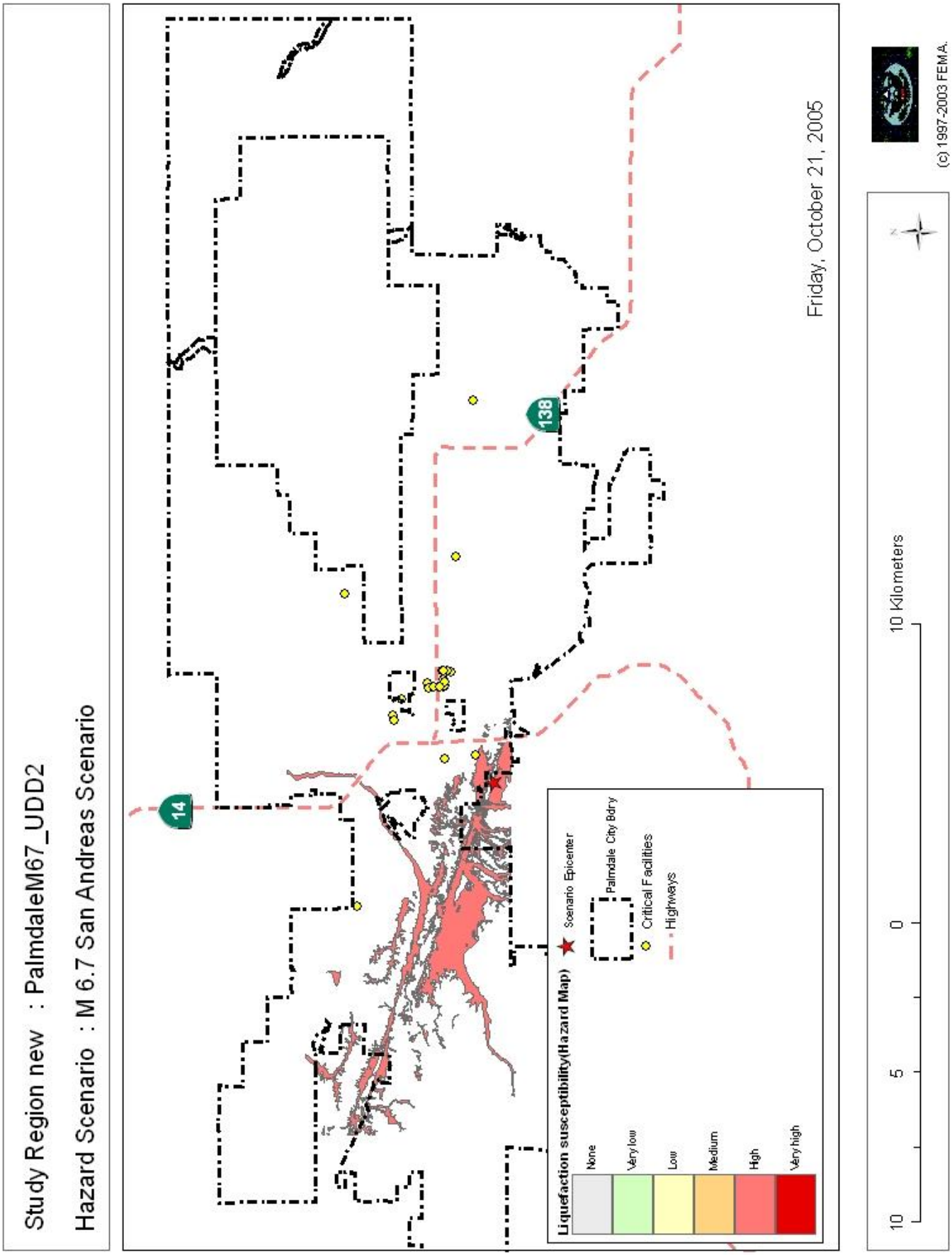
Fire Following Earthquake



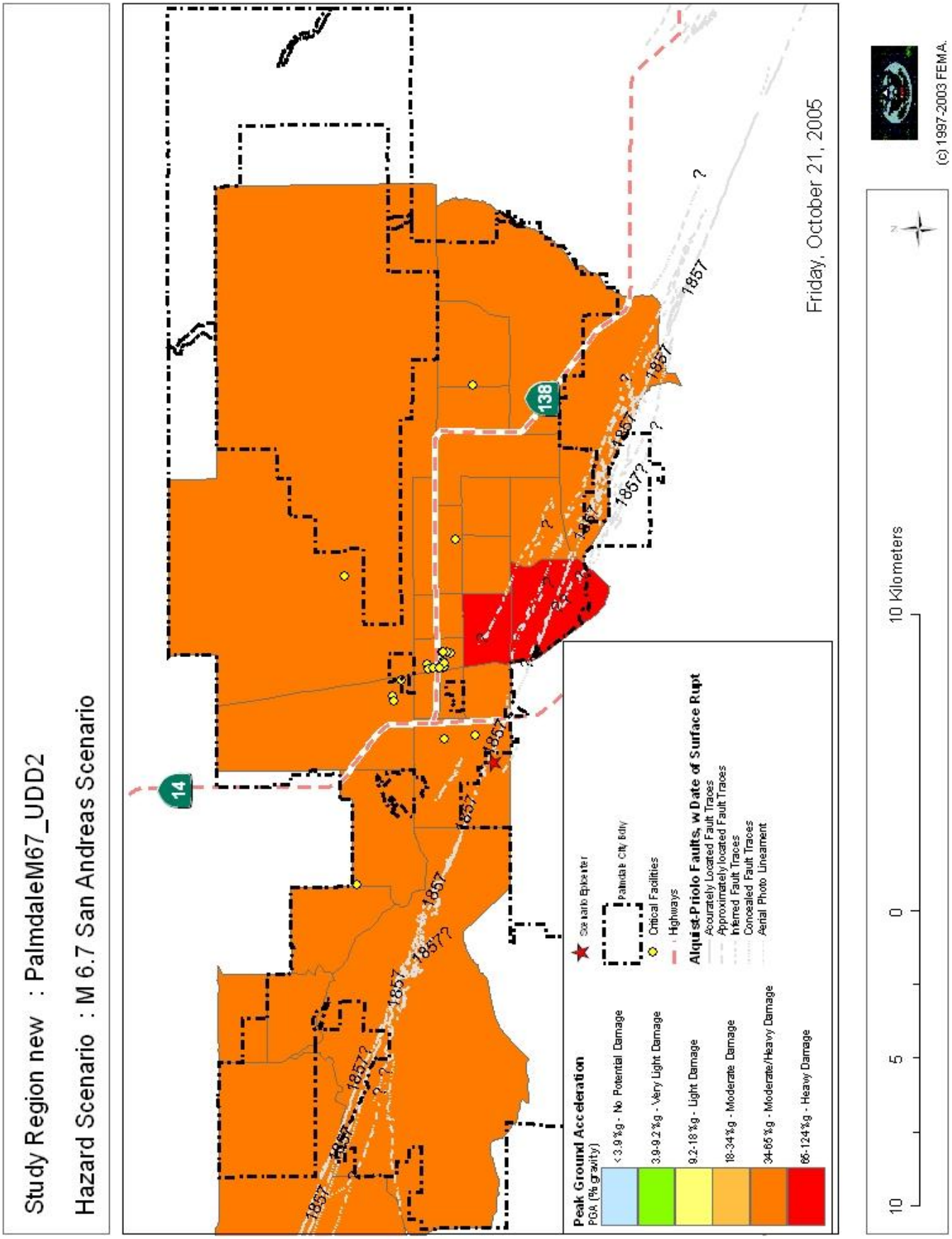
Fire Water Demand Following Earthquake



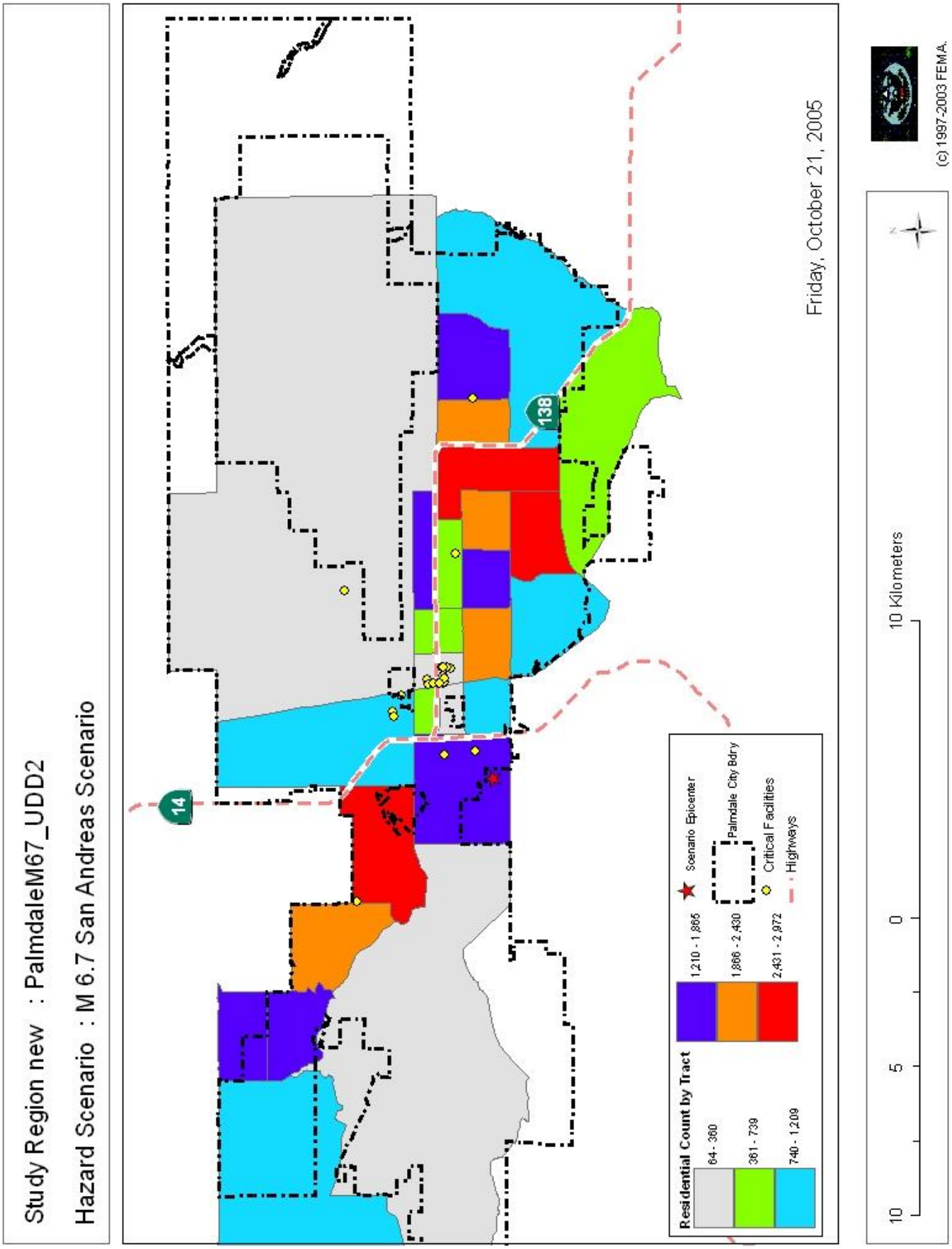
Highway Bridge Damage



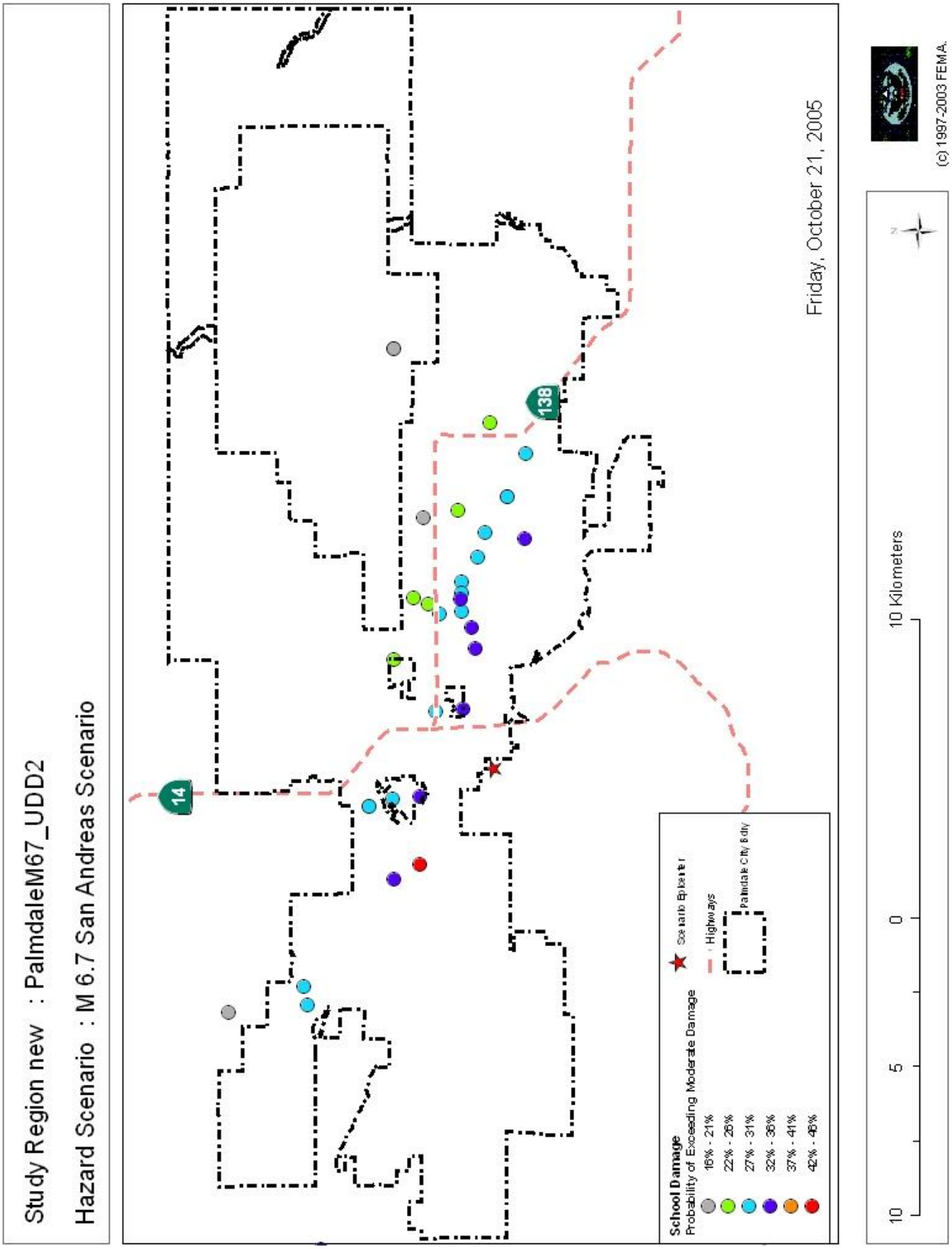
Liquefaction Susceptibility



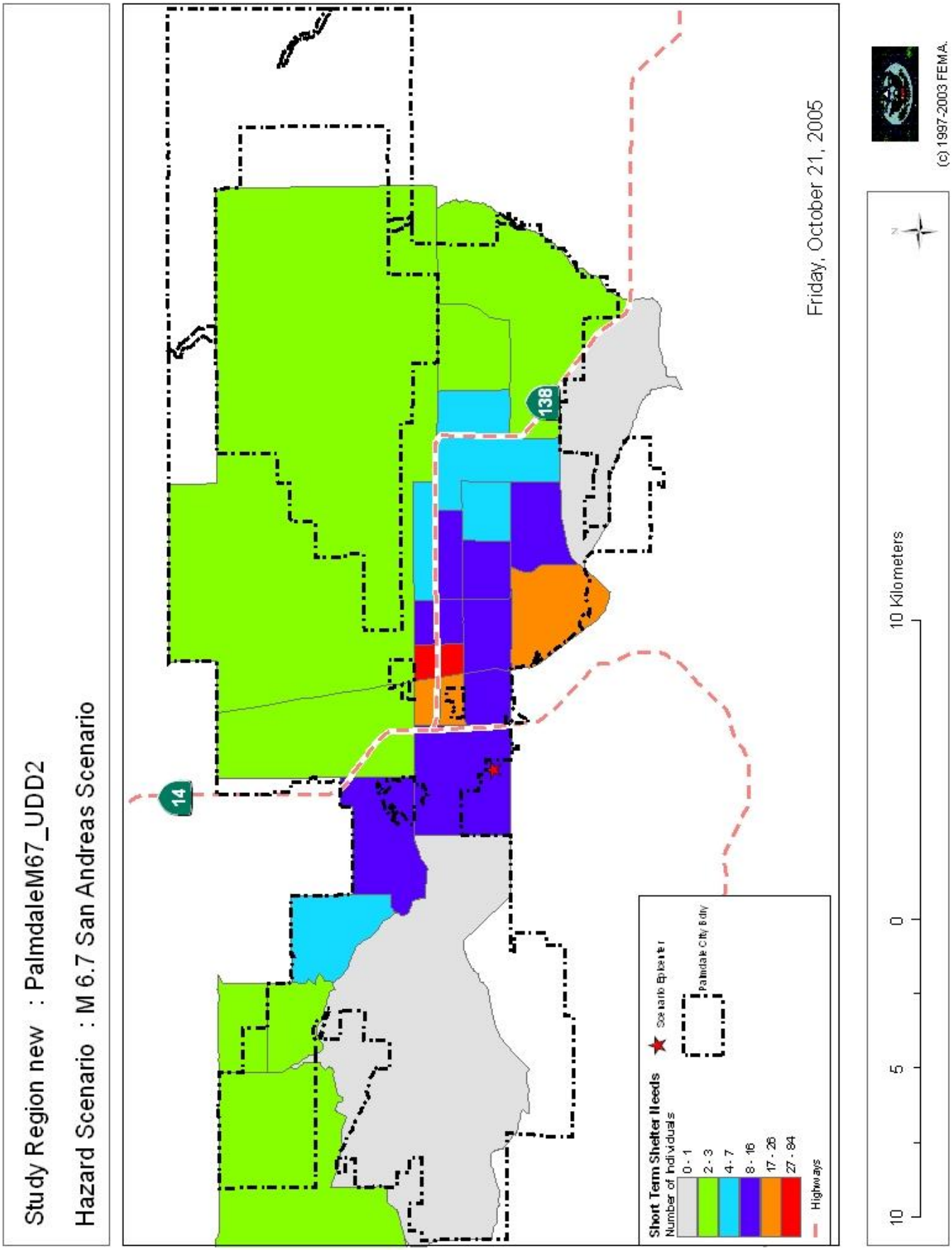
Peak Ground Acceleration



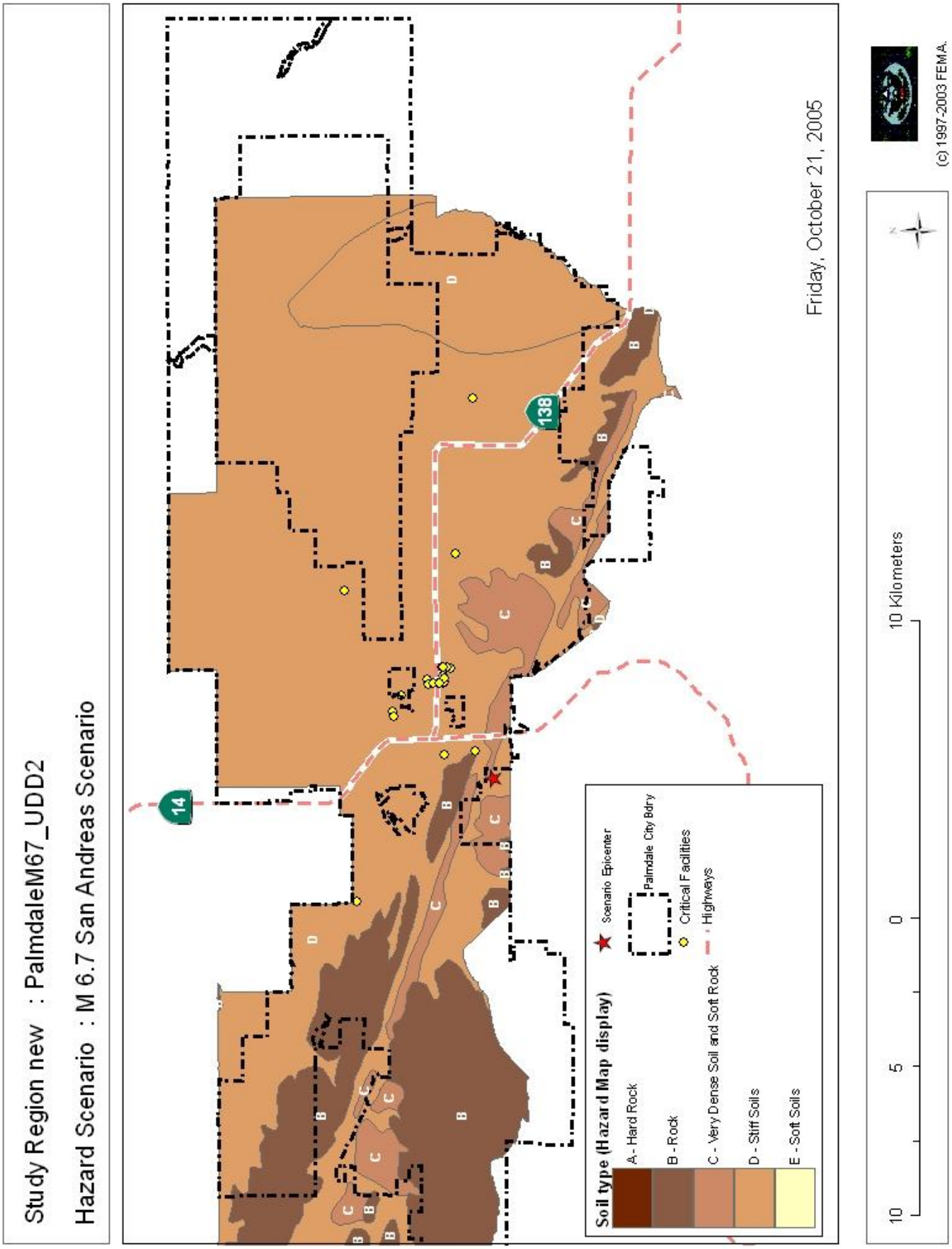
Residential Count by Tract



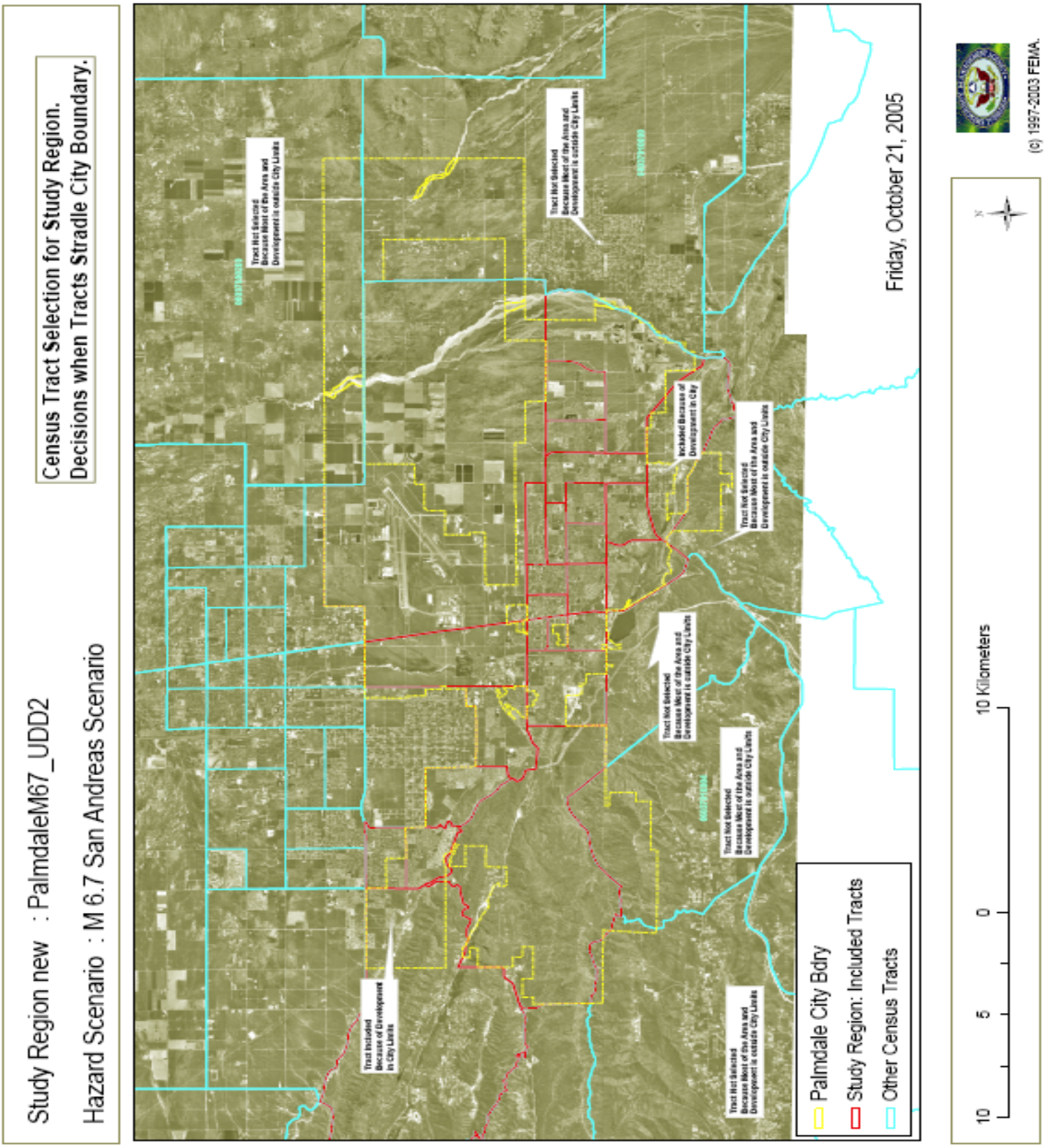
School Damage



Short Term Shelter Needs


Study Region new : PalmdaleM67_UDD2
Hazard Scenario : M 6.7 San Andreas Scenario
Friday, October 21, 2005
14
138
Soil type (Hazard Map display)
A - Hard Rock
B - Rock
C - Very Dense Soil and Soft Rock
D - Stiff Soils
E - Soft Soils
Scenario Epicenter
Palmdale City Bdry
Critical Facilities
Highways
10 Kilometers
10
5
0
(c) 1997-2003 FEMA.

Soil Type



Tract Selection

APPENDIX

D

PLANNING RESOURCES DIRECTORY

Master Resource Directory

The Resource Directory provides contact information for Local, Regional, State, and Federal programs that are currently involved in hazard mitigation activities. The City of Palmdale Hazard Mitigation Steering Committee may look to the organizations on the following pages for resources and technical assistance. The Resource Directory provides a foundation for potential partners in action item implementation.

The City of Palmdale Hazard Mitigation Steering Committee will continue to add contact information for organizations currently engaged in hazard mitigation activities. This section may also be used by various community members interested in hazard mitigation information and projects.

American Public Works Association			
Level: National	Hazard: Multi	http://www.apwa.net	
2345 Grand Boulevard		Suite 500	
Kansas City, MO 64108-2641		Ph: 816-472-6100	Fx: 816-472-1610
Notes: The American Public Works Association is an international educational and professional association of public agencies, private sector companies, and individuals dedicated to providing high quality public works goods and services.			
Association of State Floodplain Managers			
Level: Federal	Hazard: Flood	www.floods.org	
2809 Fish Hatchery Road			
Madison, WI 53713		Ph: 608-274-0123	Fx:
Notes: The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning and recovery			
Building Seismic Safety Council (BSSC)			
Level: National	Hazard: Earthquake	www.bssconline.org	
1090 Vermont Ave., NW		Suite 700	
Washington, DC 20005		Ph: 202-289-7800	Fx: 202-289-109
Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation.			

California Department of Transportation (CalTrans)			
Level: State	Hazard: Multi	http://www.dot.ca.gov/	
120 S. Spring Street			
Los Angeles, CA 90012		Ph: 213-897-3656	Fx:
Notes: CalTrans is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries. Alone and in partnership with Amtrak, Caltrans is also involved in the support of intercity passenger rail service in California.			
California Resources Agency			
Level: State	Hazard: Multi	http://resources.ca.gov/	
1416 Ninth Street		Suite 1311	
Sacramento, CA 95814		Ph: 916-653-5656	Fx:
Notes: The California Resources Agency restores, protects, and manages the state's natural, historical, and cultural resources for current and future generations using solutions based on science, collaboration, and respect for all the communities and interests involved.			
California Division of Forestry (CDF)			
Level: State	Hazard: Multi	http://www.fire.ca.gov/php/index.php	
210 W. San Jacinto			
Perris CA 92570		Ph: 909-940-6900	Fx:
Notes: The California Department of Forestry and Fire Protection protect over 31 million acres of California's privately-owned wildlands. CDF emphasizes the management and protection of California's natural resources.			
California Division of Mines and Geology (DMG)			
Level: State	Hazard: Multi	www.consrv.ca.gov/cgs/index.htm	
801 K Street		MS 12-30	
Sacramento, CA 95814		Ph: 916-445-1825	Fx: 916-445-5718
Notes: The California Geological Survey develops and disseminates technical information and advice on California's geology, geologic hazards, and mineral resources.			
California Environmental Resources Evaluation System (CERES)			
Level: State	Hazard: Multi	http://ceres.ca.gov/	
900 N St.		Suite 250	
Sacramento, Ca. 95814		Ph: 916-653-2238	Fx:
Notes: CERES is an excellent website for access to environmental information and websites.			

California Department of Water Resources (DWR)			
Level: State	Hazard: Flood	http://wwwdwr.water.ca.gov	
1416 9th Street			
Sacramento, CA 95814		Ph: 916-653-6192	Fx:
Notes: The Department of Water Resources manages the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.			

California Department of Conservation: Southern California Regional Office			
Level: State	Hazard: Multi	www.consrv.ca.gov	
655 S. Hope Street		#700	
Los Angeles, CA 90017-2321		Ph: 213-239-0878	Fx: 213-239-0984
Notes: The Department of Conservation provides services and information that promote environmental health, economic vitality, informed land-use decisions and sound management of our state's natural resources.			

California Planning Information Network		
Level: State	Hazard: Multi	www.calpin.ca.gov
Ph:		Fx:
Notes: The Governor's Office of Planning and Research (OPR) publishes basic information on local planning agencies, known as the California Planners' Book of Lists. This local planning information is available on-line with new search capabilities and up-to-the- minute updates.		

EPA, Region 9			
Level: Regional	Hazard: Multi	http://www.epa.gov/region09	
75 Hawthorne Street			
San Francisco, CA 94105		Ph: 415-947-8000	Fx: 415-947-3553
Notes: The mission of the U.S. Environmental Protection Agency is to protect human health and to safeguard the natural environment through the themes of air and global climate change, water, land, communities and ecosystems, and compliance and environmental stewardship.			

Federal Emergency Management Agency, Region IX			
Level: Federal	Hazard: Multi	www.fema.gov	
1111 Broadway		Suite 1200	
Oakland, CA 94607		Ph: 510-627-7100	Fx: 510-627-7112
Notes: The Federal Emergency Management Agency is tasked with responding to, planning for, recovering from, and mitigating against disasters.			

Federal Emergency Management Agency, Mitigation Division			
Level: Federal	Hazard: Multi	www.fema.gov/fima/planhowto.shtm	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.			
Floodplain Management Association			
Level: Federal	Hazard: Flood	www.floodplain.org	
P.O. Box 50891			
Sparks, NV 89435-0891		Ph: 775-626-6389	Fx: 775-626-6389
Notes: The Floodplain Management Association is a nonprofit educational association. It was established in 1990 to promote the reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. Members include representatives of federal, state, and local government agencies as well as private firms.			
Gateway Cities Partnership			
Level: Regional	Hazard: Multi	www.gatewaycities.org	
7300 Alondra Boulevard		Suite 202	
Paramount, CA 90723		Ph: 562-817-0820	Fx:
Notes: Gateway Cities Partnership is a 501 C 3 non-profit Community Development Corporation for the Gateway Cities region of southeast LA County. The region comprises 27 cities that roughly speaking extends from Montebello on the north to Long Beach on the South, the Alameda Corridor on the west to the Orange County line on the east.			
Governor's Office of Emergency Services (OES)			
Level: State	Hazard: Multi	www.oes.ca.gov	
P.O. Box 419047			
Rancho Cordova, CA 95741-9047		Ph: 916 845- 8911	Fx: 916 845- 8910
Notes: The Governor's Office of Emergency Services coordinates overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response, and recovery efforts.			

Greater Antelope Valley Economic Alliance		
Level: Regional	Hazard: Multi	
42060 N. Tenth Street West		
Lancaster, CA 93534	Ph: 661-945-2741	Fx: 661-945-7711
Notes: The Greater Antelope Valley Economic Alliance, (GA VEA) is a 501 (c)(6) nonprofit organization with a 501(c)(3) affiliated organization with the Antelope Valley Economic Research and Education Foundation. GA VEA is a public-private partnership of business, local governments, education, non-profit organizations and health care organizations that was founded in 1999 with the goal of attracting good paying jobs to the Antelope Valley in order to build a sustainable economy.		

Landslide Hazards Program, USGS		
Level: Federal	Hazard: Landslide	http://landslides.usgs.gov/index.html
12201 Sunrise Valley Drive	MS 906	
Reston, VA 20192	Ph: 703-648- 4000	Fx:
Notes: The NLIC website provides good information on the programs and resources regarding landslides. The page includes information on the National Landslide Hazards Program Information Center, a bibliography, publications, and current projects. USGS scientists are working to reduce long-term losses and casualties from landslide hazards through better understanding of the causes and mechanisms of ground failure both nationally and worldwide.		

Los Angeles County Economic Development Corporation		
Level: Regional	Hazard: Multi	www.laedc.org
444 S. Flower Street	34th Floor	
Los Angeles, CA 90071	Ph: 213-236-4813	Fx: 213- 623-0281
Notes: The LAEDC is a private, non-profit 501 (c) 3 organization established in 1981 with the mission to attract, retain, and grow businesses and jobs in the Los Angeles region. The LAEDC is widely relied upon for its Southern California Economic Forecasts and Industry Trend Reports. Lead by the renowned Jack Kyser (Sr. Vice President, Chief Economist) his team of researchers produces numerous publications to help business, media, and government navigate the LA region's diverse economy.		

Los Angeles County Public Works Department			
Level: County	Hazard: Multi	http://ladpw.org	
900 S. Fremont Ave.			
Alhambra, CA 91803		Ph: 626-458-5100	Fx:
Notes: The Los Angeles County Department of Public Works protects property and promotes public safety through Flood Control, Water Conservation, Road Maintenance, Bridges, Buses and Bicycle Trails, Building and Safety, Land Development, Waterworks, Sewers, Engineering, Capital Projects and Airports			
National Wildland/Urban Interface Fire Program			
Level: Federal	Hazard: Wildfire	www.firewise.org/	
1 Batterymarch Park			
Quincy, MA 02169-7471		Ph: 617-770-3000	Fx: 617 770-0700
Notes: Firewise maintains a Website designed for people who live in wildfire- prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.			
National Resources Conservation Service			
Level: Federal	Hazard: Multi	http://www.nrcs.usda.gov/	
14th and Independence Ave., SW		Room 5105-A	
Washington, DC 20250		Ph: 202-720-7246	Fx: 202-720-7690
Notes: NRCS assists owners of America's private land with conserving their soil, water, and other natural resources, by delivering technical assistance based on sound science and suited to a customer's specific needs. Cost shares and financial incentives are available in some cases.			
National Interagency Fire Center (NIFC)			
Level: Federal	Hazard: Wildfire	www.nifc.gov	
3833 S. Development Ave.			
Boise, Idaho 83705-5354		Ph: 208-387- 5512	Fx:
Notes: The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations.			

National Fire Protection Association (NFPA)			
Level: National	Hazard: Wildfire	http://www.nfpa.org/catalog/home/index.asp	
1 Batterymarch Park			
Quincy, MA 02169-7471		Ph: 617-770-3000	Fx: 617 770-0700
Notes: The mission of the international nonprofit NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training and education			
National Floodplain Insurance Program (NFIP)			
Level: Federal	Hazard: Flood	www.fema.gov/nfip/	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.			
National Oceanic /Atmospheric Administration			
Level: Federal	Hazard: Multi	www.noaa.gov	
14th Street & Constitution Ave NW		Rm 6013	
Washington, DC 20230		Ph: 202-482-6090	Fx: 202-482-3154
Notes: NOAA's historical role has been to predict environmental changes, protect life and property, provide decision makers with reliable scientific information, and foster global environmental stewardship.			
National Weather Service, Office of Hydrologic Development			
Level: Federal	Hazard: Flood	http://www.nws.noaa.gov/	
1325 East West Highway		SSMC2	
Silver Spring, MD 20910		Ph: 301-713-1658	Fx: 301-713-0963
Notes: The Office of Hydrologic Development (OHD) enhances National Weather Service products by: infusing new hydrologic science, developing hydrologic techniques for operational use, managing hydrologic development by NWS field office, providing advanced hydrologic products to meet needs identified by NWS customers			

National Weather Service			
Level: Federal	Hazard: Multi	http://www.nws.noaa.gov/	
520 North Elevar Street			
Oxnard, CA 93030		Ph: 805-988- 6615	Fx:
Notes: The National Weather Service is responsible for providing weather service to the nation. It is charged with the responsibility of observing and reporting the weather and with issuing forecasts and warnings of weather and floods in the interest of national safety and economy. Briefly, the priorities for service to the nation are: 1. protection of life, 2. protection of property, and 3. promotion of the nation's welfare and economy.			
San Gabriel Valley Economic Partnership			
Level: Regional	Hazard: Multi	www.valleynet.org	
4900 Rivergrade Road		Suite A310	
Irwindale, CA 91706		Ph: 626-856-3400	Fx: 626-856-5115
Notes: The San Gabriel Valley Economic Partnership is a non-profit corporation representing both public and private sectors. The Partnership is the exclusive source for San Gabriel Valley-specific information, expertise, consulting, products, services, and events. It is the single organization in the Valley with the mission to sustain and build the regional economy for the mutual benefit of all thirty cities, chambers of commerce, academic institutions, businesses, and residents.			
Sanitation Districts of Los Angeles County			
Level: County	Hazard: Flood	http://www.lacsd.ora/	
1955 Workman Mill Road			
Whittier, CA 90607		Ph:562-699-7411 x2301	Fx:
Notes: The Sanitation Districts provide wastewater and solid waste management for over half the population of Los Angeles County and turn waste products into resources such as reclaimed water, energy, and recyclable materials.			
Santa Monica Mountains Conservancy			
Level: Regional	Hazard: Multi	http://smmc.ca.gov/	
570 West Avenue Twenty-Six		Suite 100	
Los Angeles, CA 90065		Ph: 323-221-8900	Fx:
Notes: The Santa Monica Mountains Conservancy helps to preserve over 55,000 acres of parkland in both wilderness and urban settings, and has improved more than 114 public recreational facilities throughout Southern California.			

South Bay Economic Development Partnership			
Level: Regional	Hazard: Multi	www.southbaypartnership.com	
3858 Carson Street		Suite 110	
Torrance, CA 90503		Ph: 310-792-0323	Fx: 310-543-9886
Notes: The South Bay Economic Development Partnership is a collaboration of business, labor, education, and government. Its primary goal is to plan an implement an economic development and marketing strategy designed to retain and create jobs and stimulate economic growth in the South Bay of Los Angeles County.			

South Coast Air Quality Management District (AQMD)			
Level: Regional	Hazard: Multi	www.aqmd.gov	
21865 E. Copley Drive			
Diamond Bar, CA 91765		Ph: 800-CUT-SMOG	Fx:
Notes: AQMD is a regional government agency that seeks to achieve and maintain healthful air quality through a comprehensive program of research, regulations, enforcement, and communication. The AQMD covers Los Angeles and Orange Counties and parts of Riverside and San Bernardino Counties.			
Southern California Earthquake Center (SCEC)			
Level: Regional	Hazard: Earthquake	www.scec.org	
3651 Trousdale Parkway		Suite 169	
Los Angeles, CA 90089-0742		Ph: 213-740-5843	Fx: 213/740-0011
Notes: The Southern California Earthquake Center (SCEC) gathers new information about earthquakes in Southern California, integrates this information into a comprehensive and predictive understanding of earthquake phenomena, and communicates this understanding to end-users and the general public in order to increase earthquake awareness, reduce economic losses, and save lives.			
Southern California Association of Governments (SCAG)			
Level: Regional	Hazard: Multi	www.scag.ca.gov	
818 W. Seventh Street		12th Floor	
Los Angeles, CA 90017		Ph: 213-236-1800	Fx: 213-236-1825
Notes: The Southern California Association of Governments functions as the Metropolitan Planning Organization for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial. As the designated Metropolitan Planning Organization, the Association of Governments is mandated by the federal government to research and draw up plans for transportation, growth management, hazardous waste management, and air quality.			

State Fire Marshal (SFM)			
Level: State	Hazard: Wildfire	http://osfm.fire.ca.gov	
1131 "S" Street			
Sacramento, CA 95814		Ph: 916-445-8200	Fx: 916-445-8509
Notes: The Office of the State Fire Marshal (SFM) supports the mission of the California Department of Forestry and Fire Protection (CDF) by focusing on fire prevention. SFM regulates buildings in which people live, controls substances which may, cause injuries, death, and destruction by fire; provides statewide direction for fire prevention within wildland areas; regulates hazardous liquid pipelines; reviews regulations and building standards; and trains and educates in fire protection methods and responsibilities.			
The Community Rating System (CRS)			
Level: Federal	Hazard: Flood	http://www.fema.gov/nfip/crs.shtm	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Community Rating System (CRS) recognizes community floodplain management efforts that go beyond the minimum requirements of the NFIP. Property owners within the County would receive reduced NFIP flood insurance premiums if the County implements floodplain management practices that qualify it for a CRS rating. For further information on the CRS, visit FEMA's website.			
United States Geological Survey			
Level: Federal	Hazard: Multi	http://www.usgs.gov/	
345 Middlefield Road			
Menlo Park, CA 94025		Ph: 650-853-8300	Fx:
Notes: The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.			
US Army Corps of Engineers			
Level: Federal	Hazard: Multi	http://www.usace.army.mil	
P.O. Box 532711			
Los Angeles CA 90053- 2325		Ph: 213-452- 3921	Fx:
Notes: The United States Army Corps of Engineers work in engineering and environmental matters. A workforce of biologists, engineers, geologists, hydrologists, natural resource managers and other professionals provide engineering services to the nation including planning, designing, building, and operating water resources and other civil works projects.			

USDA Forest Service			
Level: Federal	Hazard: Wildfire	http://www.fs.fed.us	
1400 Independence Ave. SW			
Washington, D.C. 20250-0002		Ph: 202-205-8333	Fx:
Notes: The Forest Service is an agency of the U.S. Department of Agriculture. The Forest Service manages public lands in national forests and grasslands.			
USGS Water Resources			
Level: Federal	Hazard: Multi	www.water.usgs.gov	
6000 J Street		Placer Hall	
Sacramento, CA 95819-6129		Ph: 916-278-3000	Fx: 916-278-3070
Notes: The USGS Water Resources mission is to provide water information that benefits the Nation's citizens: publications, data, maps, and applications software.			
Western States Seismic Policy Council (WSSPC)			
Level: Regional	Hazard: Earthquake	www.wsspc.org/home.html	
125 California Avenue		Suite D201, #1	
Palo Alto, CA 94306		Ph: 650-330-1101	Fx: 650-326-1769
Notes: WSSPC is a regional earthquake consortium funded mainly by FEMA. Its website is a great resource, with information clearly categorized - from policy to engineering to education.			
Westside Economic Collaborative C/O Pacific Western Bank			
Level: Regional	Hazard: Multi	http://www.westside-Ia.or	
120 Wilshire Boulevard			
Santa Monica, CA 90401		Ph: 310-458-1521	Fx: 310-458-6479
Notes: The Westside Economic Development Collaborative is the first Westside regional economic development corporation. The Westside EDC functions as an information gatherer and resource center, as well as a forum, through bringing business, government, and residents together to address issues affecting the region: Economic Diversity, Transportation, Housing, Workforce Training and Retraining, Lifelong Learning, Tourism, and Embracing Diversity.			

APPENDIX

E

FEDERAL ACRONYMS

Federal Acronyms

AASHTO American Association of State Highway and Transportation Officials
ATC Applied Technology Council b/ca benefit/cost analysis
BFE Base Flood Elevation
BLM Bureau of Land Management
BSSC Building Seismic Safety Council
CDBG Community Development Block Grant
CFR Code of Federal Regulations CRS Community Rating System
EDA Economic Development Administration EPA Environmental Protection Agency ER Emergency Relief
EWP Emergency Watershed Protection (NRCS Program)
FAS Federal Aid System FEMA Federal Emergency Management Agency FIRM Flood Insurance Rate Map
FMA Flood Mitigation Assistance (FEMA Program) FTE Full Time Equivalent GIS Geographic Information System
GNS Institute of Geological and Nuclear Sciences (International) GSA General Services Administration
HAZUS Hazards U.S.
HMGP Hazard Mitigation Grant Program
HMST Hazard Mitigation Survey Team HUD Housing and Urban Development (United States, Department of)
IBHS Institute for Business and Home Safety
ICC Increased Cost of Compliance
IHMT Interagency Hazard Mitigation Team
NCDC National Climate Data Center
NFIP National Flood Insurance Program
NFPA National Fire Protection Association
NHMP Natural Hazard Mitigation Plan (also known as "409 Plan") NIBS National Institute of Building Sciences
NIFC National Interagency Fire Center
NMFS National Marine Fisheries Service
NOAA National Oceanic and Atmospheric Administration NPS National Park Service
NRCS Natural Resources Conservation Service
NWS National Weather Service SBA Small Business Administration
SEAO Structural Engineers Association of Oregon
SHMO State Hazard Mitigation Officer
TOR Transfer of Development Rights
UGB Urban Growth Boundary
URM Unreinforced Masonry
SACE United States Army Corps of Engineers
SBR United States Bureau of Reclamation
SDA United States Department of Agriculture
SFA United States Fire Administration
USFS United States Forest Service

USGS	United States Geological Survey
WSSPC	Western States Seismic Policy Council

California Acronyms

A&W	Alert and Warning
AA	Administering Areas
AAR	After Action Report
ARC	American Red Cross
ARP	Accidental Risk Prevention
ATC20	Applied Technology Council 20
ATC21	Applied Technology Council 21
BCP	Budget Change Proposal
BSA	California Bureau of State Audits
CAER	Community Awareness & Emergency response
CalARP	California Accidental Release Prevention
CalBO	California Building Officials
CalEPA	California Environmental Protection Agency
CalREP	California Radiological Emergency Plan
CALSTARS	California State Accounting Reporting System
CalTRANS	California Department of Transportation
CBO	Community Based Organization
CD	Civil Defense
CDF	California Department of Forestry and Fire Protection
CDMG	California Division of Mines and Geology
CEC	California Energy Commission
CEPEC	California Earthquake Prediction Evaluation Council
CESRS	California Emergency Services Radio System
CHIP	California Hazardous Identification Program
CHMIRS	California Hazardous Materials Incident Reporting System
CHP	California Highway Patrol
CLETS	California Law Enforcement Telecommunications System
CSTI	California Specialized Training Institute
CUEA	California Utilities Emergency Association
CUPA	Certified Unified Program Agency
DAD	Disaster Assistance Division (of the state Office of Emergency Svcs)
DFO	Disaster Field Office
DGS	California Department of General Services
DHSRHB	California Department of Health Services, Radiological Health Branch
DO	Duty Officer
DOC	Department Operations Center
DOE	Department of Energy
DOF	California Department of Finance
DOJ	California Department of Justice
DPA	California Department of Personnel Administration
DPIG	Disaster Preparedness Improvement Grant

DR	Disaster Response
DSA	Division of the State Architect
DSR	Damage Survey Report
DSW	Disaster Service Worker
DWR	California Department of Water Resources
EAS	Emergency Alerting System
EDIS	Emergency Digital Information System
EERI	Earthquake Engineering Research Institute
IEMA	Emergency Management Assistance
EMI	Emergency Management Institute
EMMA	Emergency Managers Mutual Aid
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency (U.S.)
EPEDAT	Early Post Earthquake Damage Assessment Tool
EPI	Emergency Public Information
EPIC	Emergency Public Information Counsel
ESC	Emergency Services Coordinator
FAY	Federal Award Year
FDAA	Federal Disaster Assistance Administration
FEAT	Governor's Flood Emergency Action Team
FEMA	Federal Emergency Management Agency
FFY	Federal Fiscal Year
FIR	Final Inspection Reports
FIRESCOPE	Firefighting Resources of So. Calif. Organized for Potential Emergencies
FMA	Flood Management Assistance
FSR	Feasibility Study Report
FY	Fiscal Year
GIS	Geographical Information System
HAZMAT	Hazardous Materials
HAZMIT	Hazardous Mitigation
HAZUS	Hazards United States (an earthquake damage assessment prediction tool)
HAD	Housing and Community Development
HEICS	Hospital Emergency Incident Command System
HEPG	Hospital Emergency Planning Guidance
HIA	Hazard Identification and Analysis Unit
HMEP	Hazardous Materials Emergency Preparedness
HMGP	Hazard Mitigation Grant Program
IDE	Initial Damage Estimate
IA	Individual Assistance
IFG	Individual & Family Grant (program)
IRG	Incident Response Geographic Information System
IPA	Information and Public Affairs (of state Office of Emergency Services)
LAN	Local Area Network
LEMMA	Law Enforcement Master Mutual Aid

LEPC	Local Emergency Planning Committee
MARAC	Mutual Aid Regional Advisory Council
MOU	Memorandum of Understanding
NBC	Nuclear, Biological, Chemical
NEMA	National Emergency Management Agency
NEMIS	National Emergency Management Information Assistance Program
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Association
NPP	Nuclear Power Plant
NSF	National Science Foundation
NWS	National Weather Service
OA	Operational Area
OASI	Operational Area Satellite Information System
OCC	Operations Coordination Center
OCD	Office of Civil Defense
OEP	Office of Emergency Planning
OES	California Governor's Office of Emergency Services
OSHPD	Office of Statewide Health Planning and Development
OSPR	Oil Spill Prevention and Response
PA	Public Assistance
PC	Personal Computer
PDA	Preliminary Damage Assessment
PIO	Public Information Office
POST	Police Officer Standards and Training
PPA/CA	Performance Partnership Agreement/Cooperative Agreement (FEMA)
PSA	Public Service Announcement
PTAB	Planning and Technological Assistance Branch
PTR	Project Time Report
RA	Regional Administrator (OES)
RADEF	Radiological Defense Program
RAMP	Regional Assessment of Mitigation Priorities
RAPID	Railroad Accident Prevention & Immediate Deployment
RDO	Radiological Defense Officer
RDMHC	Regional Disaster Medical Health Coordinator
REOC	Regional Emergency Operations Center
REPI	Reserve Emergency Public Information
RES	Regional Emergency Staff
RIMS	Response Information Management System
RMP	Risk Management Plan
RPU	Radiological Preparedness Unit (OES)
RRT	Regional Response Team
SAM	State Administrative Manual
SARA	Superfund Amendments & Reauthorization Act
SAVP	Safety Assessment Volunteer Program
SBA	Small Business Administration
SCO	California State Controller's Office

SEMS	Standardized Emergency Management System
SEPIC	State Emergency Public Information Committee
SLA	State and Local Assistance
SONGS	San Onofre Nuclear Generating Station
SOP	Standard Operating Procedure
SWEP	Statewide Emergency Planning Committee
TEC	Travel Expense Claim
TRU	Transuranic
TTT	Train the Trainer
UPA	Unified Program Account
UPS	Uninterrupted Power Source
USAR	Urban Search and Rescue
USGS	United States Geological Survey
WC	California State Warning Center
WAN	Wide Area Network
WIPP	Waste Isolation Pilot Project

APPENDIX

F

GLOSSARY

Acceleration	The rate of change of velocity with respect to time. Acceleration due to gravity at the earth's surface is 9.8 meters per second squared. That means that every second that something falls toward the surface of earth its velocity increases by 9.8 meters per second.
Asset	Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.
Base Flood	Flood that has a1 percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.
Base Flood Elevation (BFE)	Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.
Bedrock	The solid rock that underlies loose material, such as soil, sand, clay, or gravel.
Building	A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.
Coastal High Hazard Area	Area, usually along an open coast, bay, or inlet that is subject to inundation by storm surge and, in some instances, wave action caused by storms or seismic sources.
Coastal Zones	The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas having direct drainage to the ocean.
Community Rating System (CRS)	An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.
Computer-Aided Design And Drafting (CADD)	A computerized system enabling quick and accurate electronic 2-D and 3-D drawings, topographic mapping, site plans, and profile/cross section drawings.
Contour	A line of equal ground elevation on a topographic (contour) map.

Critical Facility	Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.
Debris	The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.
Digitize	To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates)for use in computer applications.
Displacement Time	The average time (in days) which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event.
Duration	How long a hazard event lasts.
Earthquake	A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.
Erosion	Wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.
Erosion Hazard Area	Area anticipated being lost to shoreline retreat over a given period of time. The projected inland extent of the area is measured by multiplying the average annual long-term recession rate by the number of years desired.
Essential Facility	Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.
Extent	The size of an area affected by a hazard or hazard event.
Extratropical Cyclone	Cyclonic storm events like Nor'easters and sever winter low-pressure systems. Both West and East coasts can experience these non-tropical storms that produce gale-force winds and precipitation in the form of heavy rain or snow. These cyclonic storms, commonly called Nor'easters on the East Coast because of the direction of the storm winds, can last for several days and can be very large – 1,000-mile wide storms are not uncommon.

Fault	A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.
Federal Emergency Management Agency (FEMA)	Independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery.
Fire Potential Index (FPI)	Developed by USGS and USFS to assess and map fire hazard potential over broad areas. Based on such geographic information, national policy makers and on-the-ground fire managers prevention activities in the defined area to reduce the risk of managed and wildfire ignition and spread. Prediction of fire hazard shortens the time between fire ignition and initial attack by enabling fire managers to pre-allocate and stage suppression forces to high fire risk areas.
Flash Flood	A flood event occurring where water levels rise water levels rise with little or no warning at an extremely fast rate.
Flood	A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.
Flood Depth	Height of the flood water surface above the ground surface.
Flood Elevation	Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.
Flood Hazard Area	The area shown to be inundated by a flood of a given magnitude on a map.
Flood Insurance Rate Map (FIRM)	Map of a community, prepared by the Federal Emergency Management Agency that shows both the special flood hazard areas and the risk premium zones applicable to the community.
Flood Insurance Study (FIS)	A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.
Floodplain	Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

Frequency	A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening every year. The reliability of this information varies depending on the kind of hazard being considered.
Fujita Scale of Tornado Intensity	Rates tornadoes with numeric values from F0 to F5 based on tornado wind speed and damage sustained. An F0 indicates minimal damage, such as broken tree limbs or signs, while an F5 indicates severe damage sustained.
Functional Downtime	The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.
Geographic Area Impacted	The physical area in which the effects of the hazard are experienced.
Geographic Information Systems (GIS)	A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.
Ground Motion	The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.
Hazard	A source of potential danger or adverse condition. Hazards in this how-to series will include naturally occurring events, such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.
Hazard Event	A specific occurrence of a particular type of hazard.
Hazard Identification	The process of identifying hazards that threaten an area.
Hazard Mitigation	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard Profile	A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.
HAZUS (Hazards U.S.)	A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA.
Hurricane	An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74-miles-per-hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160°E longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
Hydrology	The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.
Infrastructure	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry-docks, piers an regional dams.
Intensity	A measure of the effects of a hazard event at a particular place.
Landslide	Downward movement of a slope and materials under the force of gravity.
Lateral Spreads	Develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies in a seismic event. The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.
Liquefaction	Results when the soil supporting structures liquefies. This can cause structures to tip and topple
Lowest Floor	Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.

Magnitude	A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.
Mitigation Plan	A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the state and includes a description of actions to minimize future vulnerability to hazards.
National Flood Insurance Program (NFIP)	Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.
National Geodetic Vertical Datum of 1929 (NGVD)	Datum established in 1929 and used in the NFIP as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or Mean Sea Level. The Base Flood Elevations shown on most of the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency are referenced to NGVD.
National Weather Service (NWS)	Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities preparing weather and flood warning plans.
Nor'easter	An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.
Outflow	Follows water inundation creating strong currents that rip at structures and pound them with debris, and erode beaches and coastal structures.
Planimetric	Describes maps that indicate only man-made features like buildings.
Planning	The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit
Probability	A statistical measure of the likelihood that a hazard event will occur.
Recurrence Interval	The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.
Repetitive Loss Property	A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.

Replacement Value	The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type, and quality.
Richter Scale	A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.
Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can b e expressed in terms of potential monetary losses associated with the intensity of the hazard.
Riverine	Of or produced by a river.
Scale	A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.
Scarp	A steep slope.
Scour	Removal of soil or fill material by the flow of flood waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.
Seismicity	Describes the likelihood of an area being subject to earthquakes.
Special Flood Hazard Area (SFHA)	An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.
Stafford Act	The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.

State Hazard Mitigation Officer (SHMO)	The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.
Storm Surge	Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.
Structure	Something constructed. (See also Building)
Substantial Damage	Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.
Super Typhoon	A typhoon with maximum sustained winds of 150 mph or more.
Surface Faulting	The differential movement of two sides of a fracture – in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.
Tectonic Plate	Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.
Topographic	Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include manmade features.
Tornado	A violently rotating column of air extending from a thunderstorm to the ground.
Tropical Cyclone	A generic term for a cyclonic, low-pressure system over tropical or subtropical waters.
Tropical Depression	A tropical cyclone with maximum sustained winds of less than 39 mph.
Tropical Storm	A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.
Tsunami	Great sea wave produced by submarine earth movement or volcanic eruption.
Typhoon	A special category of tropical cyclone peculiar to the western North Pacific Basin, frequently affecting areas in the vicinity of Guam and North Mariana Islands. Typhoons whose maximum sustained winds attain or exceed 150 mph are called super typhoons.

Vulnerability	Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.
Vulnerability Assessment	The ex tent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.
Water Displacement	When a large mass of earth on the ocean bottom sinks or uplifts, the column of water directly above it is displaced, forming the tsunami wave. The rate of displacement, motion of the ocean floor at the epicenter, the amount of displacement of the rupture zone, and the depth of water above the rupture zone all contribute to the intensity of the tsunami.
Wave Run-up	The height that the wave extends up to on steep shorelines, measured above a reference level (the normal height of the sea, corrected to the state of the tide at the time of wave arrival).
Wildfire	An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.
Zone	A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.