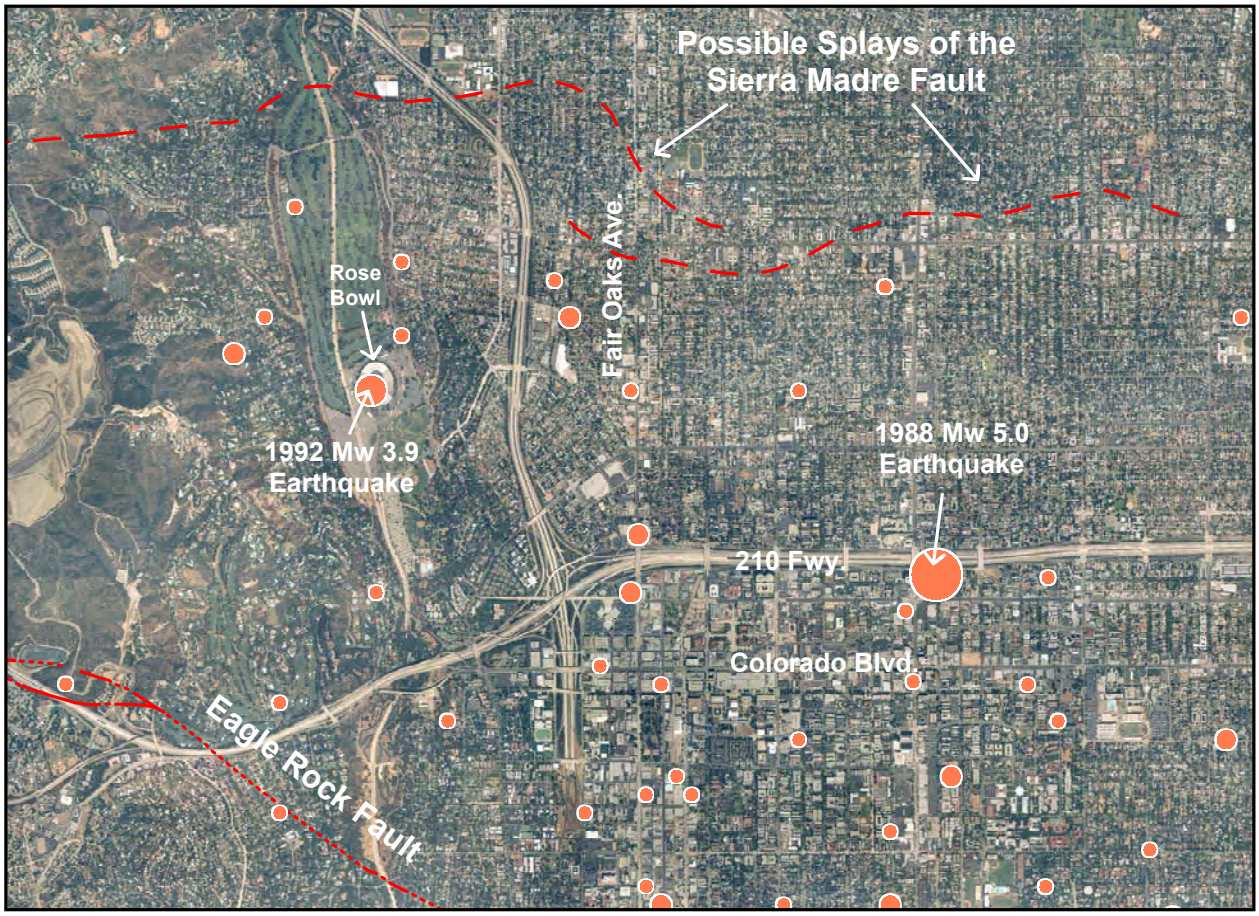

Safety Element of the General Plan
City of Pasadena, California

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The Local Hazard Mitigation Plan (LHMP), including future updates or amendments to the LHMP, guides the City of Pasadena towards greater preparedness and resiliency in harmony with the character and needs of the city and its communities. The 2025 LHMP is incorporated into the Safety Element by City Council Resolution #10173 and is available here: www.cityofpasadena.net/planning/planning-division/community-planning/general-plan/#safety-element.

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SAFETY ELEMENT GOALS AND POLICIES

1.0 Introduction

Pasadena is considered one of the best places to live in the West – it has a vibrant downtown with shops, theatres and restaurants; it is home to the corporate offices of many national and international businesses; and it has established residential neighborhoods with a strong sense of community valued deeply by their residents. The City also has a low crime rate and good schools, important indicators of a community's quality of life. However, this idyllic setting can be impacted by natural hazards that have the potential to cause death, injuries, property damage, and substantial economic and social dislocation. The Safety Element addresses these safety issues, with emphasis on the naturally occurring conditions that pose a hazard to Pasadena, and provides goals, policies, and programs aimed at reducing the City's risk from these hazards. [**Risk** is defined as the outcome of the interaction between a **hazard** and the elements of the community, such as population, buildings, and infrastructure that are vulnerable to such an impact.]

Specific hazards of concern to Pasadena include earthquakes, landslides and mudflows, dam or reservoir failure, wildland and structural fire, and contamination of soil and groundwater resources by hazardous materials associated with some of the research, commercial, and industrial facilities present in the City. These hazards can impact the City's residents, workers, and visitors, and can cause the disruption of critical (hospital, schools, fire stations) and essential (water, gas, sewage, electricity, communications) facilities. Each of these hazards is described further in the following pages; for a more detailed description of each of these conditions, refer to the accompanying Technical Background Report.

The ultimate objective of the Safety Element is to improve the safety of the community, and in the process make it more sustainable and prosperous. To that end, the Safety Element describes the natural conditions that pose a hazard, but most importantly, it presents goals, policies, and programs that if implemented can substantially reduce the risk these hazards pose to the City of Pasadena and its residents. **Goals** are statements that describe the City's purpose and direction in reducing its natural hazards. **Policies** are guidelines that can be implemented to reduce the City's risk and maximize the community's emergency preparedness. **Programs** are the specific actions that the City has committed to implement over a given number of years to reduce its hazards. Where appropriate, the agency or City department responsible for implementation and monitoring of each of these programs is identified.

Safety Elements are by scope and definition, provisional. Although the ultimate goal of these types of documents does not change much over time, the information, tools and techniques available to assess the

community's risk to various types of hazards are continuously evolving. Policies and programs are established within a framework that identifies timelines and priorities. As the more critical goals are achieved, emphasis is shifted to new priorities. Most of the data, relationships and processes that affect a community are spatial in nature, and multi-variant. As a result, manipulation of the data and assessment of the risk can be quite complex. Thankfully, geographic information systems (GIS) are increasingly being used for this purpose, and Pasadena has already embraced the use of GIS-based mapping. The hardware and software available to manage the City's risk using GIS will only get better with time.

For effective emergency preparedness and response, communities need to know in advance what are the potentially hazardous conditions specific to their area. A major part of this effort requires mapping of the vulnerable areas in the community. This is covered in the Technical Background Report to the Safety Element. For example, the Technical Report identifies the fault zones that cross the City, areas of potential landslides and unstable slopes, areas susceptible to fire and flooding hazards, and locations of the facilities that use or generate hazardous materials. Computer simulations that estimate loss of life and damage to buildings and infrastructure (such as HAZUS, the software used for this study) are still in their infancy, but already have proven to be of value in designing and prioritizing appropriate mitigation plans.

Once this information is known, appropriate land use practices and management can be identified and implemented to reduce the hazards identified. These are the topics covered in this Policy Document.

2.0 Important Terms and Concepts

The following technical terms and concepts are used in the Safety Element to describe and discuss earthquakes, landslides, flood, fire and hazardous materials conditions. For a more thorough list of terms, refer to the Glossary in the Technical Background Report.

2.1 Earthquakes and other Seismic Hazards

A break or fracture between blocks of rock is called a **fault**. Sudden, differential movement on a fault causes an **earthquake**. The strain energy released during an earthquake makes the earth vibrate and shake. Scientists typically use **moment magnitude** to measure the size of an earthquake, which is based on the amount of energy released and is directly proportional to the area of the fault that ruptured. A magnitude 6.0 earthquake releases 32 times the energy of a magnitude 5.0, and a magnitude 7.0 earthquake releases about 1,000 (32 x 32) more energy than a magnitude 5.0 earthquake. Earthquake damage is typically

measured relative to an **intensity** scale. The Modified Mercalli Intensity Scale describes the observable effects that an earthquake has on structures and people. An earthquake has one magnitude, but several intensities, because intensity effects vary with the location. Typically (although not always), intensities decrease with increasing distance from the epicenter of the earthquake.

In California, faults that have moved at least once in the last about 11,000 years are considered **active** and capable of generating earthquakes in the future. Some faults generate earthquakes every few tens to hundreds of years, while others only break every few thousand years. Faults with shorter **recurrence intervals** (time between earthquakes) have higher **slip rates**, and are generally considered to pose a greater seismic hazard. In southern California, the San Andreas and San Jacinto faults have the highest recurrence intervals, and are therefore considered to have a higher probability of causing an earthquake in the future. The seismic risk posed by a fault is also dependent on when a fault broke last – a fault with a recurrence interval of five thousand years that has not caused an earthquake in as many years may be near the end of its strain accumulation cycle, and may therefore have a higher probability of rupturing than a fault that just caused an earthquake. If a fault breaks to the ground surface, **primary ground rupture** occurs. This typically results in a relatively small percentage of the total damage in an earthquake, but structures sitting directly on top of the ruptured fault can be damaged extensively.

Earthquake-induced strong ground shaking causes most of the earthquake damage. Damage to structures is usually caused by strong **horizontal ground acceleration**, which is measured as a percentage of **g**, the acceleration of gravity. The degree of shaking depends on several factors, including earthquake size, location, depth of the focus, orientation and movement of the seismic waves (**source effects**); the type of sediments or rocks that the seismic waves travel through (**path effects**); and the interaction between the structures and the sediments or rocks at a specific site (**site effects**). Strong ground shaking can also trigger the destructive secondary effects of liquefaction and slope failure (landslides). **Liquefaction** occurs in soft, saturated sediments – when the ground shakes, the water that fills the pores increases in pressure, causing the soil to lose strength and behave as a liquid.

2.2 Geologic Hazards

Slope failure does not need to be triggered by an earthquake. Intense precipitation events, or long periods of sustained rainfall can saturate the soils even on a gentle slope, with the potential for the soils, and the underlying slope, to become unstable. If, in response to gravity, the saturated soils move down slope, they can form **mudflows** or **debris flows.** Mudflows can cause extensive damage to structures in their path. Man-made modifications to a slope, and stream erosion and down-cutting can also cause a slope to become unstable and fail. Some of the most significant factors that contribute to slope failure include slope height and steepness, shear strength and orientation of weak layers in the underlying geologic units, and pore water pressures. Damaging debris flows also can and often occur on slopes that were burnt earlier that year or in recent past years because there are few roots holding down the soil, and the surface is covered with ash and other debris.

Although not sudden and catastrophic, there are other potential geological hazards that if not recognized and mitigated properly, can cause extensive damage to structures. These hazards are specific to the soils that act as a foundation to buildings and infrastructure, and include **collapsible** and **expansive** soils. Collapsible soils undergo a rearrangement of their grains, and a loss of cementation, resulting in substantial and rapid settlement under relatively low loads. Expansive soils are fine-grained soils with variable amounts of clay minerals that can undergo significant volumetric changes as a result of changes in moisture content. The upward pressures induced by the swelling can have significant harmful effects upon structures and other surface improvements.

2.3 Flood Hazards

Rain in southern California is generally a welcomed event – it cleans and makes the air we breathe smell good, makes our hills and mountains green, and provides water for our recharge basins and reservoirs. Intense rainfall, however, when more than 1 inch of rainwater falls during the course of a few hours, or prolonged rainfall, when it rains continuously for days, can be a less than pleasant experience. Flood-prone communities can experience swollen river channels, flooded streets and basements, mudflows and debris flows at the mouths of canyons, and other similar conditions that can cause extensive damage to property, injuries, and, in some cases, loss of life.

The Federal Emergency Management Agency (FEMA) defines the "**base flood**" or "**100-year flood**" as a flood that has a 1-percent or greater chance of being equaled or exceeded during any given year. A base flood has a 26-percent chance of occurring during a 30-year period,

generally the length of most home mortgages. However, the recurrence interval represents the long-term average period between floods of a specific magnitude; rare floods could occur at short intervals or even within the same year.

The Federal Emergency Management Agency's (FEMA) **National Flood Insurance Program** offers federally subsidized flood insurance to property owners in those communities that adopt and enforce floodplain management ordinances that meet minimum criteria established by FEMA.

2.4 Fire Hazards

The Fire Hazard Severity of an area is determined based on the type and amount of vegetation, termed **fuel loading**; slope gradient; and weather (fire hazard increases in the summer and fall, when the weather is hot and dry – and especially when there are Santa Ana wind conditions). The Bates Bill Process also considers dwelling density, past fire hazard history and local building and fire codes in determining Very High Fire Hazard Severity Zones. When a **wildland** fire encroaches onto the built environment, multiple ignitions can develop as a result of "**branding**", the term for wind transport of burning cinders over long distances. If ignited structures sustain and transmit the fire from one building to the next, a **catastrophic fire** can ensue. Insurance carriers consider a fire a catastrophe if it triggers at least $25 million in claims or more than 1,000 individual claims. **Firestorms**, especially in areas of wildland-urban interfaces can be particularly dangerous and complex, posing a severe threat to public and firefighter safety, and causing devastating losses of both life and property.

Non-federal areas identified as having a fire hazard are referred to as **State Responsibility Areas** (SRAs) because the State has the primary financial responsibility of preventing and suppressing fires. The agency responsible for suppressing fires in SRAs is the California Department of Forestry. Local fire agencies are responsible for suppressing fires in private property within City limits.

Earthquakes have the potential to generate fires that have the potential to severely tax the local fire suppression agencies.

2.5 Hazardous Materials

The United States Environmental Protection Agency (EPA) defines a **hazardous waste** as a substance that 1) may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; and 2) that poses a substantial present or potential future hazard to human health or the

environment when it is improperly treated, stored, transported, disposed of or otherwise managed. Hazardous waste is also ignitable, corrosive, or reactive (explosive) (U.S. EPA 40 CFR 260.10). A material may also be classified as a hazardous material if it contains defined amounts of toxic chemicals. The EPA has developed a list of specific hazardous wastes that are in the forms of solids, semi-solids, liquids, and gases.

The State of California defines hazardous materials as substances that are toxic, ignitable or flammable, reactive, and corrosive. The State also defines an extremely hazardous material as a substance that shows high acute or chronic toxicity, **carcinogenity** (causes cancer), bioaccumulative properties (accumulates in the body's tissues), persistence in the environment, or is water reactive.

Hazardous materials are extensively regulated by Federal, State and City laws, and new regulations are constantly being developed as we learn more about the impact these substances have on human health and the environment. It is not the intent of the Safety Element to discuss or even list all of the regulations currently in effect to reduce the impacts of hazardous materials, as these will change or will be added to with time. The three main sources of information on hazardous materials management as they pertain to the City of Pasadena are: 1) the Environmental Protection Agency (EPA), 2) the California Department of Health Services (DHS), and 3) the City of Pasadena Fire Department.

The Clean Air Act requires the EPA to set **National Ambient Air Quality Standards** for pollutants considered harmful to public health and the environment. To that end, the EPA requires that the levels of five major air pollutants be measured on a daily basis. These Air Quality Indexes are reported daily in the local news media serving metropolitan areas with populations exceeding 200,000. Air Quality Indexes are reported using a numerical value between 0 and 500 that corresponds to a health descriptor like "good" or "unhealthful." The local agency responsible for monitoring and enforcing air quality is the South Coast Air Quality Management District.

The EPA's National Primary Drinking Water Standard protects drinking water quality by limiting the levels of specific contaminants that are known to occur or have the potential to occur in water and can adversely affect public health. The EPA and the California Department of Health Services (DHS) set the **Maximum Contaminant Levels (**MCLs) for specific contaminants in ground water. These contaminants include organic and inorganic chemicals (minerals), substances that are known to cause cancer (carcinogens), radionuclides (such as uranium and radon), and microbial contaminants. Water purveyors are required to test their water for these contaminants on a fixed schedule, and report their results to the DHS.

Leaking underground storage tanks (UST's) have been recognized since the early 1980s as the primary cause of groundwater contamination by gasoline compounds and solvents. In California, regulations aimed at protecting against UST leaks have been in place since 1983. California's program is more stringent than the Federal program, requiring that all tanks be double walled, and prohibiting gasoline delivery to non-compliant tanks. The State Water Resources Control Board (SWRCB) has been designated the lead regulatory agency in the development of UST regulations and policy. The SWRCB maintains an inventory of leaking underground storage tanks in a statewide database.

3.0 Regulatory Environment

There are several Federal and State programs and regulations pertaining to public safety that provide the legal framework to Safety Elements of the General Plan. These programs provide the minimum guidelines and criteria that must be complied with – individual jurisdictions can choose to go beyond the Federal or State requirements and implement more stringent regulations. Some of the specific plans and programs that apply to the City of Pasadena are discussed briefly below. This is not intended to be an all-inclusive list. For a more detailed description of the programs described below, refer to the Technical Background Report. For information regarding additional Federal, State and City regulations, refer to the Federal and State Codes of Regulations, and the City of Pasadena Municipal Codes (all of these can be found on the world wide web, using various search engines).

3.1 California Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was signed into law in 1972 with its primary purpose being to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault. The Act requires the State Geologist to delineate "Earthquake Fault Zones" along faults that are "sufficiently active" and "well defined." The Act dictates that cities and counties withhold development permits for projects within an Earthquake Fault Zone within their jurisdiction until geologic investigations demonstrate that the projects are not threatened by surface displacements from future faulting. Projects include all land divisions and most structures for human occupancy. State law exempts single-family wood-frame and steel-frame dwellings which are less than three stories and are not part of a development of four units or more. However, local agencies can be more restrictive than State law requires.

3.2 California Seismic Hazards Mapping Act

The goal of the Seismic Hazards Mapping Act of 1990 is to minimize loss of life and property by identifying and mitigating seismic hazards. The act addresses non-surface fault rupture earthquake hazards, including strong ground shaking, liquefaction and seismically induced landslides. The State agency charged with implementation of the Act is the California Geological Survey (CGS). The CGS prepares and provides local governments with seismic hazard zone maps that identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures. The seismic hazard zones delineated by the CGS are referred to as "zones of

required investigation," because site-specific geological hazard investigations are required for construction projects located within these areas.

3.3 Real Estate Disclosure Requirements

Pursuant to the **Natural Hazards Disclosure Act,** since June 1, 1998, sellers of real property and their agents are required to provide prospective buyers with a "Natural Hazard Disclosure Statement" when the property being sold lies within one or more State-mapped hazard areas, such as within an Alquist-Priolo Earthquake Fault Zone or a Seismic Hazard Zone.

3.4 California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970 to insure that local governmental agencies consider and review the environmental impacts of development projects within their jurisdictions. CEQA requires that an Environmental Impact Report (EIR) be prepared for projects that may have significant effects on the environment. EIRs are required to identify geologic and seismic hazards, and to recommend potential mitigation measures, giving the local agency the authority to regulate private development projects in the early stages of planning.

3.5 California Building Code

The **California Building Code** (CBC), which is included in Title 24 of the California Administrative Code, provides "minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures" within the City of Pasadena. These documents are historically updated every three years. The most current CBC adopted by the City of Pasadena is the 1998 edition, based on the 1997 edition of the Uniform Building Code. A new CBC was issued in 2001. The City of Pasadena is expected to adopt this version in the Fall of 2002.

3.6 Unreinforced Masonry Law

The Unreinforced Masonry Law of 1986 requires all cities and counties in Seismic Zone 4 (CBC, 1998) to identify hazardous unreinforced masonry (URM) buildings in their jurisdictions. Owners of such buildings must be notified of the potential earthquake hazard, and mitigation must be performed. The

mitigation method, which may include retrofitting or demolition, is left to the local jurisdiction. URMs in Pasadena have been identified and catalogued, in accordance with the 1994 Uniform Code for Conservation of Buildings (Chapter 14.06 of the City Code – also referred to as the City's URM Ordinance). Many of the URMs on the original list compiled by the City have since been retrofitted or demolished; the rest are all at various stages of the mitigation process.

3.7 National Flood Insurance Act and Flood Disaster Protection Act

The Federal Emergency Management Agency (FEMA) is mandated by the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to evaluate flood hazards and provide Flood Insurance Rate Maps (FIRM's) for local and regional planners to promote sound land use and floodplain development. Further, the Flood Disaster Protection Act requires owners of all structures in identified Special Flood Hazard Areas to purchase and maintain flood insurance as a condition of receiving Federal or federally related financial assistance, such as mortgage loans from federally insured lending institutions. The National Flood Insurance Reform Act of 1994 further strengthened the National Flood Insurance Program by providing a grant program for State and community flood mitigation projects. The act also established a system (Community Rating System - CRS) for crediting communities that implement measures to protect the natural and beneficial functions of their floodplains, as well as managing the erosion hazard. The City of Pasadena has participated in the NFIP since 1984 (City ID No. – 065050); however, there are no FIRM maps for the City, and Pasadena is not currently listed in FEMA's CRS of cities.

3.8 Fire Regulations

Assembly Bill 337 (the Bates Bill, adopted September 29, 1992) was a direct result of the great loss of lives and homes in the Oakland Hills "Tunnel Fire" of 1991. The Bates Bill Process is used to identify Very High Fire Hazard Severity Zones in Local Responsibility Areas. **Government Code Section 51178** specifies that the Director of the California Department of Forestry (CDF), in cooperation with local fire authorities, shall identify areas that are Very High Fire Hazard Severity Zones (VHFHSZs) in Local Responsibility areas (LRAs), based on consistent statewide criteria and the expected severity of fire hazard. State Responsibility Areas (SRAs) include all lands regardless of ownership, except for cities and federal lands.

Although the State has financial responsibility for SRAs, it is not the State's responsibility to provide fire protection services to any building or structure located within a wildland area, unless the CDF has entered into a cooperative agreement with a local agency for those purposes pursuant to **Public Resources Code Section 4142**. Under **Assembly Bill 3819**, passed in 1994 (AB 3819 – Willie Brown), "Class A" roofing, minimum clearances of 30 feet around structures, and other fire defense improvements are required in VHFHSZs.

Government Code Section 51178 states that a local agency may, at its discretion, exclude from the requirements of Section 51182 an area identified as a VHFHSZ by the CDF. This requires a finding, supported by substantial evidence, that the requirements of Section 51182 are not necessary for effective fire protection within the area. Conversely, local agencies may include areas not identified as a VHFHSZ by the CDF, following a finding that the requirements of Section 51182 are necessary for effective fire protection. According to **Section 51182**, such changes made by a local agency shall be final and cannot be rebutted by the CDF.

Wildland areas require disclosure for real-estate transactions. Specifically, Assembly Bill 6 (AB6) requires that both types of fire hazard areas (SRAs and VHFHSZs) be disclosed in real estate transactions. **Civil Code Section 1103(c)(6)** also requires real estate sellers to inform prospective buyers whether or not a property is located within a wildland area that could contain substantial fire risks and hazards.

Public Resources Code Section 4290 requires minimum statewide fire safety standards pertaining to:

- Road standards for fire equipment access;
- Standards for signs identifying streets, roads, and buildings;
- Minimum private water supply reserves for emergency fire use; and
- Fuel breaks and greenbelts.

Wildland fire areas are also subject to **Public Resources Code Sections 4291 through 4299**, which require property owners in such areas to conduct maintenance in order to reduce the fire danger.

The **City of Pasadena's Hazardous Vegetation Ordinance** (Pasadena Municipal Code sections 14.29.030 and 14.29.040) is a fire prevention partnership between property owners and the City in order to prevent disastrous fires. The ordinance is designed to minimize fire danger by controlling density and placement of flammable vegetation. The Pasadena Fire Department is responsible for fire suppression on all private lands within the City of Pasadena. The Pasadena Fire Department constantly monitors the fire hazard in the City, and has ongoing programs for investigation and alleviation of hazardous situations.

The **California Emergency Services Act, section 8568**, states that "the State Emergency Plan shall be in effect in each political subdivision of the State, and the governing body of each political subdivision shall take such action as may be necessary to carry out the provision thereof." The act provides the basic authorities for conducting emergency operations following the proclamations of emergencies by the Governor or appropriate local authority, such as a City Manager.

The SEMS law refers to the Standardized Emergency Management System described by the **Petris Bill (SB 1841).** It requires all jurisdictions within the State of California to participate in the establishment of a standardized statewide emergency management system.

The City uses the California Fire Code with amendments and several other fire ordinances to further reduce the City's vulnerability to structural and widland fires.

3.9 National Pollutant Discharge Elimination System (NPDES)

The **Clean Water Act of 1995** and its subsequent amendments give the U.S. Environmental Protection Agency (EPA) the authority to regulate industrial and municipal discharges into public storm drains, sewer systems and surface water bodies. The **National Pollutant Discharge Elimination System (NPDES) permit program** controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are defined by the EPA as discrete conveyances such as pipes or man-made ditches.

The City of Pasadena is a member of the **Los Angeles County Stormwater Program.** This program regulates and controls storm water and urban runoff into the Los Angeles River, San Gabriel River, Santa Clara River, tributaries to these rivers, and ultimately, the Pacific Ocean. The Los Angeles County Stormwater Program is the local enforcer of the NPDES program. In the Pasadena Area, NPDES permits are filed with the California Regional Water Quality Control Board, Los Angeles Region.

3.10 Emergency Planning and Community Right-To-Know Act (EPCRA)

The primary purpose of the Federal Emergency Planning and Community Right-To-Know Act (EPCRA) is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report to state and local agencies the locations and quantities of chemicals stored on-site. Section 313 of EPCRA requires manufacturers to report the release to the environment of any of more than 600 designated toxic chemicals. These reports help communities prepare to respond to chemical spills and similar emergencies. In the City of Pasadena, businesses that use, store or generate any amount of hazardous materials are required to provide the Fire department with an inventory of the hazardous materials that they use. This helps the Fire Department identify the appropriate actions to take in the event of a significant or threatened significant release of a hazardous material.

EPCRA mandates that Toxic Release Inventory (TRI) reports be made public. The TRI is a database that contains information on toxic chemical releases and other waste management activities reported annually by certain industry groups as well as federal facilities. This inventory was established in 1986 under the

EPCRA and expanded by the **Pollution Prevention Act of 1990**.

3.11 Comprehensive Environmental Response, Compensation and Liability Act

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 is a regulatory or statute law developed to protect the water, air, and land resources from the risks created by past chemical disposal practices. This act is also referred to as the Superfund Act, and the sites listed under it are referred to as Superfund sites.

3.12 Resources Conservation and Recovery Act

The Resources Conservation and Recovery Act (RCRA) is the principal Federal law that regulates the generation, management, and transportation of hazardous materials and hazardous wastes. Hazardous waste management includes the treatment, storage, or disposal of hazardous waste.

3.13 Hazardous Materials Disclosure Program

As indicated previously, hazardous materials are extensively legislated by the Federal, State and City governments. In exceedance of Federal and State requirements, the City of Pasadena requires all businesses that handle any amount of hazardous materials to submit an inventory of the hazardous materials that they manage to the Pasadena Fire Department.

In 1986, Congress passed the **Superfund Amendments and Reauthorization Act** (SARA). Title III of this legislation requires that each community establish a Local Emergency Planning Committee (LEPC). This committee is responsible for developing an emergency plan that outlines steps to prepare for and respond to chemical emergencies in that community.

Several California statutes require the emergency notification of a hazardous chemical release. These include: Health and Safety Codes §25270.7, §25270.8 and §25507; Vehicle Code §23112.5; Public Utilities Code §7673; Government Codes §51018, §8670.25.5(a); Water Codes §13271 and §13272; and California Labor Code §6409.1(b)10. The **Safe Drinking Water and Toxic Enforcement Act of 1986**, better known as **Proposition 65, and §9030 of the California Labor Code** also has specific reporting requirements.

4.0 Environmental Setting and Summary of Natural Hazards Specific to the City of Pasadena

The City of Pasadena is located at the boundary between two of southern California's geomorphic provinces, in an area that is being compressed by geological forces associated with movement on the Pacific and North American tectonic plates. Growth of the San Gabriel Mountains in response to earthquakes on the Sierra Madre fault is the most obvious result of this compression. Other manifestations of this plate boundary include a broad zone of faulting that extends from offshore southern California inland to the Mojave Desert, and the regular occurrence of earthquakes. Movement of these plates is also causing this portion of Los Angeles basin to rotate clockwise. To accommodate this rotation, several of the faults in the area move laterally, typically with one block moving to the left relative to the other (left-lateral strike-slip).

In the Pasadena area, the main faults include the Sierra Madre fault, a reverse fault that extends across the City's northern boundary, and the left-lateral strike-slip Raymond fault that locally extends into Pasadena's southern and eastern boundaries. A worst-case scenario earthquake (maximum magnitude) for Pasadena would involve rupture of the segment of the Sierra Madre fault that extends through the northern portion of the City. A maximum magnitude earthquake on the Raymond fault is a close second in terms of damage potential to the City. In addition to the two faults above, the Verdugo, Hollywood, Whittier and Elysian Park fault zones are likely sources of earthquakes that may impact the City. The San Andreas fault has the highest probability of causing an earthquake, and although farther away from Pasadena, it also has the potential to cause some damage in the City. Most of the loss of life and injuries that have occurred and will occur during an earthquake are related to the collapse of hazardous buildings and structures, or from non-structural components (contents) of those buildings. Given that the City of Pasadena is almost completely built out, the reduction of earthquake losses depends primarily on the prudent retrofitting of existing structures.

The eastern and central sections of the Raymond fault are zoned under the Alquist-Priolo Earthquake Fault Zoning Act, so geological evaluations to locate the fault are mandated by State law if developments or re-developments amounting to more than 50 percent of the value of the structure are proposed within this zone. The traces of the Sierra Madre fault that have been mapped or inferred through the City of Pasadena, at and south of the break in slope at the mountain front are not currently mapped by the State. The northernmost trace that extends through the Loma Alta Park in Altadena has recently been shown to be active. The inferred fault traces farther to the south are based only on breaks in slope; as a result some traces or sections of traces are better

defined in the topography than others (see Plate P-1). None of these inferred traces have been investigated by trenching or other direct geologic methods. Nevertheless, given the density of development in the areas where these traces have been mapped, it is proposed that geological studies to evaluate the potential for surface fault rupture should be required in these zones before certain types of development, such as critical facilities, are approved. Similarly, geological investigations of the Eagle Rock fault should also be required. For specific information about these requirements, refer to the Implementation Section of this Report (Section 5.0).

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed investigations of individual sites.

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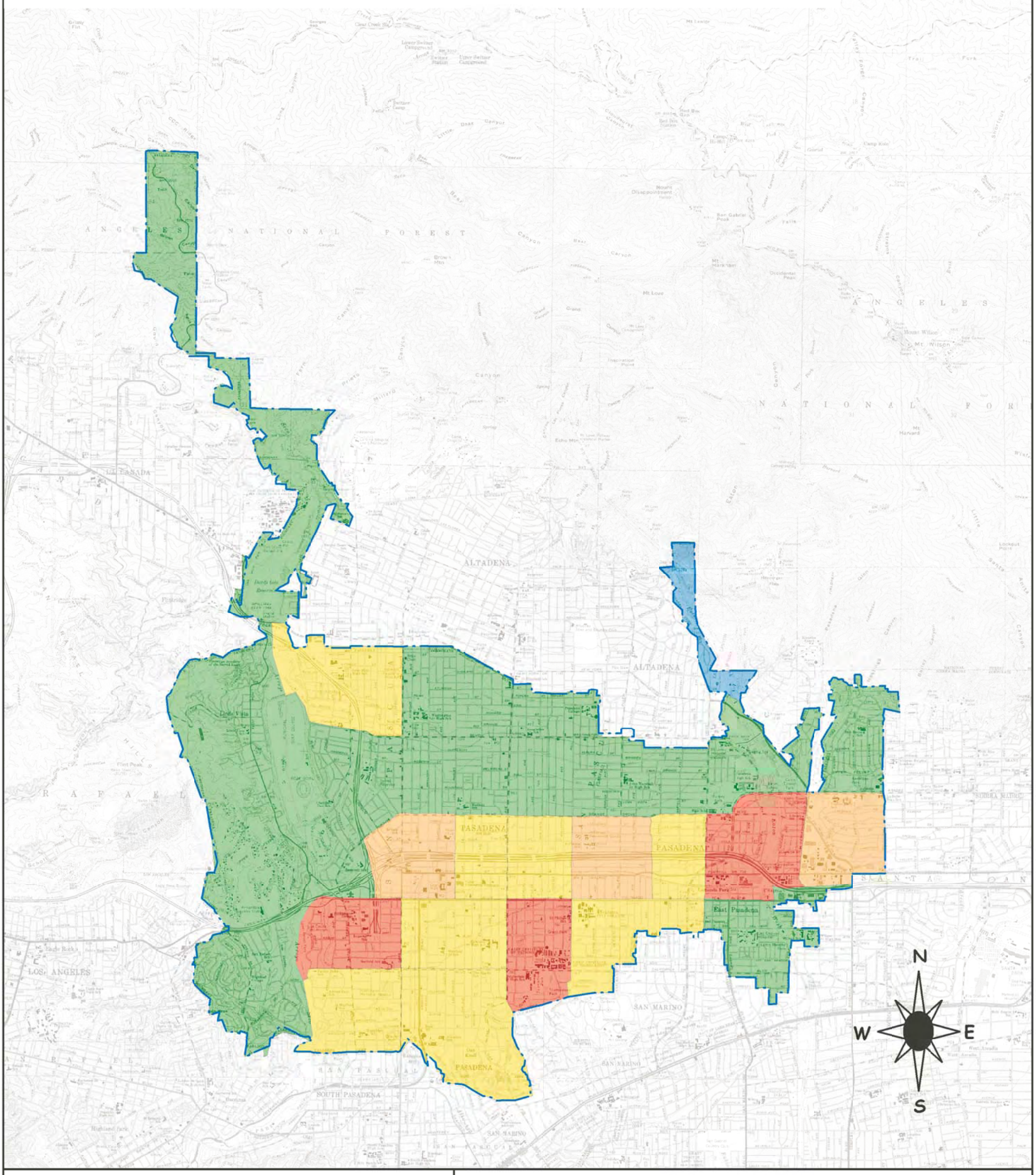


Base Map: USGS Topographic Map from Sure!RASTER MAPS
Sources: Environmental Protection Agency, Federal Emergency, 2001; Management Agency, HAZUS, 1999.

Scale: 1:64,000

1 0 1 2 3 Kilometers

0.5 0 0.5 1 1.5 Miles

EXPLANATION

Number of Hazardous Waste Listings per Census Tract

- No Sites
- 1 to 10
- 11 to 20
- 21 to 30
- 31 to 45

Pasadena City Boundary

Census Tract Boundary

Hazardous materials listings include: US Environmental Protection Agency, California Environmental Protection Agency, and Toxic Release Inventory listings. Some sites are included in more than one list, and may therefore be counted more than once.

CITY OF PASADENA * INCORPORATED JUNE 1886 *

Earth Consultants International

Project Number: 2022
Date: June, 2002

Distribution of Hazardous Materials Sites By Census Tract for Pasadena, California

Plate 5-1

The San Gabriel Mountains form the backdrop to Pasadena, but most of the City is largely situated on the surface of uplifted older alluvial fans (outspread, gently sloping surfaces consisting of stream-lain deposits) below the San Gabriel Mountains. Only the edges of the City encroach onto or near mountainous areas on the west, the northwest and northeast. Geologic units within the City consist of poorly or crudely stratified sand, silt, and gravel in the valley, with dense crystalline rock forming most of the hillsides. Hills in the southeast corner of the City, generally south of Colorado Boulevard, are composed of stratified sedimentary rocks, typically sandstone, conglomerate and shale.

The City's hillsides are vulnerable to slope instability due primarily to the fractured, crushed and weathered condition of the bedrock, and the steep terrain (see Plate P-1). Oversteepened slopes along the large drainage channels are also locally susceptible. The probability of large bedrock landslides occurring is relatively low, therefore the source of potential losses due to slope instability arises primarily from the occurrence of smaller slope failures in the form of small slides, slumps, soil slips, debris flows and rockfalls. The initiation of such failures is generally tied to a preceding event, such as wildfire, heavy winter storms, seismic activity, or man's activities.

Some of the geologic units in the Pasadena area have fine-grained components that are moderately to highly expansive. These units are generally present in the southern San Rafael Hills (south of Colorado Boulevard) and in the southern part of the City, where fine-grained sequences within the alluvial fans are more likely to be present. These fine-grained units may not be present at the surface but may be exposed during grading.

Two major stream channels transect the City: Arroyo Seco on the west, and Eaton Wash on the east. Arroyo Seco has a deeply entrenched channel that originates in the San Gabriel Mountains and flows southward along the eastern side of the San Rafael Hills, eventually flowing into the Los Angeles River. Eaton Wash also emanates from the mountains to the north, is joined by the channels from Pasadena Glen and Hastings Canyons, and eventually flows into the Rio Hondo River. Both drainages have been modified by flood control dams near the base of the mountains, and both have been confined to man-made channels or storm drains along their lower reaches, in the valley.

In most years, both channels carry little water, with peak discharges typically of less than 1,000 cubic feet per second (cfs) for Arroyo Seco, and less than 500 cfs for Eaton Wash. Records indicate that the two most severe storms in the 20th Century, during 1938 and 1969, caused the highest historical peak discharges measured in these channels, with approximately 8,800 cfs for Arroyo Seco. Historical records also show that historical peak discharges in these watersheds have occurred most

often between November and March, indicating that future flooding in the area is most likely to occur in the winter months. The City of Pasadena is currently not vulnerable to flooding associated with the Arroyo Seco and Eaton Canyon Creek and its tributaries. However, future development in the upstream areas could change this.

Debris flooding has occurred previously in many of the canyons near the Pasadena area, in the upper reaches of the watersheds. Zachau, Rubio and Shields Canyons have flooded in the past, and are likely to flood again. Debris floods are more likely to occur in wet years following wildland fires. The inundation pathways resulting from the catastrophic failure for each of the dams on these drainages have been mapped (see Plate P-2). If Devil's Gate Reservoir fails catastrophically, most of the water will be confined to the Arroyo Seco channel, but it would impact the Rose Bowl and other developed areas both north and south of the 210 Freeway. If Eaton Wash Dam failed, the inundation would impact residential and commercial areas located downstream of the dam, but north of the 210 Freeway.

Currently, shallow ground water levels (< 50 feet from the ground surface) are known to have occurred historically only in some portions of the City, generally along the mayor drainages and canyons. Shallow ground water has also been reported in the southwestern portion of the City, at the base of the San Rafael Hills, and along the Raymond fault, where water ponds against the fault, rising to within 50 feet of the surface. Seasonal fluctuations in groundwater levels, and the introduction of residential irrigation requires that site-specific investigations be completed to support these generalizations in areas mapped as potentially susceptible to liquefaction (see Plate P-1). Some areas of the City may also be susceptible to seismically induced settlement. Sites near the base of the San Rafael Hills, at the valley margins, may be particularly vulnerable as a result of differential settlement at the bedrock-alluvial contact.

The portions of the San Rafael Hills and the San Gabriel Mountains within City limits are mapped as having a fire hazard due to the steep topography of the area and the presence of flammable vegetation (see Plate P-2). Some of these areas are under Federal jurisdiction (Very High Fire Hazard Severity Zones), and some are under State jurisdiction (State Responsibility Areas). Other areas, such as developments at the margins of the Hahamongna Watershed Park, near Eaton Canyon, and at the base and the flanks of the San Rafael Hills, at the wildland-urban interface, are the City's responsibility. Residents in all of these areas need to recognize that they live in a hazardous area, and that they are responsible for maintaining their properties. This includes but is not limited to establishing a fire-resistant landscape, and building with fire-resistant materials. Earthquake-induced fires pose a risk in the developed, downtown areas of the City, the result of downed electric

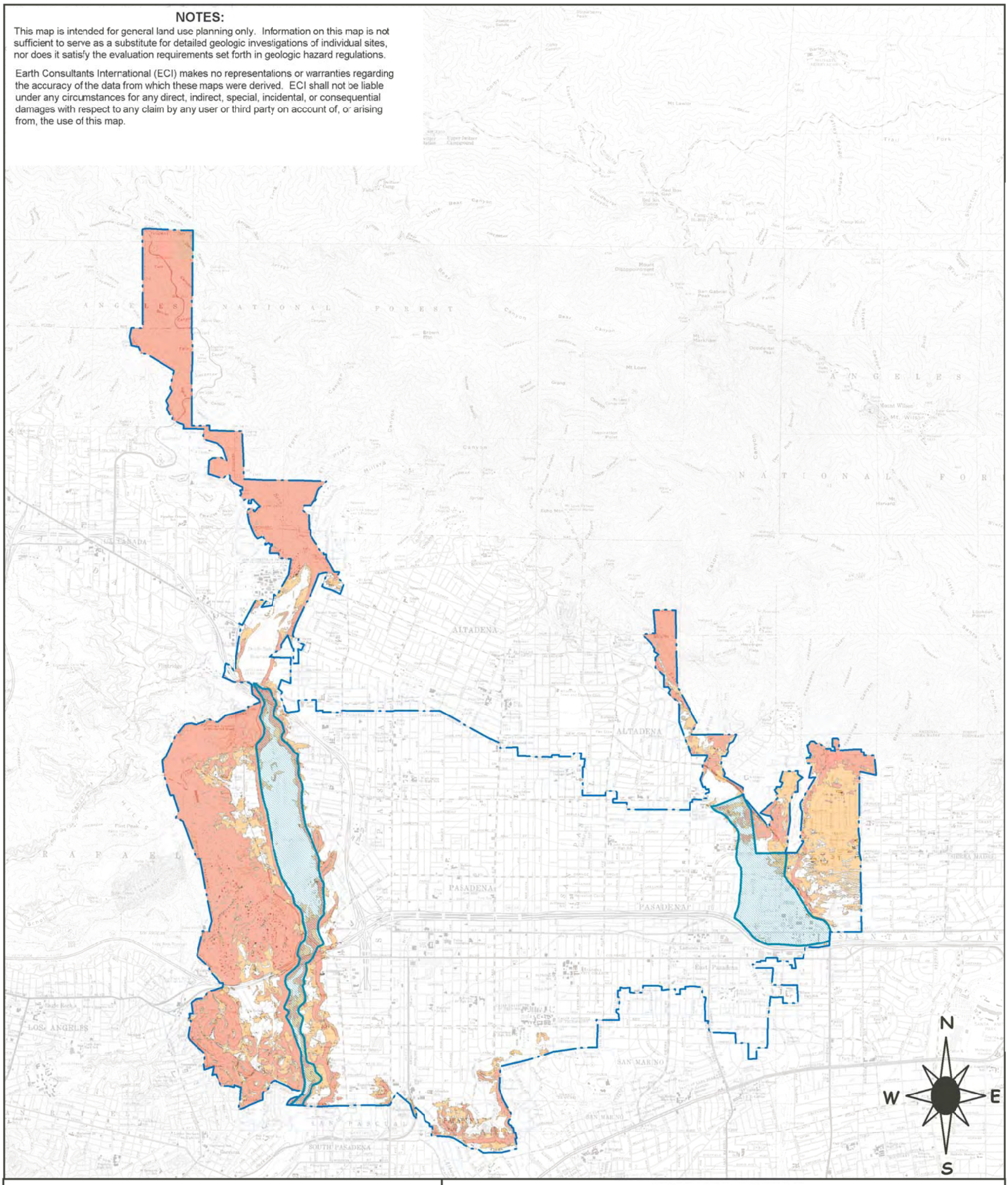
lines, broken gas mains, and tipped-over appliances. Multiple ignitions over a broad area of the City can tax the local Fire Department, especially if the water reservoirs or water mains have also been damaged during the earthquake.

There are two large-quantity and more than two hundred small-quantity generators of hazardous materials in the City. Given these numbers, it is impressive that the actual number of unauthorized releases of hazardous materials into the environment is fairly small, as documented in the Federal and State databases reviewed. There are four sites at or near the City that have released hazardous materials of concern into the air – the EPA monitors these facilities closely to reduce the potential of future emissions at concentrations above the acceptable limits. Of these, the Jet Propulsion Laboratory (JPL) site, just outside the City boundaries, is located within the recommended fault hazard management zone for the Sierra Madre, and within a fire hazard area. Since JPL is also the largest user of hazardous materials in the area, there is a real potential for this site to negatively impact the surrounding area should an earthquake on the Sierra Madre fault or a wildfire cause hazardous materials to be released.

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.



Base Map: USGS Topographic Map from Sure!RASTER MAPS

Source: Los Angeles County Flood Control District, 1973; Earth Consultants International, 2002.

Scale: 1:64,000

1 0 1 2 3 Kilometers

0.5 0 0.5 1 1.5 Miles

EXPLANATION

Dam Inundation Zone

Pasadena City Boundary

Fire Hazard Zones

Very High

Moderate

CITY OF PASADENA ★ INCORPORATED JUNE 1886 ★

Earth Consultants International

Project Number: 2022
Date: June, 2002

Summary of Hazards Map (II)

Pasadena, California

Plate P-2

None of the significant hazardous sites are located within or adjacent to a liquefaction susceptible area, or an unstable slope area. Furthermore, none of the sites are located within or adjacent to a dam inundation area. Therefore, with the exception of JPL, most significant hazardous sites are well situated. The one concern that applies to all sites is that the Pasadena area is susceptible to high to very high ground motions as a result of an earthquake on either the Sierra Madre or Raymond fault. Therefore, all sites should provide for, at a minimum, secondary containment of hazardous substances, including segregation of reactive chemicals, in accordance with the most recent California Fire Code and City of Pasadena Fire Code amendments.

5.0 IMPLEMENTATION

In conformance with State law, the City of Pasadena has updated the Safety Element of the General Plan. As required by section 65302(g) of the California Code of Regulations, each local government is required to maintain a comprehensive Safety Element that addresses a variety of natural and man-made hazards and that provides goals and policies aimed at reducing the risk associated with these hazards. The Safety Element serves the following functions:

- Provides an assessment of the natural and man-made hazards in the City, including, but not limited to, earthquakes, landslides, fire, flood, dam inundation, and hazardous materials incidents;
- Provides a framework by which safety considerations are introduced into the land use planning process and the redevelopment process;
- Strengthens the City's existing municipal codes, and provides guidelines that the City can use during the project review and permitting process to identify and mitigate hazards for new development and redevelopment;
- Provides policies directed at identifying and reducing hazards in existing development; and
- Strengthens earthquake flood, fire, and hazardous materials preparedness planning and post-disaster reconstruction policies particular to the City of Pasadena.

Whether related to earthquakes, other natural or man-made hazards, or disaster preparedness, Safety Element goals are guided by the City's responsibility to:

- Minimize fatalities and injuries;

- Minimize the burden on public and emergency response resources (police, fire, medical, etc.);

- Minimize public and private costs for cleanup, repair and recovery; and

- Minimize long-term impacts caused by displaced households, business disruption, and reduced fiscal resources (with a consequent tax burden).

Policy statements address specific concerns believed to be of long-term planning importance to the community. **Program** statements, on the other hard, are specific implementation measures selected to maintain or

improve public safety, and to satisfy the objectives of the policies and goals.

SAFETY ELEMENT GOALS AND POLICIES

The following are recommendations for the Safety Element policy framework for the City of Pasadena based on findings presented in the Technical Background Report.

SEISMIC HAZARDS:

Goal S-1: Minimize injury and loss of life, property damage, and other impacts caused by seismic shaking, fault rupture, ground failure, earthquake-induced landslides, and other earthquake-induced ground deformation.

Policy S-1: The City will monitor development or re-development within the Fault Hazard Management Zones identified for both the Sierra Madre and Raymond faults.

Program S1-1: The City will cooperate with State and Federal agencies in conducting geological investigations of the Sierra Madre and Raymond faults. The City will investigate the possibility of partnering with the Earthquake Hazards Program of the U.S. Geological Survey to better identify the active traces of the Sierra Madre fault.

Program S1-2: The City shall require geological studies, such as fault-trenching, of the ***defined traces*** of the Sierra Madre and the Raymond fault traces shown on Plate P-1. The studies shall be conducted by State-certified engineering geologists following the guidelines established in the Alquist-Priolo Earthquake Fault Studies Act. This should apply to the development and redevelopment of residential, commercial or industrial parcels or tracts that amount to 5,000 square feet or more. The City Geologist shall review the fault studies to ensure that the excavations were conducted with an acceptable level of effort to determine whether or not there are active faults through the proposed development, and that suitable fault setbacks are defined.

Program S1-3: The City will require geological studies of the ***less well-defined traces*** of the Sierra Madre fault shown on Plate P-1 for critical facilities proposed within this zone. The studies shall be conducted by State-certified engineering geologists.

Policy S-2: The City will ensure that current geologic knowledge and State-certified professional review are incorporated into the design, planning and construction stages of a project, and that site-specific data are applied to each project.

Program S2-1: The City shall retain on staff, or on a contract basis, a State-certified engineering geologist and a geotechnical engineer to review all geotechnical studies for proposed development or redevelopment, including fault studies (Programs S1-1 through S1-3), and to review grading operations (Programs S2-3 and S2-4). These individuals, whether on staff or under contract to the City, are referred to herein as the City Geologist and City Geotechnical Engineer, respectively.

Program S2-2: The City will modify the fault hazard management zones for the Raymond and Sierra Madre faults as data obtained from the implementation of Programs S1-1 through S1-3 become available. Modification of the map will be conducted by or under the direction of the City Geologist.

Program S2-3: The City shall require geological and geotechnical investigations in areas of potential seismic or geologic hazards as part of the environmental and development review process. The City shall not approve proposals and projects for development or redevelopment which do not provide for mitigation of seismic or geologic hazards to the satisfaction of the responsible agencies.

Program S2-4: The City shall continue to require preliminary geological investigations of tract sites by State-registered geotechnical engineers and certified engineering geologists (in accordance with the California Building Code).

Program S2-5: The City shall continue to require liquefaction assessment studies in areas identified as susceptible to liquefaction in accordance with the California Geological Survey Special Publication 117 Guidelines, and the Southern California Earthquake Center's procedures to implement Special Publication 117.

Policy S-3: The City will strive to ensure that the design of new, and the performance of existing structures address the appropriate earthquake hazards.

Program S3-1: The City shall continue to enforce the seismic design provisions for Seismic Zone 4 of the California Building Code, including near-source seismic conditions.

Program S3-2: The City will identify un-retrofitted buildings, including tilt-up construction, non-ductile reinforced concrete, and tuck-under parking and other soft-story construction. A catalog of these buildings in the City will be completed.

Program S3-3: The City shall prepare a plan for structural retrofit of such buildings identified under Program S3-2.

Program S3-4: The City will disclose to the buyer through City occupancy programs the potential problems with unbolted foundations in pre-1935 residences.

Program S3-5: The City will require prior to the reconstruction of damaged / destroyed buildings in hazard management zones, especially fault zones, to prove that the site can be safely restored using earthquake-resistant building techniques and land development policies as identified under Program S-1.2.

Policy S-4: The City will ensure to the fullest extent possible that, in the event of a major disaster, essential structures and facilities remain safe and functional, as required by current law. Essential facilities include hospitals, police stations, fire stations, emergency operation centers, communication centers, generators and substations, and reservoirs.

Program S-4.1: The City will continue to encourage the participation of the Planning and Development Departments during the early, conceptual stages of a critical facility project to assess its feasibility, with emphasis on issues such as surface fault rupture potential, liquefaction susceptibility, and inundation potential.

Program S-4.2: The City will encourage compliance with the 1974 Hospital Facilities Seismic Safety Act, the 1986 California Earthquake Hazards Reduction Act and SB 1953. The City will continue to work with the Huntington Memorial Hospital and state agencies to ensure that the hospital buildings will remain occupiable and operational following a maximum magnitude earthquake on the Raymond or Sierra Madre faults.

Program S-4.3: The City will seek cooperative agreements with regional hospitals outside City limits that can provide medical assistance in the event that the Huntington Hospital does not have sufficient beds to accommodate all of the casualties resulting from an earthquake or other disaster. Open areas, such as parks and school fields, from which victims could be airlifted to regional hospitals if necessary will be identified as part of this program.

Policy S-5: The City will continue earthquake strengthening and provisions for alternate or back-up essential services, such as water, sewer, electricity, and natural gas pipelines and connections throughout the City. First priority for this program should be for the essential services within the identified fault hazard management zones.

Program S-5.1: The City shall conduct seismic analysis of essential infrastructure such as water, sewer, electricity, and natural gas lines and make any structural changes necessary to withstand seismic activities. This may include additional strengthening, shoring and/or flexible pipelines in areas that cross fault hazard zones.

Policy S-6: The City will ensure to the fullest extent possible that, in the event of a major disaster, dependent care and high-occupancy facilities will remain safe.

Program S-6.1: The City's Building Department shall continue to review existing and proposed projects to ensure that stairways and elevators in high-occupancy buildings are adequately strengthened.

Program S-6.2: The City's Fire Department, as part of their annual review of businesses and dependent care facilities, shall encourage and educate the owners or operators of these facilities about emergency generators, and the value of securely anchoring computers, shelving, and other non-structural elements.

Policy S-7: The City will educate the public on the hazards that can pose a risk to the City and its residents, and will describe loss reduction strategies that can be used to mitigate the specific hazards identified.

Program S-7.1: The City will regularly review the technical data on public safety and seismic safety for use in the planning process and undertake a technical update to the Safety Element as needed. This includes the periodic update of the maps that support the Technical Background Report with newly developed data obtained in response to geological studies undertaken for fault, liquefaction or landslide studies. Where sufficient data are developed to indicate that an area currently identified as susceptible to liquefaction is NOT liquefiable, modify the map to eliminate the need for future studies in that area. Results of these findings will be submitted to the California Geological Survey.

Program S-7.2: The City will continue to develop an effective system for communicating information about risk and loss reduction strategies to City staff in all departments responsible for implementing the programs defined in the Safety Element.

Program S-7.3: The City will develop a web-based system to communicate to the City's residents, workers and visitors the hazards specific to the City, and, most importantly, to describe the loss reduction strategies that homeowners and workers can implement at home and the work place to reduce their risk.

GEOLOGIC HAZARDS

Grading and construction operations are necessary to correct for unstable soils, soil erosion, landsliding and flooding (debris and/or mudflows) in hillside areas. This is sometimes in conflict with the desire to preserve the aesthetic or natural conditions of the existing topography. There must be a balance of the two objectives.

Goal G-1: Minimize the risk to life or limb, and property damage resulting from soil and slope instability.

Policy G-1: Whenever possible, mitigation of geologic hazards will be conducted without violating the property owners' rights to modify or improve their investment, along with preserving the aesthetic or natural conditions of the area through minimal grading. When these goals are in conflict, protection of life and property will take precedence.

Program G1-1: In the areas of Pasadena susceptible to slope instability, the City will require geotechnical investigations that include engineering analyses of slope stability, provide surface and subsurface drainage specifications, and provide detailed design for fill placement and excavation.

Program G1-2: The City will discourage any grading beyond that which is necessary to create adequate and safe building pads. The City Geologist and Geotechnical Engineer shall conduct regular inspection of grading operations to maximize site safety and compatibility with community character.

Program G1-3: In the hillside or mountainous areas of Pasadena, the City will discourage excessive grading of slopes greater than 3:1 (horizontal:vertical), and will encourage varied slope ratios on design slopes to reduce the visual impact of grading.

Program G-1.4: The City shall prohibit cut or fill slopes steeper than 2:1.

Program G-1.5: The City will not permit the reconstruction of structures meant for human habitation that were damaged or destroyed by failed slopes unless the applicant can prove that the remedial measures proposed will improve the unstable slope conditions making the site suitable for redevelopment.

Policy G-2: The City will continue to participate in regional programs designed to protect the groundwater resources of the Raymond Basin while protecting the area from the hazard of regional ground subsidence.

Program G-2.1: The City will continue to encourage water conservation through public education.

Program G-2.2: The City will participate in a technical group consisting of representatives from various cities in the Raymond Basin brought together to evaluate the feasibility of implementing artificial recharge programs, protecting groundwater quality, monitoring the ground water, and publishing annual reports on basin conditions.

FLOOD HAZARDS:

Goal F-1: Minimize injury, loss of life, property damage, and economic and social disruption caused by flood and inundation hazards.

Policy F1-1: The City will discourage development in flood hazard areas and will strengthen the City's maintenance program for storm water detention basins, culverts and storm drains to minimize future flooding events.

Program F-1.1: The City will continue to participate in the National Flood Insurance Program.

Program F-1.2: The City shall, in cooperation with the Los Angeles County Flood Control Department, conduct studies of drainage and dam improvements in selected areas at the base of the San Gabriel Mountains and the San Rafael Hills, to identify where improvements may be necessary.

Program F-1.3: The City shall encourage the development of parks and recreational facilities in the Arroyo Seco area,

consistent with the natural environment of the Arroyo Seco and in an effort to retain the area as open space.

Program F-1.4: The City shall discourage the redevelopment of critical structures in the dam inundation pathway of the Eaton Canyon dam, unless it can demonstrate that the proposed project will be safe from flooding.

Program F-1.5: The City will develop evacuation plans and routes for those areas within the dam inundation pathway of the Arroyo Seco and Eaton Canyon (i.e., the Rose Bowl and parks within the Arroyo Seco drainage). These emergency response plans may include an alarm system, such as sirens and loudspeakers linked remotely to the Fire Department and the upstream dams, to be used to report on eminent inundation associated with the catastrophic release of water from upstream reservoirs.

Program F-1.6: In the San Gabriel Mountains and the San Rafael Hills, the City will assess the potential environmental impacts that new construction in upstream areas will have on already developed areas downgradient. Hydrological studies to assess the impacts shall be required for all new construction in the hillsides to determine the necessity and impact that new development will have on the County drains and privately owned debris basins downstream from new development. If the analyses indicate a potential hazard, storm improvements shall be required. Fees to pay for the improvements may be assessed to the developers, as appropriate.

Program F-1.7: The City will continue to maintain the culverts and storm drain system to prevent the accumulation of debris or other obstructions that would hamper the effectiveness of the system during rainy days.

FIRE HAZARDS

Goal R-1: It is the City's desire to reduce threats to public and private property from wildland and urban fire hazards.

Policy R-1: The City will ensure to the extent possible that fire services, such as fire equipment, infrastructure, and response times are adequate for all sections of the City.

Program R-1.1: The City will conduct, in association with the local water providers, annual fire flow tests, especially in areas of high fire hazard. Deficiencies in the system shall be addressed as soon as possible.

Program R-1.2: The City will continue to require that new private access roads are a minimum of 24 feet wide and have an adequate turning radius as required by the Fire Department.

Program R-1.3: The City will continue to enforce a Class A Roofing ordinance or better for residential and commercial develoments. Residents with existing wood-shingle or unrated roofing materials will be encouraged to upgrade to fire resistive construction, including fire resistive eves and awnings.

Policy R-2: The City will require all new development in areas with a high fire hazard to provide fire retardant landscaping and project design to reduce their fire hazard.

Program R-2.1: The City will encourage residents to plant and maintain drought-resistant, fire-retardant landscape species on slopes to reduce the risk of brush fire and soil erosion in areas adjacent to canyons; and develop stringent site design and maintenance standards for areas with high fire hazard or soil erosion potential.

Program R-2.2: The City will continue to enforce the Weed Abatement Program in high fire risk areas.

Program R-2.3: Fire management plans shall be required for all new development in areas subject to wildfire.

Program R-2.4: The City will continue to enforce the Uniform Fire Code and Municipal Fire Code Amendments for new construction in fire hazard areas, including the use of sprinklers in residential structures.

Policy R-3: The City will study the secondary water supplies for emergency fire flow needs in an emergency.

HAZARDOUS MATERIALS

The unhealthful effects of certain chemicals and substances has led to extensive regulation of hazardous materials. The City shall cooperate with adjacent jurisdictions, continue to coordinate with regional

providers of emergency services, and make every effort to ensure that all residents, workers, and visitors to Pasadena are protected from exposure to hazardous materials and wastes.

Goal H-1: Reduce the potential for hazardous contamination in the City.

Program H-1.1: The City will continue the enforcement of disclosure laws that require all users, producers, and transporters of hazardous materials and wastes to clearly identify the materials
that they store, use or transport, and to notify the appropriate City, County, State and Federal agencies in the event of a violation.

Program H-1.2: The City will identify City roadways along which hazardous materials are routinely transported. If critical facilities, such as schools, hospitals, child care centers or other facilities with special evacuation needs are located along these routes, identify emergency response plans that these facilities can implement in the event of an unauthorized release of hazardous materials.

Policy H-1.3: New proposed facilities involved in the production, use, storage, transport or disposal of hazardous materials will be located a safe distance from land uses that may be adversely impacted by such activities. Conversely, new sensitive facilities shall not be allowed to be located near existing sites that use, store or generate hazardous materials.

Policy H-1.4: The City shall assure the continued response to and capability of handling hazardous materials incidents in the City and along the sections of freeways that extend across the City.

Policy H-1.5: The City will continue to encourage residents and businesses to reduce or eliminate the use of hazardous materials. This includes encouraging residents to buy toxic substances in only the amount needed to do the job, or better yet, to use safer non-toxic alternate products that do not pose a threat to the environment.

Program H-1.6: The City will continue to support the operation of recycling centers that take hazardous substances, such as paint, paint thinner, used waste oil, etc.

DISASTER RESPONSE PLANNING

Planning issues pertaining to emergency response, disaster preparedness, and disaster recovery require an assessment of the hazards, identification of functions and resources to handle short-term response, and development of recovery procedures. Earthquakes pose the greatest challenge because they occur with little or no warning, and can set into motion a number of linked events.

Goal D-1: Plan for emergency response and recovery from natural and urban disasters, especially from earthquake and terrorist threats.

Program D-1.1: The City will continue to maintain and update the City's Multi-Hazard Functional Plan as necessary.

Program D-1.2 The City will continue to maintain and update the City's emergency response organization consisting of representatives from all City departments, local quasi-governmental agencies, private businesses, citizens, and other community partners involved in critical and/or community-wide services.

Program D-1.3: The City will maintain mutual aid agreements with neighboring cities and the County of Los Angeles; and develop partnerships with other emergency relief organizations.

Program D-1.4: The City will designate emergency shelters and centers with disaster assistance organizations (if necessary), to include identifying potential outdoor shelter locations.

Program D-1.5: Establish traffic control contingency plans for disaster routes with the use of the City's traffic control center.

Program D-1.6: The City will coordinate the identification of casualty collection points and police/fire staging areas with local public safety agencies.

Program D-1.7: The City will enhance public awareness and preparedness by encouraging residents to store supplies for self-reliance in the event of isolation.

Program D-1.8: The City will offer education programs for residents and businesses regarding disaster mitigation measures to taker prior to, during, and after emergencies.

Program D-1.9: The City will involve the public in the awareness of City emergency response plans, resources, risk reduction and mitigation measures.

Program D-1.10: The City will compile and maintain inventories of facilities with special risks, hazards and needs, that may crate special response situations during disasters.

Program D-1.11: The City will continue to participate in regional emergency exercises.

Program D-1.12: The City will support the development of local preparedness plans and multi-jurisdictional cooperation and
communication for emergency situations consistent with regional, state, and federal standards, guidelines and/or recommendations.