SECTION 7: WILDFIRES

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Why are Wildfires a Threat to Glendale?

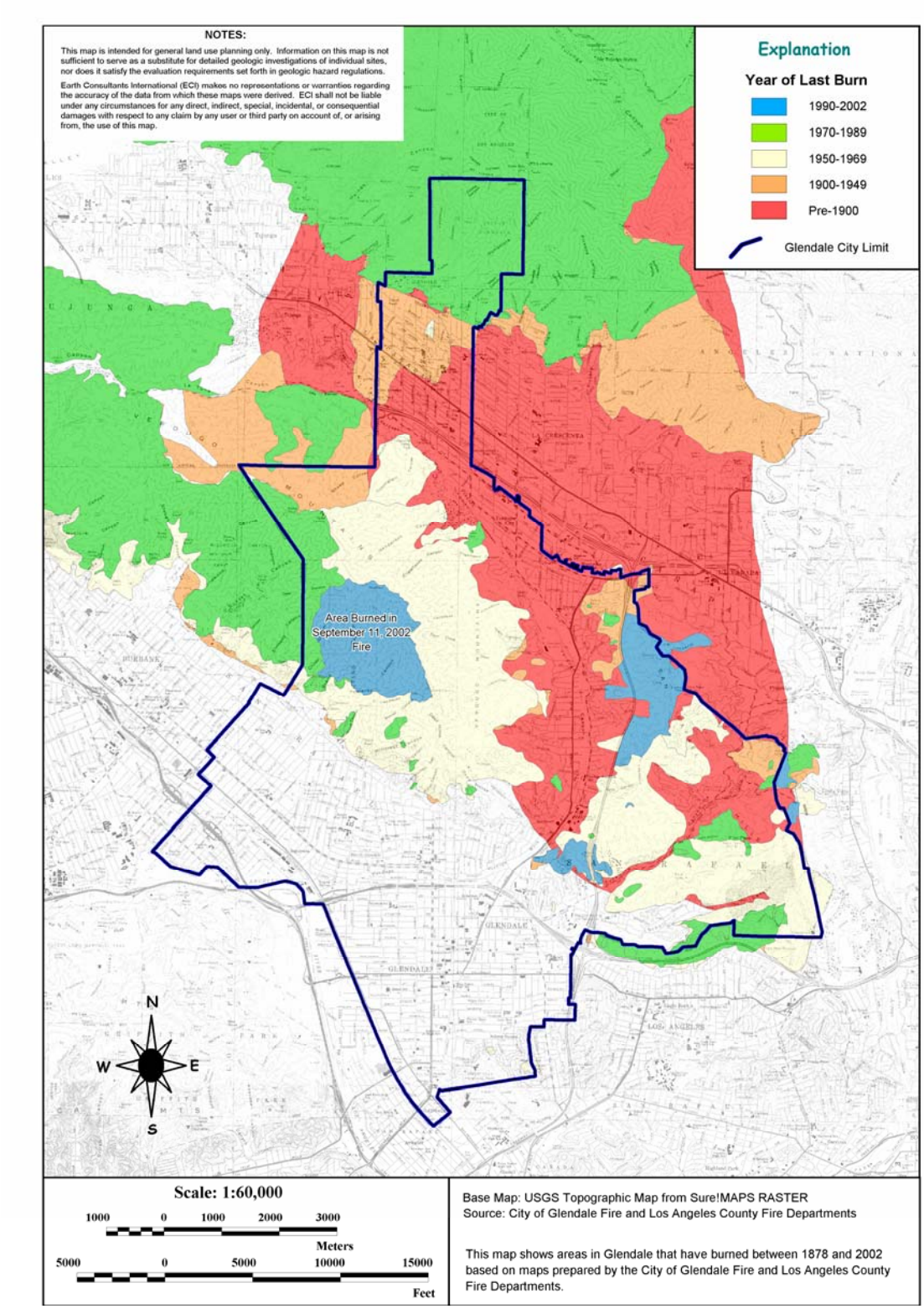
Fires have always been a natural part of the ecosystem in southern California due to the region's weather, topography and native vegetation. The typically mild, wet winters characteristic of our Mediterranean climate result in an annual growth of grasses and plants that dry out during the hot summer months. This dry vegetation often provides fuel for wildfires in the autumn, when the area is intermittently impacted by Santa Ana (or Santana) winds, the hot, dry winds that blow across the region in the late fall. These winds often fan and help spread the fires. Furthermore, many of our native plants have a high oil content that makes them highly flammable.

Wildland fire is a natural process, and wildfires are a necessary part of the natural ecosystem of southern California. Many of the native plants require periodic burning to germinate and recycle nutrients that enrich the soils. Wildfires become an issue, however, when they extend out of control into developed areas, with a resultant loss of property, and sometimes unfortunately, loss of life. The wildfire risk in the United States has increased in the last few decades with the increasing encroachment of residences and other structures into the wildland environment, and the increasing number of people living and playing in wildland areas. Today, approximately 10 percent of all wildland fires in the United States are started by lightning strikes, with humans causing the rest. The most common causes of wildfires are arson, sparks from brush-clearing equipment and vehicles, improperly maintained campfires, improperly disposed cigarettes, and children playing with matches.

Wildfires pose a substantial hazard to life and property in communities built within or adjacent to hillsides and mountainous areas, at the urban-wildland interface or UWI. Fires at the UWI can be particularly dangerous and complex, posing a severe threat to public and firefighter safety, and causing devastating losses of life and property because when a wildland fire encroaches onto the built environment, ignited structures can then sustain and transmit the fire from one building to the next (multiple ignitions develop as a result of "branding", the term for wind transport of burning cinders over a distance of a mile or more). This is what happened at four of the most devastating fires in California: the Oakland Hills/Berkeley Tunnel fire of October 1991, the Laguna fire of 1970 in northern San Diego County, the Laguna Beach fire of 1993, and the 2003 firestorms in San Diego and San Bernardino Counties. In the Oakland Hills fire, 25 lives were lost, and 2,900 structures were damaged for a total of $1.7 billion in insured losses. The September 1970 fire, which started as a result of downed power lines, burned 175,425 acres, destroyed 382 structures and killed 5 people. The Laguna Beach fire of 1993 burned 14,437 acres and destroyed 441 homes, but thankfully no lives were lost. More recently, the 2003 fires destroyed more than 4,800 homes and claimed 22 lives (see next section).

Several historical fires have impacted the Glendale area and vicinity over the years. In fact, the entire northern two-thirds of the city have burned at some time in the last 125 years. Historical records kept by the City and the County of Los Angeles indicate that significant acreage was impacted by fires in 1878, 1927, 1933, 1964, 1975, and 1980 (see Map 7.1, below). The most recent wildland fires in the Verdugo Mountains occurred in September

Map 7.1: Historical Wildfires in the Glendale Area



2002 (the Mountain Incident brush fire which burned 752 acres), and October 2005 (the Burbank fire that burned 700 acres but did not impact any structures). The worst fire in the City's history, however, is the College Hills fire of June 1990, which burned 100 acres and destroyed 64 homes in the foothills of the San Rafael Hills.

Historic Fires in Southern California:

As mentioned above, large fires have been part of the southern California landscape for millennia. Researchers have determined that Native Americans in California used fire to reduce fuel load and improve their ability to hunt and forage. It is estimated that as much as 12 percent of the State was burned every year by the various tribes (Coleman, 1994). 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, burned over half a million acres. In the early 20th century, as development started to encroach onto the foothills, wildfires came to be unacceptable as they posed a hazard with the potential loss of property and even life. As a result, in the early 1920s, the fire service began to prevent wildfires from occurring. Unfortunately, over time, this led to an increase in fuel loads. Wildfires that impact areas with fuel buildup are more intense and significantly more damaging to the ecosystem than periodic, low-intensity fires. The 20 largest historic fires in California for the time period between 1961 and 2003 are listed in Table 7.1 below.

Table 7.1: Large Historic Fires in California for the period 1961-2003
(in order of number of structures damaged)

	Fire Name	Date	County	Acres	Structures	Deaths
1	Tunnel	October 1991	Alameda	1,600	2,900	25
2	Cedar	October 2003	San Diego	273,246	2,820	14
3	Old	October 2003	San Bernardino	91,281	1,003	6
4	Jones	October 1999	Shasta	26,200	954	1
5	Paint	June 1990	Santa Barbara	4,900	641	1
6	Fountain	August 1992	Shasta	63,960	636	0
7	City of Berkeley	September 1923	Alameda	130	584	0
8	Bel Air	November 1961	Los Angeles	6,090	484	0
9	Laguna Fire	October 1993	Orange	14,437	441	0
10	Paradise	October 2003	San Diego	56,700	415	2
11	Laguna	September 1970	San Diego	175,425	382	5
12	Panorama	November 1980	San Bernardino	23,600	325	4
13	Topanga	November 1993	Los Angeles	18,000	323	3
14	49er	September 1988	Nevada	33,700	312	0
15	Simi	October 2003	Ventura	108,204	300	0
16	Sycamore	July 1977	Santa Barbara	805	234	0
17	Canyon	September 1999	Shasta	2,580	230	0
18	Kannan	October 1978	Los Angeles	25,385	224	0
19	Kinneloa	October 1993	Los Angeles	5,485	196	1
19	Grand Prix	October 2003	San Bernardino	59,448	196	0
20	Old Gulch	August 1992	Calaveras	17,386	170	0

http://www.fire.ca.gov/FireEmergencyResponse/HistoricalStatistics/PDF/20LSTRUCTURES.pdf
"Structures" is meant to include all loss - homes and outbuildings, etc.

The 2003 Southern California Fires:

The fall of 2003 marked the most destructive wildfire season in California history (in terms of acreage burned). In a ten-day period, 12 separate fires raged across southern California in Los Angeles, Riverside, San Bernardino, San Diego and Ventura counties. The massive "Cedar" fire

in San Diego County alone consumed 2,800 homes and burned over a quarter of a million acres (see Table 7.2).

Table 7.2: 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

The 2003 California fires caused an estimated $975 million in damages, a significant loss. Yet, this loss is still below the cost of fighting fires in previous years at the national level. For example, during the 2002 fire season, more than 6.9 million acres of public and private lands burned in the United States, resulting in loss of property, damage to resources and disruption of community services. Taxpayers spent more than $1.6 billion to combat more than 88,400 fires nationwide. Many of these fires burned in wildland/urban interface areas and exceeded the fire suppression capabilities of those areas. Similar losses were reported in the year 2000. Table 7.3 summarizes the fire suppression costs for state, private and federal lands for the years 2000 through 2002.

Table 7.3: National Fire Suppression Costs

Year	Suppression Costs	Acres Burned	Structures Burned
2000	$1.3 billion	8,422,237	861
2001	$0.5 billion	3,570,911	731
2002	$1.6 billion	6,937,584	815

http://research.yale.edu/gisf/assets/pdf/ppf/wildfire_report.pdf

Wildfire Characteristics

There are three categories of interface fire: The **classic** wildland/urban interface occurs where well-defined urban and suburban development presses up against open expanses of wildland areas; the **mixed** wildland/urban interface characterized by isolated homes, subdivisions and small communities situated predominantly in wildland settings; and the **occluded**

wildland/urban interface where islands of wildland vegetation occur inside a largely urbanized area. Certain conditions must be present for significant interface fires to occur. The most common conditions include: hot, dry and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, several conditions influence its behavior, including fuel, topography, weather, and degree of development, including dwelling density and accessibility, building construction (with emphasis on the use of fire-retardant construction materials and combustible roofs), and the availability of local mitigation measures and resources (such as nearby fire stations, fire hydrants, roads, fuel modification zones, fire sprinklers in structures, etc.). The most significant of these conditions are discussed further below.

- **The Interface:** One challenge southern California faces regarding its wildfire hazard is the result of the increasing number of houses being built at the urban/wildland interface. Every year the growing population has expanded farther and farther into the hills and mountains, including forest lands. The increased "interface" between urban/suburban areas and the open spaces created by this expansion have produced a significant increase in threats to life and property from fires, and have pushed existing fire protection systems beyond original or current design and capability. Property owners in the interface are not aware of the problems and threats they face. Therefore, many owners have done very little to manage or offset the fire hazards on their own properties. Furthermore, human activities increase the incidence of fire ignition and potential damage.

- **Fuel:** Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is classified by volume and by type. Volume is described in terms of "fuel loading," or the amount of available vegetative fuel.

  The type of fuel also influences wildfire. Southern California has two distinct areas of risk for wildland fire: 1) The foothills and lower mountain areas most often covered with scrub brush or chaparral, and 2) the forested terrain at higher elevations, in the mountains.

  Chaparral is a primary fuel of southern California wildfires. In southern California, chaparral habitat ranges in elevation from near sea level to over 5,000 feet. Chaparral communities experience long dry summers and receive most of their annual precipitation from winter rains. Although chaparral is often considered as a single species, there are two distinct types: hard chaparral and soft chaparral. Within these two types are dozens of different plants, each with its own particular characteristics.

  Chaparral communities have evolved so that they require fire to spawn regeneration. Many species invite fire through the production of plant materials with large surface-to-volume ratios, volatile oils and periodic die-back of vegetation. These species have further adapted to display special reproductive mechanisms following fire. For example, several species produce vast quantities of seeds which lie dormant until fire triggers germination. The parent plant which produces these seeds defends itself from fire with a thick layer of bark that allows enough of the plant to survive so that the plant can crown sprout following the blaze. In general, chaparral community plants have adapted to fire through the following methods: a) fire induced flowering, b) bud production and sprouting subsequent to fire, c) in-soil seed storage and fire-stimulated germination, and d) on-plant seed storage and fire-stimulated dispersal.

Chaparral vegetation creates one type of exposure, with fires burning through an area rather quickly, and typically at lower temperatures than forest fires. Studies also suggest that prescribed burning programs of chaparral-covered areas are not effective in halting shrubland fires; under Santa Ana wind conditions, fires carry through all chaparral regardless of age of the vegetation stands (Dr. John Keeley, USGS fire researcher).

Forest fires pose a higher risk to the urban/widland interface, as exemplified by the 2003 fires. The magnitude of these fires was the result of three primary factors: 1) severe drought, accompanied by a series of storms that produced thousands of lightning strikes and windy conditions; 2) an infestation of bark beetles that has killed thousands of mature trees in the area; and 3) the effects of wildfire suppression over the past century that has led to buildup of brush and small-diameter trees in the forests. Our forests today are significantly denser than they were in the not too-distant past: Lewis and Clark, on their exploration of the American Northwest, reported that forest were relatively open, with 20 to 25 mature trees per acre; forest density was controlled by lightning-started fires that would sweep through clearing out the underbrush and small trees. Today's forests typically have 300 to 400 mature trees to an acre, along with thick underbrush. This density makes trees susceptible to disease, and less drought- and fire-resistant. The thick under-story causes forest fires to burn intensely, which destroys the mature trees, so that damaged forest take decades to recover, rather than a few years. Unfortunately, this change in our forests is the result of the well-intentioned but misguided forest management programs started in the 1920s.

An important element in understanding the danger of wildfire is the availability of diverse fuels in the landscape, such as natural vegetation, manmade structures and combustible materials. A house surrounded by brushy growth rather than cleared space allows for greater continuity of fuel and increases the fire's ability to spread. After decades of fire suppression "dog-hair" thickets have accumulated, which enable high intensity fires to flare and spread rapidly.

- **Topography:** Topography influences the movement of air, thereby directing a fire course. For example, if the percentage of uphill slope doubles, the rate of spread in wildfire will likely double. Gulches and canyons can funnel air and act as chimneys, which intensify fire behavior and cause the fire to spread faster. Solar heating of dry, south-facing slopes produces up-slope drafts that can complicate fire behavior. Unfortunately, hillsides with hazardous topographic characteristics are also desirable residential areas in many communities. This underscores the need for wildfire hazard mitigation and increased education and outreach to homeowners living in interface areas.

  Although Glendale is a highly urbanized community, there are several large areas in the city that consist of undeveloped, grass- and chaparral-covered hillsides and mountains. The Verdugo Mountains, located in the western section of the city, are more than 2,300 feet higher in elevation than the valley floor. Similarly, at their highest point, the San Rafael Hills rise more than 1,200 feet above the alluvial plain in the eastern section of the city. The San Gabriel Mountains to the north have an elevation gain of as much as 2,700 feet within City limits. The rough topography that characterizes these areas not only facilitates the spread of fire but also impedes or hinders responding fire-fighting personnel and equipment. Traffic congestion in the urban areas and long travel distances and narrow, winding roads in the hillsides and mountains can also hinder fire department response to the urban-wildland interface areas. Thus, enhanced onsite protection for structures and people in or adjacent to these undeveloped areas is

absolutely necessary, with property owners assuming responsibility for maintenance of their properties and adhering to construction standards that make their houses more fire-resistant.

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- **Weather:** Weather patterns combined with certain geographic locations can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30 inches per year are extremely fire susceptible. High-risk areas in southern California share a hot, dry season in late summer and early fall when high temperatures and low humidity favor fire activity. The so-called "Santa Ana" winds, which are heated by compression as they flow southwestward from Utah to southern California, create a particularly high risk, as they can rapidly spread what might otherwise be a small fire.

  The Glendale area typically has mild, wet winters that lead to an annual growth of grasses and plants. This vegetation dries out during the hot summer months and is exposed to Santa Ana wind conditions in the fall. During Santa Ana conditions, winds in excess of 40 miles per hour (mph) are typical; gusts in excess of 100 mph may occur locally. Santa Ana winds are generally consistent in their direction, but when combined with winds generated from burning vegetation, the wind direction generally becomes extremely erratic. This can stress fire-fighting resources and reduce fire-fighting success.

  Recent concerns about the effects of climate change, particularly drought, are contributing to concerns about wildfire vulnerability. The term drought is applied to a period in which an unusual scarcity of rain causes a serious hydrological imbalance. Unusually dry winters, or significantly less rainfall than normal, can lead to relatively drier conditions and leave reservoirs and water tables lower. Drought leads to problems with irrigation and may contribute to additional fires, or additional difficulties in fighting fires.

- **Urban Development:** Growth and development in scrubland and forested areas is increasing the number of human-made structures in the interface areas of southern California. Wildfire has an effect on development, yet development can also influence wildfire. Owners often prefer homes that are private, have scenic views, are nestled in vegetation and use "natural" construction materials. A private setting may be far from public roads, or hidden behind a narrow, curving driveway. These conditions, however, make evacuation and fire fighting difficult. The scenic views found along mountain ridges can also mean areas of dangerous topography. Natural vegetation contributes to scenic beauty, but it may also provide a ready trail of fuel leading a fire directly to the combustible fuels of the home itself.

  In Glendale, some hillside areas have a historical legacy of narrow roads, difficult access, insufficient water supplies, and non-rated flammable building construction. Furthermore, an increasing number of people use the surrounding undeveloped areas for recreation purposes, and as a result, there is an increased potential for fires to be accidentally or purposely set in the difficult-to-reach portions of the city.

Wildfire Hazard Identification

Wildfire hazard areas are commonly identified at the wildland/urban interface. Ranges of the wildfire hazard are further determined by the ease of fire ignition due to natural or human conditions and the difficulty of fire suppression. The wildfire hazard is also magnified by several factors related to fire suppression/control such as the surrounding fuel load, weather, topography and property characteristics. Generally, hazard identification rating systems are based on weighted factors of fuels, weather and topography. Since the early 1970s, several fire

hazard assessment systems have been developed for the purpose of identifying and quantifying the severity of the hazard in a given area. Those that have been developed or used in California are described further below. Early systems characterized the fire hazard of an area based on a weighted factor that typically considered fuel, weather and topography. More recent systems rely on the use of Geographic Information System (GIS) technology to integrate the factors listed above to map the hazards, and to predict fire behavior and the impact on watersheds.

- **HUD Study System:** In April 1973, the California Department of Forestry and Fire Prevention (CDF) published a study funded by the Department of Housing and Urban Development (HUD) under an agreement with the Governor's Office of Planning and Research (Helm et al., 1973). As is often the case, the study was conducted in response to a disaster: during September and October 1970, 773 wildfires burned more than 580,000 acres of California land. The HUD mapping process relied on information obtained from US Geological Survey (USGS) 15- and 7.5-minute quadrangle maps on fuel loading (vegetation type and density) and slope, and combined it with fire weather information to determine the Fire Hazard Severity of an area.

- **California Department of Forestry and Fire Protection – State Responsibility Areas System**: Legislative mandates passed in 1981 (Senate Bill 81, Ayala, 1981) and 1982 (Senate Bill 1916, Ayala, 1982) that became effective on July 1, 1986, required the CDF to develop and implement a system to rank the fire hazards in California. Areas were rated as moderate, high or very high based primarily on fuel types. Thirteen different fuel types were considered using the 7.5-minute quadrangle maps by the US Geological Survey as base maps (Phillips, 1983). Areas identified as having a fire hazard were referred to as **State Responsibility Areas** (SRAs) (Public Resources Code Section 4125). These are non-federal lands covered wholly or in part by timber, brush, undergrowth or grass, for which the State has the primary financial responsibility of preventing and suppressing fires.

- **Bates Bill Process:** The Bates Bill (Assembly Bill 337, September 29, 1992) was a direct result of the great loss of lives and homes in the Oakland Hills Tunnel Fire of 1991. Briefly, the California Department of Forestry and Fire Protection (CDF), in cooperation with local fire authorities was tasked to identify Very High Fire Hazard Severity Zones (VHFHSZs) in Local Responsibility Areas (LRAs). To accomplish this, the CDF formed a working group comprised of state and local representatives that devised a point system that considers fuel (vegetation), slope, weather, and dwelling density. To qualify as a VHFHSZ, an area has to score ten or more points in the grading scale.

  Once the boundaries of a VHFHSZ have been delineated, the CDF notifies the local fire authorities that are responsible for fire prevention and suppression within that area. Since the State is not financially responsible for Local Responsibility Areas, local jurisdictions have final say regarding whether or not an area should be included in a VHFHSZ (Government Code Section 51178). As a result, although several areas in California have adopted the State-developed fire hazard maps, many local jurisdictions did not acknowledge the Bates system, and developed their own maps instead. Local jurisdictions that do not follow the Bates system are required to follow at a minimum the model ordinance developed by the State Fire Marshal for mitigation purposes. The City of Glendale is one of the cities that has developed its own fire hazard map and has adopted stringent hazard mitigation programs that have often been years ahead of State regulations. This will be discussed further in the following sections of this report.

- **California Fire Plan**: The 1996 California Fire Plan is a cooperative effort between the State Board of Forestry and Fire Protection and the CDF (California Board of Forestry, 1996). This system ranks the fire hazard of the wildland areas of the State using four main criteria: fuels, weather, assets at risk, and level of service (which is a measure of Fire Department's success in initial-attack fire suppression). The California Fire Plan uses GIS data layers to conduct the initial evaluations, and local CDF Ranger Units are then tasked with field validation of the initial assessment. The final maps use a Fire Plan grid cell with an area of approximately 450 acres, which represents 1/81 of the area of a 7.5-minute quadrangle map (called Quad 81). The fire hazard of an individual cell is ranked as moderate, high or very high. This system is expected to replace the current State Responsibility Areas process, but at the time of this writing, the California Fire Plan has not been implemented. For additional information regarding this system refer to http://www.fire.ca.gov/FireEmergencyResponse/FirePlan/FirePlan.asp.

- **FireLine System**: The Insurance Services Office (ISO) developed a program used by the insurance industry to identify those areas where the potential loss due to wildfire is greatest (ISO, 1997). ISO retained Pacific Meridian Resources of Emeryville, California to develop the FireLine software, which uses satellite-imagery interpretation to evaluate the factors of fuel types, slope and roads (access) to develop the risk rating. Most insurance companies that provide insurance services to homeowners in California now use this system. This software is only available through ISO. Updated versions of this system are being developed that include the factors of elevation, aspect, and relative slope position.

- **National Fire Plan**: Funding for the National Fire Plan was authorized by Congress in October 2000 in response to the wildfires of that year. The plan is a cooperative effort of the US Department of Agriculture's Forest Service, the Department of the Interior, and the National Association of State Foresters. National Fire Plan maps show communities that are within the vicinity of federal lands that are at high risk from wildland fire. The plan uses hazardous fuel reduction treatment techniques (including prescribed fire alone, mechanical treatment alone, mechanical treatment plus prescribed fire, and other/wildland fire use, such as allowing lightning-caused fires to burn) to reduce the impact of wildland fire on communities within the urban-wildland interface. For additional information refer to http://www.fireplan.gov/.

  A major component of the National Fire Plan is funding for projects designed to reduce fire risks in developed areas and at the urban/wildland interface. A fundamental step in realizing this goal was the identification of areas that are at high risk of damage from wildfire. Federal fire managers authorized State Foresters to determine which communities were under significant risk for wildland fire on Federal lands. The CDF undertook the task of generating the state's list of communities at risk. With California's extensive Wildland-Urban Interface situation, the list of communities extends beyond just those on Federal lands. The CFA has identified 1,264 fire-threatened communities in California, one of which is Glendale. For additional information refer to http://www.cafirealliance.org/.

- **FARSITE, BEHAVEPlus and FlamMap**: These are PC-based programs that can be used by local fire managers to calculate potential fire behavior in a given area using GIS data inputs for terrain and fuels. The purpose of these models is to predict fire behavior. Data inputs that can be used in the analyses include elevation, slope, aspect, surface fuel, canopy cover, stand height, crown base height and crown bulk density.

The oldest of these models is the BEHAVE Fire Behavior Prediction and Fuel Modeling System (Burgan and Rothermel, 1984; Burgan, 1987; Andrews, 1986; Andrews and Chase, 1989; Andrews and Bradshaw, 1991) that has been used since 1984. A newer version of it is referred to as the BehavePlus Fire Modeling System (Andrews and Bevins, 1999). This software is undergoing additional updates to make it more user- friendly and provide additional fire modeling capabilities. FARSITE (Finney, 1995, 1998) "simulates the growth and behavior of a fire as it spreads through variable fuel and terrain under changing weather conditions" (http://fire.org/cgi-bin/nav.cgi?pages=JFSP&mode=9). This software can be used to project the growth of ongoing wildfires and prescribed fires, and can be used as a planning tool for fire suppression and prevention, and fuel assessment. The FlamMap fire behavior mapping and analysis system is still under preparation, although a prototype has been released and is being used for the Tahoe Basin project (http://fire.org/cgi-bin/nav.cgi?pages=JFSP&mode=11). FlamMap combines elements of the two older models. The Glendale Fire Department is considering the use of some of these computer models to simulate fire conditions and predict fire behavior in the fire hazard areas of the city.

- **Brian Barrette's Structural Vulnerability System**: This system starts with the State Responsibility Area fire hazard severity rating described above, but also includes structural elements as rating factors (Barrette, 1999). The structural elements considered include roofing, siding, vegetation clearance, roads and signage, chimneys, structural accessories, water supply, and the location of the structure in relation to the surrounding conditions (see Table 7.4, below). Under this system, a score of 3 equals the most danger, whereas a score of 1 equals the least danger). This system is intended for use in assessing individual parcels, and is therefore not likely to be used by agencies, as it is time- and personnel-intensive. However, the system is easy to use and can therefore be used by individual homeowners or insurance companies to determine whether or not a specific property has a high fire hazard and is therefore a good candidate for specific fire hazard mitigation measures.

Table 7.4: Sample Hazard Identification Rating System

Category	Indicator	Rating
Roads and Signage	Steep; narrow; poorly signed	3
	One or two of the above	2
	Meets all requirements	1
Water Supply	None, except domestic	3
	Hydrant, tank, or pool over 500 feet away	2
	Hydrant, tank, or pool within 500 feet	1
Location of the Structure	Top of steep slope with brush/grass below	3
	Mid-slope with clearance	2
	Level with lawn, or watered groundcover	1

Exterior Construction	Combustible roofing, open eaves, Combustible siding	3
	One or two of the above	2
	Non-combustible roof, boxed eaves, non-combustible siding	1

As discussed above, in order to determine the "base hazard factor" of specific wildfire hazard sites and interface regions, several factors must be taken into account. Categories used to assess the base hazard factor include:

- ✓ Topographic location, characteristics and fuels;
- ✓ Site/building construction and design;
- ✓ Site/region fuel profile (landscaping);
- ✓ Defensible space;
- ✓ Accessibility;
- ✓ Fire protection response; and
- ✓ Water availability.

The use of Geographic Information System (GIS) technology in recent years has been a great asset to fire hazard assessment, allowing further integration of fuels, weather and topography data for such ends as fire behavior prediction, watershed evaluation, mitigation strategies and hazard mapping.

Vulnerability and Risk

As discussed previously, the city of Glendale is considered at risk from wildfire by the California Department of Forestry. Furthermore, the Glendale Fire Department rates almost two-thirds of the city as highly susceptible to wildland fires. The High Fire Hazard Areas in the city defined by the Glendale Fire Department are shown on Map 7.2 (and Plate H-7). These areas are based on vegetation, access, zoning and topography.

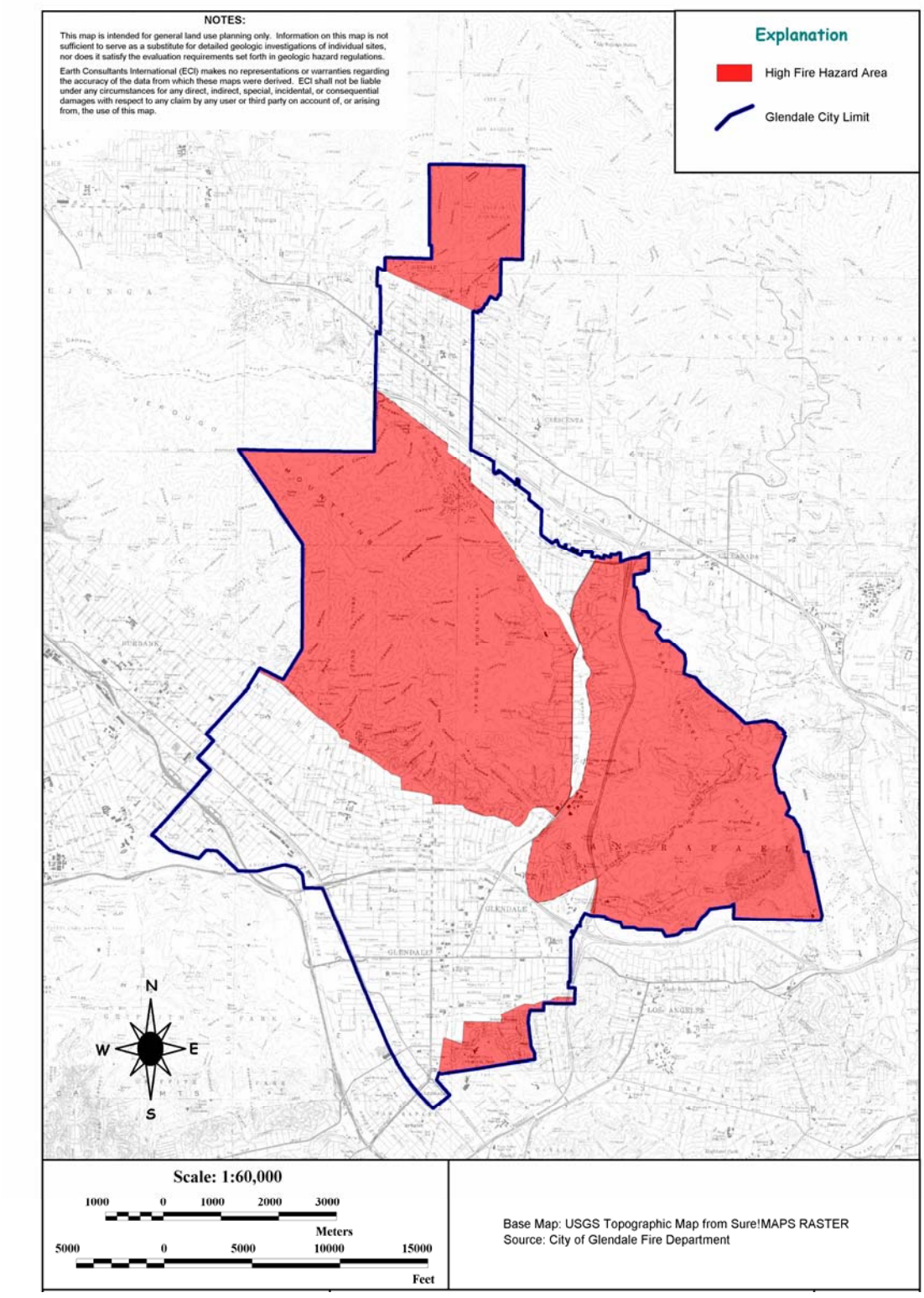
Notice that the Glendale Fire Department, consistent with the Bates Bill process described above, does not classify the fire hazard of an area as low, medium, high or extreme, but rather, a property is either in the fire hazard area, or it is not. [The City's High Fire Hazard Area includes all areas with a medium, high or extreme brush fire hazard as delineated in the City's 1975 Safety Element.] The reason for this yes - no approach is that California State law requires that fire hazard areas be disclosed in real estate transactions; that is, real-estate sellers are required to inform prospective buyers whether or not a property is located within a wildland area that could contain substantial fire risks and hazards [Assembly Bill 6; Civil Code Section 1103(c)(6)]. Real-estate disclosure requirements are important because in California the average period of ownership for residences is only five years (Coleman, 1994). This turnover creates an information gap between the several generations of homeowners in fire hazard areas: Uninformed, new homeowners may attempt landscaping or structural modifications that could be a detriment to the fire-resistant qualities of the structure, with negative consequences.

A vulnerability assessment of the interface areas of the city at risk from wildfire requires knowledge about the population and total value of the property at risk, and an estimate of the area that would be impacted by the fire. Other key factors that need to be considered in the assessment of wildfire risk include ignition sources, building materials and design, community design, structural density, slope, vegetative fuel, fire occurrence and weather, as well as whether or not the area is experiencing a drought, and if it is, how long have drought conditions persisted. The National Wildland/Urban Fire Protection Program has developed the Wildland/Urban Fire Hazard Assessment Methodology tool for communities to assess their

risk to wildfire. For more information on wildfire hazard assessment refer to http://www.firewise.org.

Unlike an earthquake, which has the potential to impact the entire region, wildfires at the urban/wildland interface are often contained thanks to the heroic efforts of the local fire departments, in some cases with help from other regional, State, and Federal agencies. However, as discussed above, there are now some computer models available (FARSITE, BEHAVEPlus, and FlamMap) that, given reasonable inputs regarding slope, wind, fuel availability, moisture conditions, and other parameters, can be used to forecast the area that would be impacted. Once the impacted area is determined, a risk assessment that looks at the population and property within that area can be conducted, from which loss estimates can be calculated.

Map 7.2: Fire Hazard Zones in Glendale



Community Wildfire Issues

What is Susceptible to Wildfire?

The hills and mountainous areas of southern California are considered to be at the urban/wildland interface. The development of homes and other structures has encroached and will continue to encroach onto the wildlands, expanding the urban/wildland interface areas. The neighborhoods at the interface are characterized by a diverse mixture of housing structures, development patterns, ornamental and natural vegetation, and natural fuels. In the event of a wildfire, this diverse mixture of vegetation, structures and development patterns, compounded by the local topography and weather at that specific time, can result in an unwieldy and unpredictable fire. Factors important in fighting of such fires include access, firebreaks, proximity of water sources, distance from a fire station and available firefighting personnel and equipment. A review of past urban/wildland interface fires has shown that many structures are destroyed or damaged for one or more of the following reasons:

- ✓ Combustible roofing material;
- ✓ Wood construction;
- ✓ Structures with no defensible space;
- ✓ Fire department with poor access to structures;
- ✓ Subdivisions located in heavy natural fuel types;
- ✓ Structures located on steep slopes covered with flammable vegetation;
- ✓ Limited water supply; and
- ✓ Winds over 30 miles per hour.

Road Access:
Road access is a major issue for all emergency service providers. As development has encroached into the rural areas of the county, the number of houses without adequate turn-around space has increased. In many single-family residential neighborhoods, there is not adequate space for emergency vehicle turnarounds, hindering emergency workers' access to the houses at risk. Narrow winding roads with inadequate turn-around space are particularly challenging as fire trucks are too long to maneuver in these roads. In these cases, fire fighters may evacuate the property owners and then leave themselves, unable to safely remain to save the threatened structures.

Fires at the urban-wildland interface tend to move quickly, with most of the damage or losses generally occurring in the first few hours after the fire starts (Coleman, 1994). Therefore, access to the urban-wildland interface for the purposes of emergency response is critical. This requires streets that meet minimum access and egress requirements so that they can be traversed by fire apparatus. The Glendale Municipal Code includes minimum width standards for local streets and width and length standards for cul-de-sacs. The Glendale Fire Code (Volume VI, Article 10, Section 10.207) requires an all-weather surface roadway with a minimum width of 20 feet (without parking) that can support loads of 55,000 pounds, minimum 13-feet 6-inches of vertical clearance, a grade that does not exceed 12 percent, and an approved turnaround when in excess of 150 feet in length. Chapter 28, Section 28-59 of the Municipal Code stipulates that any local street or cul-de-sac street that is abutted by more than ten residences shall be no less than 24 feet wide from curb to curb, within a 28-foot wide dedication. The length of cul-de-sacs is regulated based on the number of dwelling units and distance from the point of dual access, but the maximum distance for dead-end or no-outlet streets is 2,600 feet. In fire hazard areas, easy access for fire equipment shall be provided.

Unfortunately, many streets in the hillside areas of Glendale are of insufficient width because they were built prior to the development of the current standards. Several other roads are non-

compliant because they are dead-end streets more than 1/2-mile long, or do not have a turnaround at their end. There are several non-compliant residential streets off of East Chevy Chase Drive, and in the southeastern corner of the city, off of Adams Street. Several other roads in the eastern and southern Verdugo Mountains are also narrow and do not have proper turnarounds. The streets that do not meet Glendale's Municipal Code requirements are shown on Plate 4-3. Although not shown on the map, the City's Fire Department also considers the east end of Glenoaks Boulevard, east of the Glendale Freeway as a potentially hazardous road because it does not have a secondary outlet. A wildland fire, earthquake or another disaster in the area could place a substantial number of people at risk of not being able to evacuate this neighborhood if and when necessary.

Water Supply:
Fire fighters at the urban/wildland interface may be faced by limited water supply and lack of hydrant taps. Rural areas are characteristically outfitted with small-diameter pipe water systems, inadequate for providing sustained fire-fighting flows.

Areas at higher elevations may also be serviced by water that is pumped up to the higher elevations. In the event of a fire, there may be insufficient water pressure to do so. Emergency water storage is also critical, especially when battling large wildland fires. During the 1993 Laguna Beach (Orange County) fire, "water streams sprayed on burning houses sometimes fell to a trickle" (Orange County Fire Department, 1994), primarily because most water reservoirs in Laguna were located at lower elevations, and the water district could not supply water to the higher elevations as fast as the fire engines were using it. Leaks and breaks in the water distribution system, including leaking irrigation lines and open valves in destroyed homes also reduced the amount of water available to the fire fighters. A seven-day emergency storage supply is recommended, especially in areas likely to be impacted by fires after earthquakes, due to the anticipated damage to the main water distribution system as a result of ground failure due to fault rupture, liquefaction, or landsliding.

Interface Fire Education Programs and Enforcement:
Fire protection in urban/wildland interface areas relies more heavily on landowners taking measures personally to protect their properties. Property owners are more likely to take the initiative if they are informed of the risk. Therefore, public education and awareness should play a greater role in interface areas. In those areas with strict fire codes, property owners who resist maintaining the minimum brush clearances on their property should be cited for failure to clear brush.

The Need for Mitigation Programs:
Continued development into the urban/wildland interface will have a growing impact on the wildfire risk of the area. Wildfires in southern California occur periodically, often with catastrophic results, with the history of deadly and expensive fires going back decades, if not a century. Continued growth and development underscores the increased need for natural hazards mitigation planning in southern California.

Fires After an Earthquake – The Threat of Urban Conflagration:

Although this section deals primarily with the hazard of wildfires, there is another type of fire hazard that needs to be addressed. Specifically, large fires following an earthquake in an urban region, although rare, have the potential to cause great losses. The two largest peace-time urban fires in history, the 1906 San Francisco and 1923 Tokyo, were both caused by earthquakes. The conflagration in San Francisco after the 1906 earthquake was the single largest urban fire, and the single largest earthquake loss, in U.S. history. Three days of fires consumed more than 28,000 buildings within a 12-square-kilometer area. The cost is staggering: $250 million in 1906 dollars, or about $5 billion at today's prices. Although the

threat that existed in San Francisco was and is far greater than that in Glendale today, there are some sections of Glendale where, due to ground failure as a result of either fault rupture or liquefaction, breaks in the gas mains and the water distribution system could lead to a significant fire-after-earthquake situation. Refer to the maps in Appendix H for information regarding those areas of the city susceptible to surface fault rupture and liquefaction.

The 1989 Loma Prieta earthquake, the 1994 Northridge earthquake, and the 1995 Kobe, Japan earthquake all demonstrate the current, real possibility of a fire-following-an earthquake developing into a conflagration. In the United States, all the elements that would hamper fire-fighting capabilities are present: density of wooden structures, limited personnel and equipment to address multiple fires, debris blocking the access of fire-fighting equipment, and a limited water supply.

Of the examples above, let's look at the earthquake closest to home. The moderately sized, M6.7 Northridge earthquake of 1994 caused several structural fires, many the result of broken gas mains: the earthquake caused 15,021 natural gas leaks that resulted in three street fires, 51 structural fires (23 of these caused total ruin) and the destruction by fire of 172 mobile homes. In one incident, the earthquake severed a 22-inch gas transmission line and a motorist ignited the gas while attempting to restart his stalled vehicle. Response to this fire was impeded by the earthquake's rupture of a water main; five nearby homes were destroyed. Elsewhere, one mobile home fire started when a downed power line ignited a ruptured transmission line. In many of the destroyed mobile homes, fires erupted when inadequate bracing allowed the homes to slip off their foundations, severing gas lines and igniting fires. There was a much greater incidence of mobile home fires (49.1 per thousand) than other structure fires (1.1 per thousand).

The damages from the 1994 earthquake reminded researchers of the findings of a study published in 1988 by the California Division of Mines and Geology (Toppozada and others, 1988). This study identified projected damages in the Los Angeles area as a result of an earthquake on the Newport-Inglewood fault. The earthquake scenario estimated that thousands of gas leaks would result from damage to pipelines, valves and service connections. This study prompted the Southern California Gas Company to start replacing their distribution pipelines with flexible plastic polyethylene pipe, and to develop ways to isolate and shut off sections of supply lines when breaks are severe. Nevertheless, as a result of the 1994 Northridge earthquake, the Southern California Gas Company reported 35 breaks in its natural gas transmission lines and 717 breaks in distribution lines. About 74 percent of its 752 leaks were corrosion related. Furthermore, in the aftermath of the earthquake, 122,886 gas meters were closed by customers or emergency personnel. Thankfully, most of the leaks were small and could be repaired at the time of service restoration, but the costs and time associated with these repairs were considerable.

History indicates that fires following an earthquake have the potential to severely tax the local fire suppression agencies, and develop into a worst-case scenario. Earthquake-induced fires can place extraordinary demands on fire suppression resources because of multiple ignitions. The principal causes of earthquake-related fires are open flames, electrical malfunctions, gas leaks, and chemical spills. Downed power lines may ignite fires if the lines do not automatically de-energize. Unanchored gas heaters and water heaters are common problems, as these readily tip over during strong ground shaking (State law now requires new and replaced gas-fired water heaters to be attached to a wall or other support).

Many factors affect the severity of fires following an earthquake, including ignition sources, types and density of fuel, weather conditions, functionality of the water systems, and the ability of firefighters to suppress the fires. Casualties, debris and poor access can all limit fire-fighting effectiveness. Water availability in Los Angeles County following a major earthquake will most

likely be curtailed due to damage to the water distribution system — broken water mains, damage to the aqueduct system, damage to above-ground reservoirs, etc.

Loss-estimation scenarios were conducted for the city of Glendale using HAZUS. Specifics of this analysis are discussed in detail in Section 6 – Earthquakes. Five different earthquake scenarios were considered for the city. The results of these loss estimations indicate that Glendale could experience between 3 and 11 ignitions immediately following an earthquake, with the San Andreas fault earthquake scenario triggering 3 ignitions, and the Verdugo and Sierra Madre faults triggering 11 ignitions each. The Raymond and Hollywood faults are both expected to trigger 10 ignitions in the city. The burnt area resulting from these ignitions will vary depending on wind conditions. Normal wind conditions of about 10 miles per hour (mph) are expected to result in burn areas of between 1.9 and 6.7 percent of the region's total area. If Santa Ana wind conditions are present at the time of the earthquake, the burnt areas can be expected to be significantly larger.

The fires triggered by an earthquake on the San Andreas fault are anticipated to displace as few as 30 people (if the winds are low), and as many as 308 people (if 30 mph winds are blowing through the area at the time). The fires triggered by the other earthquake scenarios are expected to impact between 116 and 354 people (if winds are low), and as many as 2,047 to 2,919 people (if 30 mph winds are present).

Wildfire Mitigation Activities:

Hazard mitigation programs in fire hazard areas currently include fire prevention, vegetation management, legislated construction requirements, and public awareness. Each of these programs is described further below.

Fire Prevention: Fire prevention aims to reduce the incidence and extent of fire by preventing wildfires from occurring in the first place. Over the years, a variety of fire prevention programs have been developed and implemented by Federal, State, and local agencies. These programs typically include education, engineering, patrolling, code enforcement, and signing (Greenlee and Sapsis, 1996). Smokey Bear is one of the best-known characters that both children and adults recognize, attesting to the success of public education programs aimed at fire prevention. Quantitative studies show that fire losses arising from human fires, especially those caused by children, have dropped substantially over the last 30 years or so, in some cases by as much as 80 percent (Greenlee and Sapsis, 1996). Therefore, fire prevention is a well-understood program with a high degree of success. However, as discussed above, by preventing fire from occurring, fuel loads are allowed to increase, with the potential for high intensity fires and resultant damage. Therefore, fire prevention needs to be complemented with a variety of other programs that will guarantee long-term success in reducing the losses resulting from fires.

Fire Prevention can include limiting access to fire hazard areas during certain times of the year. Although not apparent from Map 7.2, the wildfire susceptibility of an area changes throughout the year, and from one year to the next, in response to local variations in precipitation, temperature, vegetation growth, and other conditions. When the fire danger in a High Fire Hazard Zone is deemed to be of special concern, local authorities can rely on increased media coverage and public announcements to educate the local population about being fire safe. For example, to reduce the potential for wildfires during fire season, the City of Glendale can opt to close hazardous fire areas to public access during at least part of the year. By monitoring site-specific wildfire susceptibility of a region, the Fire Department can establish regional prevention priorities that help reduce the risk of wildland fire ignition and spread, and help improve the allocation of suppression forces and resources, which can lead to faster control of fires in areas of high concern.

Restricted public access to hiking trails in and around the city of Glendale during the fire season may help reduce the opportunity for human-caused wildfires in the area. Continued use of signs during high and extreme fire conditions along the freeways and roads that cut through the wildland areas in the city and adjacent areas can also help reduce the fire hazard by alerting and educating motorists and residents.

The City of Glendale has a variety of fire prevention programs in place. Routine (annual or bi-annual) fire prevention inspections are conducted on a citywide basis by the Fire Department for residential, commercial, and industrial-type occupancies. The Fire Prevention Bureau of the City's Fire Department inspects all new and existing public assemblies, educational facilities, institutions and hospitals, high-rise buildings, hazardous materials occupancies, malls and large retail centers, and all new residential dwellings (Glendale Fire Department, 1994). The inspections are conducted for the purpose of enforcing the Fire Code and hazardous materials regulations, for Fire Department personnel from within that jurisdictional area to become familiar with the premises (this is helpful in the event that they need to respond to a fire or emergency), and to instruct occupants about fire prevention methods and procedures. The Neighborhood Services Section of the Community Development Department provides assistance with the inspection of single-family residential dwellings as part of a community-wide beautification program. All personnel that conduct these surveys have received training in hazard recognition from the Fire Department.

Glendale's Fire Prevention Bureau is comprised of several different units, each with specific responsibilities. Fire Prevention Bureau members have the powers of a peace officer in enforcing the City's Fire Code. The responsibilities of each unit are described further below:

- Fire Code Inspection – conducts inspections of all new and existing structures.
- Development Plan Review – reviews proposed developments for conformance with fire protection requirements including fire-resistive construction, landscaping, emergency access, available fire flow, and built-in fire detection and suppression systems.
- Fire Investigation and Arson – investigates fire cause and origin, administers aggressive code enforcement, and analyzes cost recovery for negligent or malicious acts causing fire. All members of this unit have full police powers as set in California Penal Code Section 832 (Section 103.2.2.3 of the City's Building and Safety Code).
- Vegetation Management – reviews existing properties for compliance with fuel management requirements; administers and enforces the weed abatement and brush clearance program, and contracts for fire hazard reduction measures, including fuel breaks, fire roads, and non-compliant parcels.
- Hazardous Materials and Waste Management – administers hazardous materials disclosure laws and legislation, as well as conducts inspection of underground storage tanks and facilities that use or store hazardous materials for environmental compliance.
- Public Education – provides public fire safety education for groups or individuals on the hazards associated with the urban-wildland interface area.

Vegetation Management: Although, as discussed above, wildland fire is a significant potential hazard in large portions of Glendale, there are several management tools that can be implemented to reduce this hazard to manageable levels. Experience and research have shown that **vegetation management** is an effective means of reducing the wildland fire hazard in southern California. As a result, in areas identified as susceptible to wildland fire, jurisdictions typically require property owners to use a combination of maintenance approaches aimed at reducing the amount and continuity of the fuel (vegetation) available.

Fuel or vegetation treatments often used include mechanical, chemical, biological and other forms of biomass removal (Greenlee and Sapsis, 1996) or **hazard reduction** within a given

distance from habitable structures. The intent is to create a defensible space that slows the rate and intensity of the advancing fire, and provides an area at the urban-wildland interface where firefighters can set up to suppress the fire and save the threatened structures. Defensible space is defined as an area, either natural or man-made, where plant materials and natural fuels have been treated, cleared, or modified. However, removal of the native vegetation and maintenance of a wide strip of bare ground is not aesthetically acceptable and it increases the potential for water runoff and soil erosion. Native vegetation can be replaced with a green belt of low-lying, vegetation, but the increased use of water and maintenance requirements can make this option undesirable.

Another approach used in some areas of southern California is referred to as **fuel modification.** This method places emphasis on the space near structures that provides natural landscape compatibility with wildlife, water conservation and ecosystem health. Immediate benefits of this approach include improved aesthetics, increased health of large remaining trees and other valued plants, and enhanced wildlife habitat.

The City of Glendale uses fuel modification to reduce its wildfire hazard. Specifically, in 1993, the City of Glendale adopted a Hillside Development Plan that provides guidelines regarding landscaping and vegetation modification to promote fire safety while protecting the visual quality of the hillsides (City of Glendale, 1993). The landscape guidelines provide lists of plants (referred to as plant palettes) that are drought tolerant and help control erosion to be used on engineered slopes. By using these plants instead of non-native species, the visual contrast between the natural hillsides and the engineered slopes can be diminished, making the man-made slopes resemble more closely the adjacent natural slopes. Two plant palettes are available: the naturalizing palette, which includes plants to be used on that portion of the engineered slopes closer to the natural hillsides; and the ornamental palette, to be used on that section of the slope closer to structures, adjacent to the ornamental vegetation. On large enough slopes, both plant palettes can be blended along a 150-foot wide interface. For the most recent version of the plant palettes acceptable in Glendale, request a copy from the City's Planning Department.

The Fire Zone Management Guidelines portion (Section 8.0) of Glendale's Landscape Guidelines Plan outlines the methods by which the two plant palettes discussed above are to be used around all flammable structures in the urban-wildland interface. A minimum buffer distance of 100 feet is required around all structures; in some cases, at the discretion of the City's Fire Chief, this buffer distance may be increased to 200 feet. Within this buffer distance, the City requires four distinct Fire Management Zones to be established. Each of these zones is described further below and shown graphically on Figure 1-1.

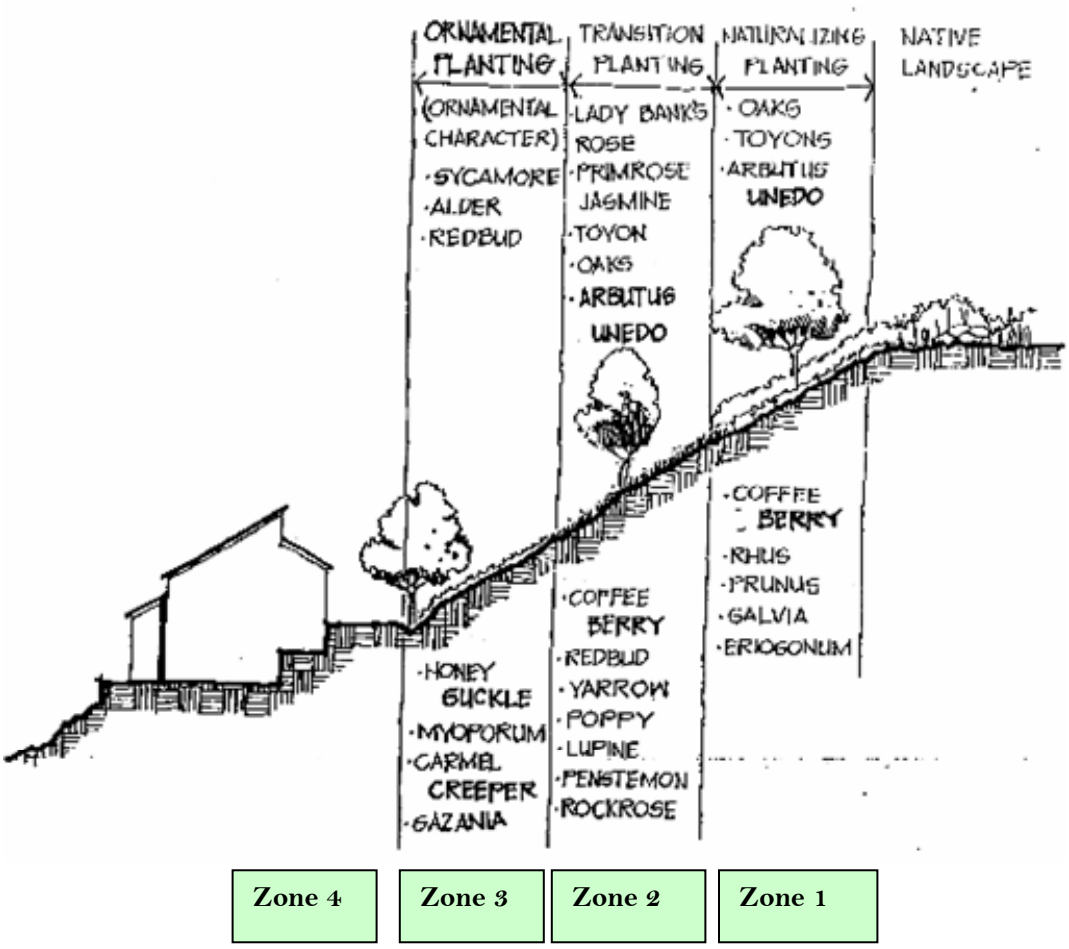
- **Zone 1:** Zone 1 includes the natural, ungraded slope and continues to the edge of the engineered slope. Existing vegetation in this zone needs to be thinned selectively to reduce the fuel volume and lower the intensity of any fire that may approach buildings. Foliage mass reduction is accomplished by removing large shrubby plants and dense groupings. The thinning of these plants needs to be conducted in such a way as to create a natural appearance and not expose excess soil areas that would then be susceptible to erosion.

- **Zone 2**: Zone 2 is the next zone inward from the natural, ungraded terrain, where low, slow-burning plantings should predominate. The volume of vegetation in this zone needs to be reduced and replaced with fire-resistant plant materials from both the naturalizing and ornamental plant palettes. Their low growth and limited foliage mass can diminish the intensity of wildfires, and prevent erosion of the slope.

- **Zone 3**: This zone can vary between 20 and 25 feet in width, depending upon the degree of fire risk in the area, and consists of fire-retardant plantings. This zone is referred to as the fire buffer zone or maximum fire prevention edge, and includes plants from both the ornamental and naturalizing palettes that require regular irrigation and weed control. Although some drought tolerant plants may be acceptable in this area, higher water and maintenance demands actually help achieve the maximum fire barrier. The plants in this zone are typically ground covers and plants with low fuel volumes.

- **Zone 4:** This zone is the area immediately surrounding the structure where ornamental plantings are preferred. The plants in this zone should be carefully selected and placed. The amount of tall trees should be limited. Foliage should be thinned and dead branches and vegetation removed from those areas next to the building.

Figure 7.1: Glendale's Hillside Planting Zones
(from the City of Glendale Landscape Guidelines for Hillside Development)



These standards require property owners in fire hazard areas, especially at the urban-wildland interface, to conduct maintenance, modifying or removing non-fire-resistive vegetation around their structures to reduce the fire danger. This affects any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining the UWI area. Other

specific maintenance actions that can be undertaken by property owners in the fire hazard areas include:

- Remove all dead vegetation and keep grasses and weeds maintained within 100 feet of any building and within 10 feet of any roadway. These provisions are part of an amendment to the Hazardous Vegetation Ordinance adopted in 1990. In extreme cases, clearance up to 200 feet from a structure and 50 feet from a roadway may be required by the Fire Department.
- Grasses and other vegetation located more than 30 feet from any building and less than 18 inches in height may be maintained where necessary to prevent erosion. Large trees and shrubs in that area should be at least 18 feet apart.
- Remove leafy foliage, dead wood, combustible ground cover, twigs, or branches within 3 feet of the ground from mature trees located within 100 feet of any building or within 10 feet of any roadway.
- Remove dead limbs, branches, and other combustible matter from trees or other growing vegetation adjacent to or overhanging any structure.
- Remove any portion of a tree that extends within 10 feet of a chimney or stovepipe.
- Trim and maintain all vegetation away from the curb line up to a height of 13.5 feet to accommodate emergency vehicles.
- Maintain 5 feet vertical clearance between roof surfaces and any overhanging portions of trees.
- Property owners in the urban-wildland interface area can request that the Fire Department conduct a comprehensive fire safety survey of their homes and property. The Fire Department inspects the residences for compliance with applicable regulations, and prepares a report for use by the homeowner to reduce its fire hazard. Implementation of the recommended mitigation measures may help the homeowner obtain a reduction in the cost of fire insurance.

It is the philosophy of the Glendale Fire Department to prevent catastrophic brush fires through comprehensive code enforcement efforts and, when necessary, a rapid response of properly trained and equipped firefighters. Successfully preventing fires requires a partnership between the community and the Glendale Fire Department to maintain the hill areas free of hazardous brush and combustible vegetation.

Prescribed Fire: As discussed previously, before modern settlement began, the area experienced small but frequent wildfires that impacted primarily the grasses and low-lying bushes, without severely damaging the tree stands. As man-made structures were built in these fire-susceptible areas, there was a strong effort to suppress fires, since these would threaten the structures and people living there. As a result, dense stands of vegetation have accumulated locally in the outlying areas, while increasingly larger numbers of people have moved into the urban-wildland interface. Over time, fire suppression and increasing populations have produced these results:

- Increased losses to life, property, and resources.
- Difficulty of fire suppression, increased safety problems for firefighters, and reduced productivity by fire crews on perimeter lines.
- Longer periods between recurring fires for many vegetation types by a factor of 5 or more.
- Increased volume of fuel per acre.
- Increased fire intensities.

- Increased taxpayer costs and property losses.

Recognition of these problems has led to vegetation management programs such as those described above, and in some areas, prescribed fires. A prescribed fire is deliberately set under carefully controlled and monitored conditions. The purpose is to remove brush and other undergrowth that can fuel uncontrolled fires. Prescribed fire is used to alter, maintain or restore vegetative communities, achieve desired resource conditions, and to protect life and property that would be degraded by wildland fire. Prescribed fire is only accomplished through managed ignition and should be supported by planning documents and appropriate environmental analyses.

Since 1981, prescribed fire has been the primary means of fuel management in Federal and State owned lands. Approximately 500,000 acres — an average of 30,000 acres a year — have been treated with prescribed fire under the vegetation management program throughout the State. In the past, the typical vegetation management project targeted large wildland areas. Now, increasing development pressures (with increased populations) at the urban-wildland interface often preclude the use of large prescribed fires. Many still find the notion of "prescribed fire" difficult to accept since for the last 100 years or so, humans have attempted to suppress and fight fires. Prescribed fire also carries a risk, as recent experiences in New Mexico and Arizona have shown. The Cerro Grande fire began when a prescribed burn escaped, destroying several hundred homes in Los Alamos, New Mexico and burning more than 50,000 acres. It is likely that this fire will lead to revisions in the guidelines for performing prescribed burns. Furthermore, a recent program review by the CDF has identified needed changes, with focus on citizen and firefighter safety, and the creation of wildfire safety and protection zones.

Prescribed fire is not presently being used in the City of Glendale to mitigate the wildland fire hazard. However, the cities of Glendale and La Canada Flintridge have entered into a cooperative agreement with Los Angeles County Fire Department to conduct prescribed fires in the Descanso Gardens area. This effort will include open space areas within the City of Glendale at the north end of the San Rafael Hills. The proposed plan has been approved by all parties involved and is ready to be implemented as soon as all conditions for a safe prescribed fire are met.

Hazard Abatement Notices: Each spring, the Glendale Fire Department mails information and hazard brush pamphlets to approximately 4,500 residences located in designated High Fire Hazard Areas. The purpose of this mailing is to remind and inform property owners of their specific responsibility to mitigate hazardous vegetation conditions. The mailing is followed-up, commencing May 1, by Fire Department fire company inspections of residences and lots to ensure compliance. Fire department personnel are assigned inspection districts throughout the City. Fire Department personnel survey the hillside areas and issue notices of violation for hazardous vegetation on an annual basis. If abatement work is not completed in a timely manner, a "Notice to Abate Fire Hazard" is sent and a compliance inspection is conducted 30 days later. If abatement is still not satisfactory a "Notice of Intention to Abate Public Nuisance" is sent, and a final inspection made after 15 days to ensure compliance. If voluntary compliance is not achieved, the Fire Department may abate the hazardous vegetation using an approved contractor, and charge the owner or impose a lien on the property.

At this time, per an agreement between Glendale and the County of Los Angeles, the Los Angeles County Agricultural Commissioner provides for weed abatement on non-compliant improved properties and approximately 800 vacant lots in the City of Glendale.

Legislated Construction Requirements in Fire Hazard Areas: Building construction standards for such items as roof coverings, fire doors, and fire resistant materials help protect

structures from external fires *and* contain internal fires for longer periods. That portion of a structure most susceptible to ignition from a wildland fire is the **roof**, due to the deposition of burning cinders or brands. Burning brands are often deposited far in advance of the actual fire by winds. Roofs can also be ignited by direct contact with burning trees and large shrubs (Fisher, 1995). The danger of combustible wood roofs, such as wooden shingles and shakes, has been known to fire fighting professionals since 1923, when California's first major urban fire disaster occurred in Berkeley. It was not until 1988, however, that California was able to pass legislation calling for, at a minimum, Class C roofing in fire hazard areas. Then, in the early 1990s, there were several other major fires, including the Paint fire of 1990 in Santa Barbara, the 1991 Tunnel fire in Oakland/Berkeley, and the 1993 Laguna Beach fire, whose severe losses were attributed in great measure to the large percentage of combustible roofs in the affected areas. In 1995-1996 new roofing materials standards were approved by the California legislature for Very High Fire Hazard Severity Zones.

Significantly, the City of Glendale has been at the forefront of the State on this issue since the early 1980s. Specifically, in 1984, Glendale adopted a Fire Safe Roofing Ordinance that required a minimum Class B roof covering for all new and re-roof applications City-wide. In 1989, Glendale adopted legislation (the Fire Safe Roofing Code) that amended the City's roofing requirements to ban the installation of wood roof material City-wide, and to upgrade the minimum classification from B to A in the high fire hazard areas. Today, Glendale requires all new roofs and re-roofs amounting to more than 25 percent of the original roof area to be done in Class A roof covering.

So what do these Classes A, B and C mean? To help consumers determine the fire resistance of the roofing materials they may be considering, roofing materials are rated as to their fire resistance into three categories that are based on the results of test fire conditions that these materials are subjected to under rigorous laboratory conditions, in accordance with test method ASTM-E-108 developed by the American Society of Testing Materials. The rating classification provides information regarding the capacity of the roofing material to resist a fire that develops outside the building on which the roofing material is installed (The Institute for Local Self Government, 1992). The three ratings are as follows:

Class A: Roof coverings that are effective against **severe** fire exposures. Under such exposures, roof coverings of this class:

- Are not readily flammable;
- Afford a high degree of fire protection to the roof deck;
- Do not slip from position; and
- Do not produce flying brands.

Class B: Roof coverings that are effective against **moderate** fire exposures. Under such exposures, roof coverings of this class:

- Are not readily flammable;
- Afford a moderate degree of fire protection to the roof deck;
- Do not slip from position; and
- Do not produce flying brands.

Class C: Roof coverings that are effective against **light** fire exposures. Under such exposures, roof coverings of this class:

- Are not readily flammable;
- Afford a measurable degree of fire protection to the roof deck;
- Do not slip from position; and
- Do not produce flying brands.

Non-Rated Roof coverings have not been tested for protection against fire exposure. Under such exposures, non-rated roof coverings:

- May be readily flammable;
- May offer little or no protection to the roof deck, allowing fire to penetrate into attic space and the entire building; and
- May pose a serious fire brand hazard, producing brands that could ignite other structures a considerable distance away.

Attic ventilation openings are also a concern regarding the fire survivability of a structure. Attics require significant amounts of cross-ventilation to prevent the degradation of wood rafters and ceiling joists. This ventilation is typically provided by openings to the outside of the structure, but these openings can provide pathways for burning brands and flames to be deposited within the attic. Therefore, it is important that all ventilation openings be properly screened to prevent this. Additional prevention measures that can be taken to reduce the potential for ignition of attic spaces are to "use non-combustible exterior siding materials and to site trees and shrubs far enough away from the walls of the house to prevent flame travel into the attic even if a tree or shrub does torch" (Fisher, 1995).

The type of **exterior wall construction** used can also help a structure survive a fire. Ideally, exterior walls should be made of non-combustible materials such as stucco or masonry. During a wildfire, the dangerous active burning at a given location typically lasts about 5 to 10 minutes (Fisher, 1995), so if the exterior walls are made of non-combustible or fire-resistant materials, the structure has a better chance of surviving. For the same reason, the type of **windows** used in a structure can also help reduce the potential for fire to impact a structure. Single-pane, annealed glass windows are known for not performing well during fires; thermal radiation and direct contact with flames cause these windows to break because the glass under the window frame is protected and remains cooler than the glass in the center of the window. This differential thermal expansion of the glass causes the window to break. Larger windows are more susceptible to fracturing when exposed to high heat than smaller windows. Multiple-pane windows, and tempered glass windows perform much better than single-pane windows, although they do cost more. Fisher (1995) indicates that in Australia, researchers have noticed that the use of metal screens helps protect windows from thermal radiation. Some homeowners may consider the use of exterior, heavy-duty metal blinds that are dropped down into position, at least on the windows in the exposed portion of the structure facing the wildland area.

Fire **sprinklers** are very effective at controlling structural fires, saving property and lives. In 1988, Glendale passed an ordinance requiring automatic fire sprinklers in existing structures four stories or more in height, and since 1989, the City of Glendale has required all new one- and two-family structures to have fire sprinklers. Fire sprinklers can help contain a fire that starts inside a structure from becoming a potential incendiary source, impacting other nearby structures and brush. Fire sprinklers are not likely to protect a structure from an external wildland fire, however. Sprinklers permanently mounted on the roof have been suggested as a defensive measure, but most authorities argue against the value of external sprinklers as a viable alternative to fire-resistant roofing materials (http://www.fs.fed.us/psw/publications/documents/gtr-050/struct.html).

The City of Glendale has adopted the California Building and Fire Codes with local additions and amendments (City Ordinance 5329 - Glendale Building and Safety Code, Volume I, Section 715 which deals with construction requirements in fire hazard areas, and Volume VI, which pertains to fire and life-safety requirements). These additions and amendments make the Glendale Building and Safety Code more restrictive than the minimum State Code / model ordinance. For specific requirements regarding roofing standards (non-combustible Class A roofs), construction materials and standards including fire resistive siding and eaves, the

orientation and placement of window glazing, sprinklers, etc., contact the Fire Prevention Bureau and Building Section of the City of Glendale.

Public Awareness: Individuals can make an enormous contribution to fire hazard reduction and need to be educated about their important role. The Glendale Fire Department has several outreach programs aimed at providing fire safety education to the public. These presentations are given to local schools, service clubs and associations, homeowners groups, the Chamber of Commerce, Board of Realtors, businesses and other professional organizations. The Jr. Fire Program, which is more than 50 years old, sends firefighters into all of the 5th grade classes in the area to teach fire safety and awareness. A picnic at the end of the school year is held to honor those students that demonstrated exceptional participation in the program. Every October, the Fire Department also contracts with a theater group to present fire safety programs to all elementary schools in Glendale.

One of the most recent public education tools used by the Fire Department is the Fire Safety Trailer, which is operated in conjunction with the Burbank and Pasadena Fire Departments. The trailer provides a scaled version of a house, where children can learn and practice life-saving procedures. These and many other public education and outreach programs that the Fire Department offers are described in the Fire Department's effective web site (http://fire.ci.glendale.ca.us/). This web site is also an education tool that residents can refer to for additional information regarding how to deal with fire and other natural and man-made hazards.

The Fire Department has also prepared and distributes informational brochures to hillside property owners. The brochures describe mitigation measures that can be implemented to reduce the fire hazard, and describe how property owners can help themselves to prevent loss of property or life as a result of a wildland fire. In addition to the specific requirements in the Municipal Code mentioned in the sections above regarding appropriate landscaping and construction materials, there are other steps that homeowners can take to reduce the risk of fire on their property. Some of these are listed below. This list is not all-inclusive, but provides a starting point and framework to work from.

- Mow and irrigate your lawn regularly.
- Dispose of cuttings and debris promptly, according to local regulations.
- Store firewood away from the house.
- Be sure the irrigation system is well maintained.
- Use care when refueling garden equipment and provide regular maintenance for your garden equipment.
- Store and use flammable liquids properly.
- Dispose of smoking materials carefully.
- Do not light fireworks (in accordance with the Municipal Code).
- Become familiar with local regulations regarding vegetation clearing, disposal of debris, and fire safety requirements for equipment.
- Follow manufacturers' instructions when using fertilizers and pesticides.
- Keep the gutters, eaves, and roof clear of leaves and other debris.
- Occasionally inspect your home, looking for deterioration, such as breaks and spaces between roof tiles, warping wood, or cracks and crevices in the structure.
- Use non-flammable metal when constructing a trellis and cover it with high-moisture, non-flammable vegetation.
- Install automatic seismic shut-off valves for the main gas line to your house. Information for approved devices, as well as installation procedures, is available from the Southern

California Gas Company.

Other Mitigation Programs and Activities:

Firewise: This is a program developed within the National Wildland/ Urban Interface Fire Protection Program and it is the primary federal program addressing interface fire. It is administered through the National Wildfire Coordinating Group whose extensive list of participants includes a wide range of federal agencies. The program is intended to empower planners and decision makers at the local level. Through conferences and information dissemination, Firewise increases support for interface wildfire mitigation by educating professionals and the general public about hazard evaluation and policy implementation techniques. Firewise offers online wildfire protection information and checklists, as well as listings of other publications, videos and conferences.

The interactive home page allows users to ask fire protection experts questions and to register for new information as it becomes available.

FireFree Program: This is a unique private/public program for interface wildfire mitigation involving partnerships between an insurance company and local government agencies. It is an example of an effective non-regulatory approach to hazard mitigation. Originating in Bend, Oregon, the program was developed in response to the city's "Skeleton Fire" of 1996, which burned over 17,000 acres and damaged or destroyed 30 homes and structures. Bend sought to create a new kind of public education initiative that emphasized local involvement. SAFECO Insurance Corporation was a willing collaborator in this effort. Bend's pilot program included:

1. A short video production featuring local citizens as actors, made available at local video stores, libraries and fire stations;
2. Two city-wide yard debris removal events;
3. A 30-minute program on a model FireFree home, aired on a local cable television station; and
4. Distribution of brochures, featuring a property owner evaluation checklist and a listing of fire-resistant indigenous plants.

Wildfire Mitigation Action Items

As stated in the Federal Wildland Fire Policy, "The problem is not one of finding new solutions to an old problem but of implementing known solutions. Deferred decision making is as much a problem as the fires themselves. If history is to serve us in the resolution of the wildland/urban interface problem, we must take action on these issues now. To do anything less is to guarantee another review process in the aftermath of future catastrophic fires."

The wildfire mitigation action items below provide direction on specific activities that organizations and residents of southern California, including Glendale, can undertake to reduce risk and prevent loss from wildfire events. Each action item is followed by ideas for implementation, which can be used by the steering committee and local decision makers in pursuing strategies for implementation.

Short Term – Wildfire #1:

Action Item: Enhance outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens, public agencies, private property owners and businesses to natural hazards.

Ideas for Implementation:

- Continue the hiring of fire prevention and education personnel to oversee education programs.
- Continue to train in all areas of fire prevention.
- Visit urban interface neighborhoods and rural areas and conduct education and outreach activities.
- Conduct specific community-based demonstration projects of fire prevention and mitigation in the urban interface.
- Establish neighborhood "drive-through" activities that pinpoint site-specific mitigation activities. Fire crews can give property owners suggestions and assistance.
- Perform public outreach and information activities at fire stations by creating "Wildfire Awareness Week" activities. Fire stations can hold open houses and allow the public to visit, see the equipment and discuss wildfire mitigation with the station crews.

Coordinating Organization:	Fire Department
Timeline:	Ongoing
Plan Goals Addressed:	Protect Life and Property, Public Awareness
Constraints:	Pending funding and available personnel

Short Term – Wildfire #2:

Action Item: Enhance emergency services to increase the efficiency of wildfire response and recovery activities.

Ideas for Implementation:

- Continue to develop and increase training and outreach programs.
- Evaluate internal and external notification systems that include all at-risk urban/wildland interface residents in the jurisdiction in order to contact them during evacuations.

Coordinating Organization:	Fire Department
Timeline:	2 years
Plan Goals Addressed:	Emergency Services
Constraints:	Pending funding and available personnel

Short Term – Wildfire #3:

Action Item: Educate agency personnel on federal cost-share and grant programs, Fire Protection Agreements and other related federal programs so the full array of assistance available to local agencies is understood.

Ideas for Implementation:

- Investigate potential funding opportunities for individual mitigation projects; and
- Develop, approve and promote Fire Protection Agreements and partnerships to clarify roles and responsibilities and to provide for fire mitigation activities and suppression preparedness,

Coordinating Organization:	Fire Department
Timeline:	1-2 years
Plan Goals Addressed:	Protect Life and Property, Public Awareness
Constraints:	Pending funding and available personnel

Short Term – Wildfire #4:

Action Item: Inventory alternative firefighting water sources and encourage the development of additional sources.

Ideas for Implementation:

- Advocate for water storage facilities with fire-resistant electrical pump or gravity fed systems in facilities that are not connected to a community water or hydrant system.
- Review protocol for fire department and water district to communicate all hydrant outages and water shortage information.

Coordinating Organization:	Fire, Planning, Water and Power
Timeline:	1 year
Plan Goals Addressed:	Protect Life and Property
Constraints:	Pending funding and available personnel

Long Term – Wildfire #1:

Action Item: Encourage development and dissemination of maps relating to the fire hazard to help educate and assist builders and homeowners in being engaged in wildfire mitigation activities and to help guide emergency services during response.

Ideas for Implementation:

- Update wildland/urban interface maps.
- Conduct risk analysis incorporating data and the created hazard maps using GIS technology to identify risk sites and further assist in prioritizing mitigation activities.
- Encourage coordination between fire jurisdictions and sanitary districts to make sure that the most accurate elevation maps are being used.

Coordinating Organization:	Fire Department
Timeline:	1-3 years
Plan Goals Addressed:	Protect Life and Property
Constraints:	Pending funding and available personnel

Long Term – Wildfire #2:

Action Item: Increase communication, coordination and collaboration between wildland/urban interface property owners, local and county planners and fire prevention crews and officials to address risks, existing mitigation measures and federal assistance programs.

Ideas for Implementation:

- Encourage single-family residences to have fire plans and practice evacuation routes.
- Encourage fire inspections in residential homes by fire departments to increase awareness among homeowners and potential fire responders.
- Encourage a standard for the State Fire Marshal to evaluate fire plans and emergency plans.
- Encourage fire department notification of new business applications to ensure that appropriate fire plans have been developed.
- Encourage local zoning and planning entities to work closely with landowners and/or developers who choose to build in the wildland/urban interface to identify and mitigate conditions that aggravate wildland/urban interface wildfire hazards, including:
  - Limited access for emergency equipment due to width and grade of roadways;
  - Inadequate water supplies and the spacing, consistency and species of vegetation around structures;
  - Inadequate fuel breaks, or lack of defensible space;
  - Highly flammable construction materials;
  - Building lots and subdivisions that are not in compliance with state and local land use and fire protection regulations;
  - Inadequate entry/escape routes.

- Encourage all new homes and major remodels involving roofs additions that are located in the interface to have fire resistant roofs and residential sprinkler systems.

- Encourage the public to evaluate access routes to rural homes for fire-fighting vehicles and to develop passable routes if they do not exist.

Coordinating Organization:	Fire Department, Building & Safety, Planning, Information Services
Timeline:	Ongoing
Plan Goals Addressed:	Protect Life and Property, Public Awareness, Emergency Services, Partnerships and Implementation
Constraints:	Pending funding and available personnel

Long Term – Wildfire #3:

Action Items: Encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.

Ideas for Implementation:

- Employ mechanical or other appropriate thinning technique to abate the risk of catastrophic fire and restore the more natural regime of high frequency, low-intensity burns. Prescribed burning can provide benefit to ecosystems by thinning hazardous vegetation and restoring ecological diversity to areas homogenized by invasive plants.

- Clear trimmings, trees, brush and other debris completely from sites when performing routine maintenance and landscaping to reduce fire risk.

- Enhance programs to coordinate and monitor adjacent areas that utilize prescribed burning techniques.

Coordinating Organization:	Fire Department
Timeline:	Ongoing
Plan Goals Addressed:	Natural Systems
Constraints:	Pending funding and available personnel

Wildfire Resource Directory

Local Resources:

Glendale Fire Department: The Glendale Fire Department is responsible for fire suppression on all private lands within the city of Glendale. The Glendale Fire Department constantly monitors the fire hazard in the city and has ongoing programs for investigation and alleviation of hazardous situations. Fire fighting resources in the immediate Glendale area are provided by Glendale Fire Department Station Nos. 21, 22, 23, 24, 25, 26, 27, 28, and 29. [Fire Stations 26 and 29 are no longer adequate for the Fire Department's needs due to the buildings' age, physical condition and size. Efforts are ongoing to find adequate alternative locations for these two stations. The preferred alternatives are expected to be located south of the 134 Freeway.]

The Fire Department is comprised of 12 fire companies with nine engine companies and three truck companies. The Department also staffs four rescue ambulances. These data are summarized by fire station on Table 7.4 below. Staffing at these stations is as follows: 4 crew per each ladder truck and engine company, and 2 firefighter paramedics per rescue ambulance. The Glendale Fire Department is a member of the Verdugo Fire Communications Center (VFCC) that provides dispatch services to nine cities, including Glendale.

Table 7.4: Fire Stations and Facilities in the City of Glendale

Fire Station No.	Street Address	Fire Companies and Ambulances		
		Engine Companies	***Ladder Truck Companies***	***Rescue Ambulances***
21	421 Oak Street	1	1	1
22	1201 S. Glendale Ave.	1	0	0
23	3303 E. Chevy Chase Drive	1	0	0
24	1734 Canada Blvd.	1	0	0
25	353 N. Chevy Chase Drive	1	0	1
26	1145 N. Brand Blvd.	1	1	1
27	1127 Western Ave.	1	0	0
28	4410 New York Ave.	1	0	0
29	2465 Honolulu Ave.	1	1	1
Facility		**Street Address**		
Fire Mechanical Maintenance		210 E. Palmer Avenue		
Verdugo Fire Communications Center		421 Oak Street		
Fire Prevention Bureau		420 Harvard Street		
Fire Training		541 W. Chevy Chase Drive		
Environmental Management Center		780 Flower Street		

Glendale has automatic aid agreements with the adjacent cities of Burbank, Pasadena, and Los Angeles, and with the County of Los Angeles. These agreements obligate the departments to help each other under pre-defined circumstances. **Automatic aid** agreements obligate the nearest fire company to respond to a fire regardless of the jurisdiction. **Mutual aid** agreements obligate fire department resources to respond outside of their district upon request for assistance.

The Glendale Fire Department is party to an agreement that authorizes calls for emergency response to be dispatched through the **Verdugo Joint Fire Communications Center**, which coordinates 33 different stations in the region. This "region" includes stations not only from Glendale, but also from Burbank, Pasadena, San Marino, South Pasadena, Monrovia, Arcadia, Sierra Madre and San Gabriel. The Verdugo Joint Fire Communications Center is located on the third floor of Fire Station 21 in Glendale, at 421 Oak Street. Dialing 911 in any of the cities served by the Verdugo Fire Communications Center connects the caller to police or California Highway Patrol dispatchers, who determine the nature of the emergency, and transfer fire and paramedic calls to the Verdugo Communications Center. A dispatcher at Verdugo enters the pertinent details into the computer for transmittal via radio to the fire station that is dispatched for that particular incident. Emergency personnel are on the road within 1 to 2 minutes of receiving the call, and remain in constant radio contact with the Verdugo Communications Center as additional details are received.

Numerous other agencies are available to assist the City if needed. Several Federal agencies have roles in fire hazard mitigation, response, and recovery, including: the Fish and Wildlife Service, National Park Service, US Forest Service, Natural Resource Conservation Service, Office of Aviation Services, National Weather Service, and National Association of State Foresters. The State Office of Emergency Services can be called upon for further aid if necessary, as can Federal agencies, including the Department of Agriculture, the Department of the Interior, and, in extreme cases, the Department of Defense. Private companies and individuals may also assist.

County Resources:

Los Angeles County Fire Department
1320 N. Eastern Ave.
Los Angeles, CA. 90063
Telephone: (323).881-2411
http://www.lacofd.org/default.htm

State Resources:

California Division of Forestry & Fire Protection
1416 9th Street
PO Box 944246
Sacramento California 94244-2460
(916) 653-5123
http://www.fire.ca.gov/php/index.php

Office of the State Fire Marshal (OSFM)
1131 "S" Street
Sacramento, CA 95814
PO Box 944246
Sacramento, CA 94244-2460
Tel. (916) 445-8200
Fax. (916) 445-8509

Federal Resources and Programs:

The role of the federal land managing agencies in the wildland /urban interface is reducing fuel hazards on the lands they administer; cooperating in prevention and education programs; providing technical and financial assistance; and developing agreements, partnerships and relationships with property owners, local protection agencies, states and other stakeholders in wildland/urban interface areas. These relationships focus on activities before a fire occurs, which render structures and communities safer and better able to survive a fire occurrence.

Federal Emergency Management Agency (FEMA) Programs: FEMA is directly responsible for providing fire suppression assistance grants and, in certain cases, major disaster assistance and hazard mitigation grants in response to fires. The role of FEMA in the wildland /urban interface is to encourage comprehensive disaster preparedness plans and programs, increase the capability of state and local governments and provide for a greater understanding of FEMA programs at the Federal, State and local levels.

- **Fire Suppression Assistance Grants**: Fire Suppression Assistance Grants may be provided to a state with an approved hazard mitigation plan for the suppression of a forest or grassland fire that threatens to become a major disaster on public or private lands. These grants are provided to protect life and improved property and encourage the development and implementation of viable multi-hazard mitigation measures and provide training to clarify FEMA's programs. The grant may include funds for equipment, supplies and personnel. A Fire Suppression Assistance Grant is the form of assistance most often provided by FEMA to a state for a fire.

  The grants are cost-shared with states. FEMA's US Fire Administration (USFA) provides public education materials addressing wildland/urban interface issues and the USFA's National Fire Academy provides training programs.

- **FEMA Hazard Mitigation Grant Program**: Following a major disaster declaration, the FEMA Hazard Mitigation Grant Program provides funding for long-term hazard mitigation projects and activities to reduce the possibility of damages from all future fire hazards and to reduce the costs to the nation for responding to and recovering from the disaster.

National Wildland/Urban Interface Fire Protection Program:

Federal agencies can use the National Wildland/Urban Interface Fire Protection Program to focus on wildland/urban interface fire protection issues and actions. The Western Governors' Association (WGA) can act as a catalyst to involve state agencies, as well as local and private stakeholders, with the objective of developing an implementation plan to achieve a uniform, integrated national approach to hazard and risk assessment and fire prevention and protection in the wildland/urban interface. The program helps states develop viable and comprehensive wildland fire mitigation plans and performance-based partnerships.

U.S. Forest Service:

The U. S. Forest Service (USFS) is involved in a fuel-loading program implemented to assess fuels and reduce hazardous buildup on forest lands. The USFS is a cooperating agency and, while it has little to no jurisdiction in the lower valleys, it has an interest in preventing fires in the interface, as fires often burn up the hills and into the higher elevation US forest lands.

Other Federal and National Resources:

Federal Wildland Fire Policy, Wildland/Urban Interface Protection

This is a report describing federal policy and interface fire. Areas of needed improvement are identified and addressed through recommended goals and actions. http://www.fs.fed.us/land/wdfire7c.htm

National Fire Protection Association (NFPA)

This is the principal federal agency involved in the National Wildland/Urban Interface Fire Protection Initiative. NFPA has information on the Initiatives programs and documents.
Public Fire Protection Division
1 Battery March Park.
P.O. Box 9101
Quincy, MA 02269-9101
Phone: (617) 770-3000

National Interagency Fire Center (NIFC)

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. These agencies include the Bureau of Indian Affairs, Bureau of Land Management, Forest Service, Fish and Wildlife Service, National Park Service, National Weather Service and Office of Aircraft
National Interagency Fire Center
3833 S. Development Ave.
Boise, Idaho 83705
(208) 387-5512
http://www.nifc,gov/

United States Fire Administration (USFA) of the Federal Emergency Management Agency (FEMA)

As an entity of the Federal Emergency Management Agency, the mission of the USFA is to reduce life and economic losses due to fire and related emergencies through leadership, advocacy, coordination and support.
USFA, Planning Branch, Mitigation Directorate
16825 S. Seton Ave.
Emmitsburg, MD 21727
(301) 447-1000
http://www.fema.gov/hazards/fires/wildfires.shtm - Wildfire Mitigation
http://www.usfa.fema.gov/index.htm - U.S. Fire Administration

Additional Resources:

Firewise - The National Wildland/Urban Interface Fire program

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.
Firewise
1 Battery March Park.
P.O. Box 9101

Quincy, MA 02269-9101
Phone: (617) 770-3000
http://www.firewise.org/

Publications:

National Fire Protection Association Standard 299: Protection of Life and Property from Wildfire, National Wildland/Urban Interface Fire Protection Program, (1991), National Fire Protection Association, Washington, D.C.
This document, developed by the NFPA Forest and Rural Fire Protection Committee, provides criteria for fire agencies, land use planners, architects, developers and local governments to use in the development of areas that may be threatened by wildfire. To obtain this resource:
National Fire Protection Association Publications
(800) 344-3555
http://www.nfpa.org or http://www.firewise.org

An International Collection of Wildland- Urban Interface Resource Materials
(Information Report NOR- 344). Hirsch, K., Pinedo, M., & Greenlee, J. (1996). Edmonton, Alberta: Canadian Forest Service.
This is a comprehensive bibliography of interface wildfire materials. Over 2,000 resources are included, grouped under the categories of general and technical reports, newspaper articles and public education materials. The citation format allows the reader to obtain most items through a library or directly from the publisher. The bibliography is available in hard copy or diskette at no cost. It is also available in downloadable PDF form.
Canadian Forest Service, Northern Forestry Centre, I-Zone Series
Phone: (780) 435-7210
http://www.prefire.ucfpl.ucop.edu/uwibib.htm

Wildland/Urban Interface Fire Hazard Assessment Methodology.
National Wildland/Urban Interface Fire Protection Program, (1998).
NFPA, Washington, D.C.
Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
http://www.firewise.org

Fire Protection in the Wildland/Urban Interface: Everyone's Responsibility.
National Wildland/Urban Interface Fire Protection Program, (1998). Washington, D.C.
Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
http://www.firewise.org