CHAPTER 5: WILDFIRES

5.3.0 WILDFIRE RISK ASSESSMENT

5.3.1 IDENTIFYING WILDFIRE HAZARDS

> **3.1 Identifying Hazards – Requirement §201.6(c)(2)(i):**
>
> The risk assessment **shall** include a description of the type … of all natural hazards that can affect the jurisdiction.

Wildland fire may be defined as any unwanted fire involving outdoor vegetation. While it is often thought of as occurring in forests, rangelands or crop fields, it may also occur in areas such as vacant lots, highway medians, parks and golf courses. With residential development spreading into pristine areas, a relatively new phenomenon has been created: the wildland/urban interface. This phenomenon has changed the nature of the wildland fire problem in some very significant ways. Both the life hazard and the potential economic losses in wildland areas have increased greatly, and the increase in human activity has multiplied the number and variety of potential sources of ignition.

Wildland fires are influenced by three factors: fuel, weather and topography. The spread of wildland fires depends on the type of fuel that exists within the area in the form of grasses, brush and trees. Wildland fire behavior is also influenced by local weather which can modify the burn rate (how fast the fire burns.) Examples of weather incidents that affect wildland fires are atmospheric stability, inversions, thunderstorms, relative humidity and wind. Finally, the severity of wildland fires is influenced by topography including slope, aspect, chimneys and drainages, and the accessibility of the location.

Priorities in the event of a wildfire are life safety, preservation of property and resource conservation. Life safety includes the potential for evacuation, sheltering in place (finding and directing citizens to a location safe from the threat of fire) and providing evacuation to safe refuge. Property conservation includes triage (evaluation and determination of priority of response) of threatened structures as well as evaluation of types of structures in surrounding areas. Natural resource conservation includes assessing the risk to timber, crops, wildlife, wetlands and pasture land.

CLIMATE ADAPTATION CONSIDERATIONS

As noted in the City of Santa Cruz Climate Adaption Plan (*see* Appendix P), the impacts of changing precipitation patterns will exacerbate wildland fire threats due to the potential of longer and dryer summers or wetter winters. Additionally, rising temperatures may contribute to increased wildland fires. It has been noted that the risk for large wildfires could increase by as much as 55 percent if temperatures rise to what is considered a medium warming range. Such a

percent increase is twice as high as expected if temperatures only increased into the lower warming range. (*see* CalAdapt.org)

5.3.2 PROFILING WILDFIRE HAZARD EVENTS

A LOCATION

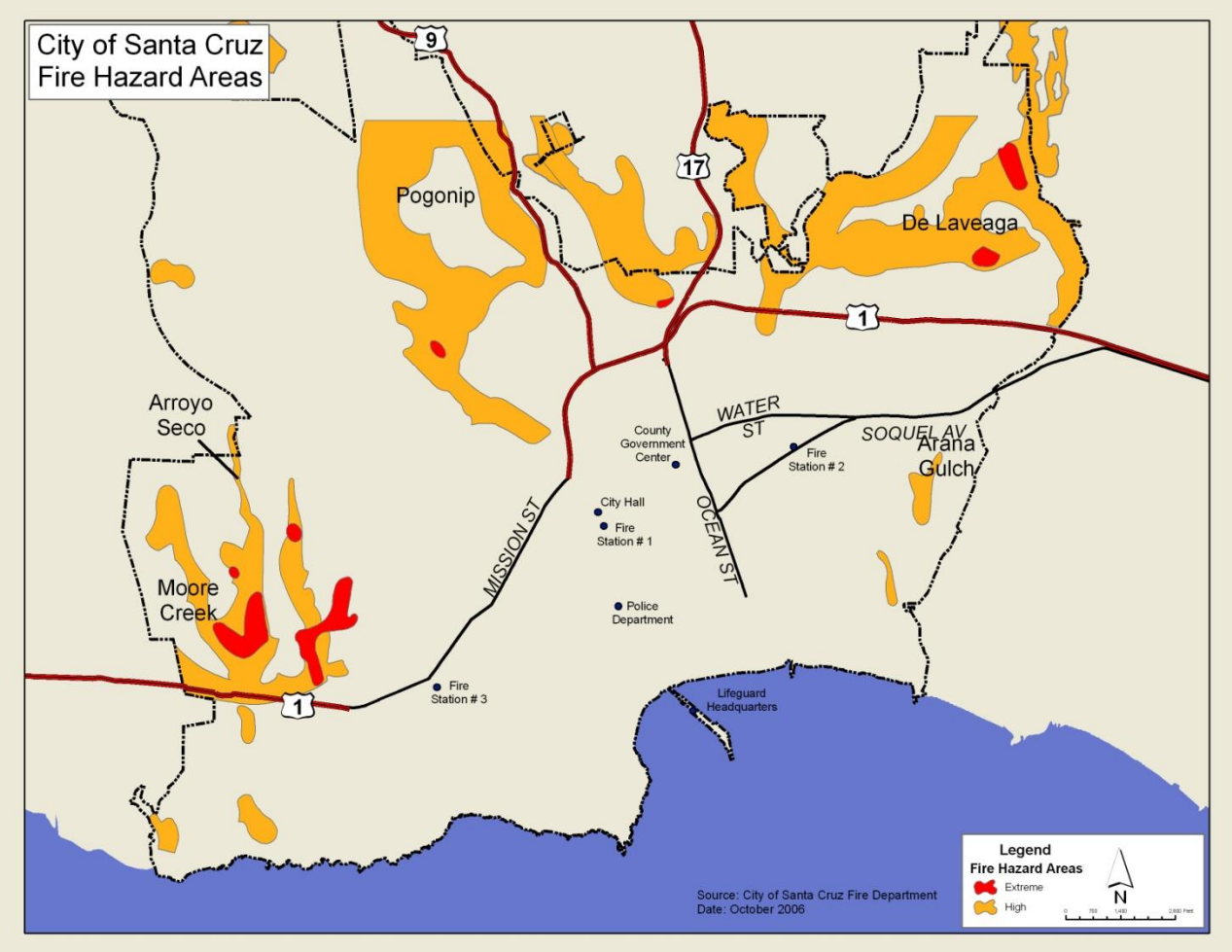

Figure 14 – Wildfire Hazard Areas within the City of Santa Cruz

Within the City of Santa Cruz there are five wildland/urban interface areas including three areas designated as *mutual threat zones*. Mutual threat zones are defined as areas where a wildfire would threaten property within the Santa Cruz fire protection district as well as property covered by another fire protection service.

For major emergencies that require more resources than can be provided by a single agency, the City of Santa Cruz, Santa Cruz County, the University of California at Santa Cruz and the State of California have an extensive mutual aid and emergency coordination system. Developed and managed in cooperation with the California Emergency Management Agency, this system allows

departments and districts to share personnel and equipment as needed to address and control emergencies.

Shared Fire Department Command, Training, Resources
In September 2011, the City of Santa Cruz and UC Santa Cruz determined that it was in the best interest of both agencies to consolidate the local provision of fire prevention and suppression activities, emergency medical services and emergency/disaster management. Both agencies had these same responsibilities within their respective boundaries.

Due to the proximity of the two fire service departments to one another and, their similar organizational elements, both jurisdictions determined that it was in their best interests to cooperate in sharing fire management functions; as well as supervision of operations, training, fire prevention, administration, fiscal management and disaster preparedness.

On September 27, 2011, the Santa Cruz City Council passed and adopted a Resolution (NS-28,405) merging the two fire departments, in a two-year pilot process. This effectively eliminated redundancy and duplication of efforts and provided opportunities for cost savings and an increased level of service for each party, and their constituents. The newly shared fire command services enhance the City of Santa Cruz' ability to mitigate fire danger in the city and surrounding greenbelt areas.

Mutual Threat Zones
Mutual threat zones (described above), are delineated in the Wildland Pre-Suppression Plan[15] for the mutual threat zone areas in and around Delaveaga Park, the Pogonip property, and the Arroyo Seco/Meder Canyon area (*see* Figure 14). This Plan is used to identify non-State responsibility areas in which any fire is considered a threat to adjacent State responsibility areas. These geographic areas are designated mutual threat zones because of the urban development that has occurred along their canyons and the vegetation that is considered significant.

Wildland fires also present a risk to open space areas within the City of Santa Cruz and adjacent to residential homes. Additional areas of concern for these wildland/urban interface zones include the Arana Gulch property, Lighthouse Field, the Moore Creek Preserve as well as other smaller wildland/urban interface areas throughout the City. It should also be noted that there are City of Santa Cruz water service areas and water infrastructure areas that are located outside of the City limits that are potentially threatened by wildland fires.

B EXTENT: MAGNITUDE OR SEVERITY

The potential magnitude and severity of future fires could be predicted from experiences gained from recent fires in 2008/2009 which occurred in the County of Santa Cruz. A few of these fires bordered jurisdictional boundary to our City. In a few of these fires, spotting exceeded 1 mile, with some flame lengths exceeding 100 feet. In 2008, over 75 structures were destroyed on three fires alone. During the 2008/2009 fire seasons over 13,000 acres have burned in five major fires in Santa Cruz County. Although the City of Santa Cruz Fire Department responds annually to about 50 vegetation type fires the opportunity for these events to become significant have been recognized over the past few fire seasons. Suppression costs to contain and extinguish each of these fires exceeded $60 million dollars The state and local cost incurred to respond to these fires were covered by the Federal Fire Management Assistance Grant and California Disaster Assistance Act.

According to the *Meder Canyon Vegetation Management Plan*, prepared by Wildland Resource Management (2004), and the *Wildland Fire Safety Plan, Delaveaga Park Area* prepared by the Hunt Research Corporation (1995), the potential for a significant wildland fire exists in and around various areas of Santa Cruz. Because some of these canyon areas have steep slopes with dense stands of eucalyptus trees, conifers, chaparral species and other vegetation, the potential for a fire with the intensity and effect of the 1991 Oakland Hills fire exists and many structures could be threatened.

Expected fire behavior in and around the canyons described above indicates that fire spread will be rapid and will run uphill toward structures. Without fuels modification and/or management, eucalyptus litter, shrubs and un-mowed grass would generate enough heat to cause shrubs, eucalyptus, or oak canopies to ignite, distributing embers widely and producing enough heat to potentially involve structures. Un-mowed grass and eucalyptus litter comprise the highest flash point type of fuels encountered in Santa Cruz.

Trees with low branches, and shrubs — particularly coyote brush and poison oak — are most likely to serve as "ladder fuel" to enable fires beneath to spread into the tree canopy or crown. Should fire become involved in the crown or tree canopy, embers may be expected to be cast throughout the neighborhood and potentially cause several additional fires. In such a case the burning debris may travel up to 1.5 miles away in a wind of 20 mph at ground level during a crown fire according to the Santa Cruz Fire Department.

In most of the wildland fire risk areas the fuels surrounding these areas have high moisture content due to the area's marine influence. Winds tend to blow from the ocean upslope. However, in the fall, "sundowner winds" *(strong, downslope winds that develop over the southern slopes of mountains in late afternoons and evenings that pose a very serious threat during the height of fire season* — NOAA) can occur from the north/northeast towards the ocean. Wind speeds can be 20 mph or more. Temperatures can be 80 degrees or more. In Santa Cruz, fuel moistures have been recorded as low as 3–4% by the Santa Cruz Fire Department.

C PREVIOUS OCCURRENCES

Recent Wildland fires in the City of Santa Cruz

- 1990 — Meder Canyon Fire — Several acres consumed in 20 minutes

A number of other wildland fires in the Santa Cruz area including the Santa Cruz Mountains have been a concern to the City of Santa Cruz.

- 2009.....Loma Fire.....485 acres consumed
- 2009..... Lockheed Fire.....7,819 acres consumed
- 2008.....Trabing Fire.....630 acres consumed
- 2008..... Martin Fire.....520 acres consumed
- 2008.....Summit Fire.....4,270 acres consumed

D PROBABILITY OF FUTURE EVENTS

Despite the fact that there has not been a recent wildland fire within the city limits, residential development continues to spread into wildland/urban interface areas increasing the danger to life and property should a fire occur. Areas targeted as "likely" to have a wildland fire include the Arroyo Seco/Meder Canyon, DeLaveaga, Pogonip, Moore Creek area and Arana Gulch. Increased use of these areas by residents, transient encampments with fires and young adults looking for a place to gather outside parental supervision, exacerbates the risks.

A fire threat will always exist in a wildland/urban interface area as long as vegetation, trees, down and dead fuels, structures and humans co-exist. There is a high probability that fires will occur in one or more of these areas. It is not a question of *if* they will occur but *when* will they occur, and whether or not the City of Santa Cruz will be prepared.

Given the recent development of insufficient rainfall leading to drought like conditions, it is likely that fuel conditions will remain dry. The increasing trend of developing residences in the wildland urban interface in hazardous areas combined with recreational and transient uses of these locations have exacerbated the situation.

5.3.3 ASSESSING WILDFIRE VULNERABILITY: OVERVIEW

> **3.3 Assessing Vulnerability: Overview Requirement §201.6(c)(2)(ii):**
>
> The risk assessment **shall** include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section.
>
> This description shall include an overall summary of each hazard and its impact on the community.

A OVERALL SUMMARY OF VULNERABILITY TO WILDFIRES

Santa Cruz is a compact city surrounded by greenbelt. While the majority of the city is urban, wildfires remain a threat in several canyons and in the wildland/urban interface. The areas most vulnerable to wildfires within the city are:

- Pogonip
- DeLaveaga
- Moore Creek Preserve
- Arana Gulch
- Arroyo Seco Canyon

Vulnerability is increased in several of these areas due to limited access and transient use. This vulnerability can be further identified with hundreds of homes located in and around these areas, in addition to neighborhood schools, a major state university, commercial facilities, and water storage tanks.

The impact of wildfire on the community could have the potential for devastating effects. These impacts could be the loss of life, environmental damage, and loss of property. During the rainy season, burned-over areas are subject to mudslides and debris torrents which can impact the infrastructure of the city. This downward flow can destroy fish habitats, compromise the water quality provided to customers, and affect the flow of water into the Monterey Bay/Pacific Ocean.

5.3.4 ASSESSING VULNERABILITY: IDENTIFYING STRUCTURES

> **3.4 Assessing Vulnerability: Identifying Structures – Requirement §201.6(c)(2)(ii)(A)**:
>
> The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

A TYPES AND NUMBERS OF EXISTING BUILDINGS, FACILITIES AND INFRASTRUCTURE

Most wildland fire areas are adjacent to residential or open space areas. Only a few public buildings are immediately threatened by wildland fires. Public buildings that are in threat areas are the historic Pogonip clubhouse, DeLaveaga Golf Club and associated buildings, schools and day care centers and some park structures. There are commercial or industrial structures in the threat zone (*see* Table 5-1).

5.3.5 ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

> **3.5 Assessing Vulnerability: Estimating Potential Losses – Requirement §201.6(c)(2)(ii)(B):**
>
> The plan **should** describe vulnerability in terms of an estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Potential Dollar Losses to Vulnerable Structures

Table 5-1 – Wildfire potential loss inventory

Inventory Assets								
WILDFIRE								
	# of Parcels		**# of Structures**		**Critical Structures**		**Loss in Value$***	
Type	**Total**	**Hazard**	**Total**	**Hazard**	**Total**	**Hazard**	**Total**	**Hazard**
Residential	14,808	1,143	17,128	3,279			$6,793,642,000	$1,657,290,000
Commercial	1,480	4	1,293	184			$1,700,635,000	$236,494,000
Industrial	257	12	321	40			$366,560,000	$59,988,000
Religious	57	2	89	12			$128,734,000	$18,424,000
Government	216	75	27	4			$63,524,000	$4,460,000
Schools/Daycare	228	1	57	8			$128,938,000	$44,496,000
Agriculture	5	1	70	10			$22,438,000	$4,504,000
Total	**17,051**	**1,238**	**18,985**	**3,537**	**38**	**1**	**$9,204,471,000**	**$2,025,656,000**
	Community	**Hazard**						
# of People	**59,946**	**5,757**						
DATE:	2010–2011							
Total = total number of structures, residents, values within the entire community								
Hazard= number of structures, residents, values that are located within the defined hazard area								
*Loss is based on Assessment Improvement values.								

B METHODOLOGY USED TO PREPARE ESTIMATE

Parcel Valuation:
Valuation of parcels within a hazard area is based on improvement values only as collected by appraisers with the County of Santa Cruz assessor's office. They don't reflect sale value or replacement value. If a parcel intersected a hazard the entire improvement value of that parcel was used.

Population:
Census population blocks were reduced to center points. If a hazard intersected a center point, that population was counted.

Calculated replacement value for average size home in the area times the number of structures for residential and for each of the commercial structures. The average home is approximately 1,800 square feet. Replacement value is approximately $220 per square foot (2012 Building Department replacement valuation) for an average replacement value of approximately $400,000.

5.3.6 ASSESSING VULNERABILITY: ANALYZING DEVELOPMENT TRENDS

3.6 Assessing Vulnerability: Analyzing Development Trends – Requirement §201.6(c)(2)(ii)(C):

The plan **should** describe vulnerability in terms of providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

C DESCRIPTION OF LAND-USES AND DEVELOPMENT TRENDS

As was discussed previously, the City of Santa Cruz is a compact urban community that is surrounded by natural barriers to outward expansion including the Santa Cruz Mountains, the Pacific Ocean and a designated greenbelt. As the demand for housing increases there is an increased risk created in the urban rural interface.

Although Santa Cruz has over 3,000 acres of greenbelt and parkland, the City does not have the resources to adequately police and protect this area. This inadequate policing increases the frequency of illegal camping (Santa Cruz has a substantial chronic homeless population), which can result in fires in limited access and canyon areas.

5.4.0 MITIGATION STRATEGY

4.0 Mitigation Strategy: Requirement §201.6(c)(3):

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

The City of Santa Cruz has initiated a number of wildfire mitigation programs in the past including the DeLaveaga Vegetation Management Program and the Arroyo Seco Canyon Vegetation Management project.

Providing vegetation management crosses several departments within the City of Santa Cruz. Identified areas for vegetation management include vacant lots, streets, islands, alleys, and greenbelt areas. Some of the practices of vegetation management include frequent mowing and abatement of vegetation in these areas and these activities continue on an annual basis.

The City also continues to maintain and develop cooperative agreements with the County, UCSC, the California Department of Forestry and other fire protection agencies to collaboratively avoid or minimize the threat from wildland/urban interface fires. An initial increase in the number of fire units dispatched to fire-related incidents has been initiated to contain and control these situations at the initial phase of fire development.

Routine and frequent training by local and state fire jurisdictions continues. Implementation of a "reverse 911" community notification and warning system has been developed.

Building partnerships with other City departments, particularly Parks and Recreation and Police, in patrolling wildland areas, is critical to mitigation efforts when staff resources are limited. Adoption of the State fire code has addressed the regulation of building materials, construction requirements, water system supply, and code enforcement in wildland urban interface areas.

Finally, through adoption of local amendments contained in the City of Santa Cruz Municipal Code, the City is more restrictive than the state fire code when it comes to turning radius requirements of fire apparatus in access/egress issues, a "zero-based" fire sprinkler ordinance for fire extinguishing systems, and vegetation management abatement and enforcement.

5.4.1 MITIGATION GOALS

4.1 Local Hazard Mitigation Goals – Requirement §201.6(c)(3)(i):

The hazard mitigation strategy **shall** include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Wildfire Goals:

Wildfire 1 — Avoid or reduce the potential for life loss, injury, property and economic damage to Santa Cruz from wildfire.

Wildfire 2 — Collaborate with other County fire districts, UCSC and the California Department of Forestry in mutual fire protection efforts.

5.4.2 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

4.2 Identification and Analysis of Mitigation Actions – Requirement §201.6(c)(3)(ii):

The mitigation strategy **shall** include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Wildfire Mitigation Actions:

Wildfire protection mitigation strategy includes the following actions:

- Cooperative fire protection agreements with other agencies (A-7)
- Reduction of fire risk in wildland/urban interface areas through improved vegetation management and appropriate code enforcement (A-8)
- Promotion of built-in fire extinguishing and warning fire alarm systems (B-9)
- Creation of a proactive (not reactive) hazard abatement program (B-10)
- Land use planning to reduce incidence of human caused wildfire (C-4)
- Adequate staffing to meet needs of City population and development (C-5)
- Fire prevention programs in schools, institutions and commercial buildings (C-6)