5. Public Health and Safety

This section describes the environmental conditions related to hazards in the study area, including environmental contamination, valley fever, and wildland fire. The "study area" encompasses the general area from Pisgah Crater west along the I-40/old Route 66 corridor to the Daggett area, and south through the Stoddard, North Lucerne, Lucerne, and Apple valleys to Hesperia.

5.1 Environmental Contamination and Hazards

The study area extends approximately 45 miles from Daggett to Hesperia in San Bernardino County, California. To collect information on the existing conditions in the study area, a search of regulatory agency databases, including the California State Water Resources Control Board (SWRCB) Geotracker, Department of Toxic Substance Control (DTSC) Envirostor, and aerial photographs, to verify land uses of concern, was performed. The agency databases identify sites with current or past hazardous waste concerns, such as the use and storage of chemicals, leaks and spills of chemicals, and leaking underground storage tanks. This review was performed in order to note any issues related to use and storage of hazardous materials within the study area. In this instance, the area of environmental contamination and hazards was narrowly defined the CLTP study corridor between the Coolwater Switchyard and Lugo Substation; therefore, other sites with current or past hazardous waste concerns may be present in the study area.

The study area primarily traverses across undeveloped desert areas (Barstow-Daggett area, Stoddard Valley) with local areas of very low-density residential in North Lucerne Valley, low-density residential from SR 18 to the Mojave River (Southern Apple Valley, Ord Mountain, and Summit Valley), and higher density residential uses from the Mojave River to Lugo Substation (Hesperia).

There are no industrial or commercial areas along the study corridor, excluding the existing substations (Coolwater Generating Station/Coolwater Switchyard and Lugo Substation), and no known hazardous waste sites were identified within 0.25 mile of the study corridor.

Military munitions and explosives of concern, principally unexploded ordnance, are known or suspected at former military sites located near the Marine Corps Logistics Base (MCLB) Barstow (Barstow-Daggett area) and near Desert View Road/Milpas Drive (Southern Apple Valley area). Three former World War II era practice bombing ranges occur in the study area, as identified on the U.S. Army Corps of Engineers Formerly Used Defense Sites database: Victorville Precision (or Practice) Bombing Range (PBR) No. 5, located in North Lucerne Valley; and the Victorville PBR No. 4 and No. 6 in Southern Apple Valley (USACE, 2014; Parsons, 2008a, 2008b, 2008c). These former bombing range sites are known or suspected to contain munitions and explosives of concern (e.g., unexploded ordnance), and therefore may present an explosive hazard. In addition, an expanded munitions response site boundary, as well as a remedial investigation/feasibility study, were recommended for both PBR No. 4 and PBR No. 6 (Parsons, 2008b; Parson, 2008c).

In the Barstow-Daggett area is the former Daggett Army Airfield (currently Barstow-Daggett Airport), and at the MCLB Barstow is a rifle range to the south and a closed and capped landfill/waste drum storage site to the north. The Daggett Army Airfield is not characterized as having munitions and

explosives of concern. The rifle range (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] or "Superfund" Area of Concern No. 33) was approved for elimination from the Base remedial investigation as not requiring further environmental investigation. The closed landfill cap cannot be breached (NAVFAC, 2012).

The active Barstow Sanitary Landfill is located in the western portion of the Barstow-Daggett area. The landfill completed installation of perimeter methane gas monitoring probes in March 2009; gas monitoring by San Bernardino County Solid Waste Management Division, in August 2014, identified low levels of methane (less than 2.3 percent) in two of seven perimeter probes and no methane in the other probes (CalRecycle, 2014a). There is no active gas extraction system at the Barstow Sanitary Landfill.

The closed Hesperia Refuse Disposal Site (municipal landfill), located in the Ord Mountain and Summit Valley area, has an active landfill gas extraction system which creates a gas-free perimeter (CalRecycle, 2014b and 2014c).

Permitted underground fuel storage tanks are located at 18920 Danbury Avenue, Hesperia.

5.1.1 Valley Fever

Coccidioidomycosis, often referred to as San Joaquin Valley Fever or valley fever, is one of the most studied and oldest known fungal infections. Valley fever most commonly affects people who live in hot dry areas with alkaline soil and varies with the season. This disease, which affects both humans and animals, is caused by inhalation of arthroconidia (spores) of the fungus *Coccidioides immitis* (CI). CI spores are found in the top few inches of soil and the existence of the fungus in most soil areas is temporary. The cocci fungus lives as a saprophyte (an organism, especially a fungus or bacterium, which grows on and derives its nourishment from dead or decaying organic matter) in dry, alkaline soil. When weather and moisture conditions are favorable, the fungus "blooms" and forms many tiny spores that lie dormant in the soil until they are stirred up by wind, vehicles, excavation, or other ground-moving activities and become airborne.

Persons exposed to airborne CI arthrospores may become infected with valley fever. The study area is designated as highly endemic for valley fever (CDC, 2014). Construction workers, agricultural workers, and other people who are outdoors and are exposed to wind, dust, and disturbed topsoil are at an elevated risk of contracting valley fever. The resulting infection is most likely to have no symptoms or present with mild cold like symptoms, but it can cause flu like symptoms, or in rare cases (one percent) cause a disseminated form of the disease that can cause severe disabling illness or death.

5.2 Wildland Fire

The study area is located in the western portion of the Mojave Desert in San Bernardino County, California. A large portion of the study area is located on BLM-administered federal land.

5.2.1 Fire Ecology

Scientists consider wildfires in the Mojave Desert to have been historically infrequent and small in size due to low or limited production of native vegetation and infrequent natural ignitions (Brooks, 2005). However, the frequency and size of wildfires have increased due to an increase in human activity and the introduction and proliferation of non-native annual grasses, especially following years with heavy

rainfall (Brooks & Matchett, 2006). These non-native grasses fill spaces between native plants that would have been mostly barren and/or patchy, creating an unnaturally continuous fuelbed across the landscape. After wildfires burn across a landscape, the non-native species tend to dominate (Brooks & Matchett, 2006), thereby modifying the fire regimes in the Mojave Desert with increased frequency, intensity, extent, type, and/or seasonality of wildfire (Brooks & Matchett, 2006).

A fire regime is defined by the:

- Type of fire such as ground, surface, or crown fire;
- Fire frequency or how often they burn;
- Fire intensity or the amount of heat released;
- Fire severity and how ecosystems respond;
- Fire size; and
- Seasonality of when wildfires burn (Barrett et al., 2010).

The prominent fire regime for the study area is identified as Group III, which has a fire frequency of 35 to 200 years (BLM, 2003).

When fire regimes are modified, the recovery of native species following wildfire can be compromised and landscapes can be converted to new vegetation types that are better adapted to the new fire regime (Brooks, 2008). Table 5-1 describes the fire regime groups used by fire managers.

Table 5-1. Fire Regime Groups with Descriptions

Group	Frequency	Severity	Severity Description
I	0-35 Year	Low/Mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0-15 Years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35-200 Years	Mixed/Low	Generally mixed-severity; can also include low severity fires
IV	35-199 Years	Replacement	High-severity
V	200+ Years	Replacement/ Any Severity	Generally replacement severity; can include any severity type in this frequency range

Source: Barrett et al., 2010

The Fire Regime Condition Class (FRCC) classifies the amount of departure from the natural regime that results in changes to one (or more) of the following ecological components: vegetation; fuel composition; fire frequency, severity, pattern; and other associated disturbances, such as insects, disease, drought, and grazing.

The dominant FRCC for the study area is FRCC 1 except in portions of the study area that contain stands of pinyon-juniper where the FRCC is identified as FRCC 2 (BLM, 2003). The FRCC class descriptions with potential risks are described in Table 5-2.

Table 5-2. Fire Regime Condition Class Descriptions

FRCC	Description	Potential Risks
Condition Class 1 < 33% departure	Within the natural (historical) range of variability of vegeta-tion characteristics; fuel composition; fire frequency,	• Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics.

Table 5-2. Fire Regime Condition Class Descriptions		
FRCC	**Description**	**Potential Risks**
	severity and pattern; and other associated disturbances.	• Composition and structure of vegetation and fuels are similar to the natural (historical) regime.
Condition Class 2 33 to 66 % departure	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	• Risk of loss of key ecosystem components (e.g., native species, large trees, and soil) are low. • Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). • Composition and structure of vegetation and fuel are moderately altered. • Uncharacteristic conditions range from low to moderate
Condition Class 3 > 66% departure	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	• Risk of loss of key ecosystem components are moderate • Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). • Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. • Risk of loss of key ecosystem components are high

Source: Barrett et al, 2010.

5.2.2 Fire History

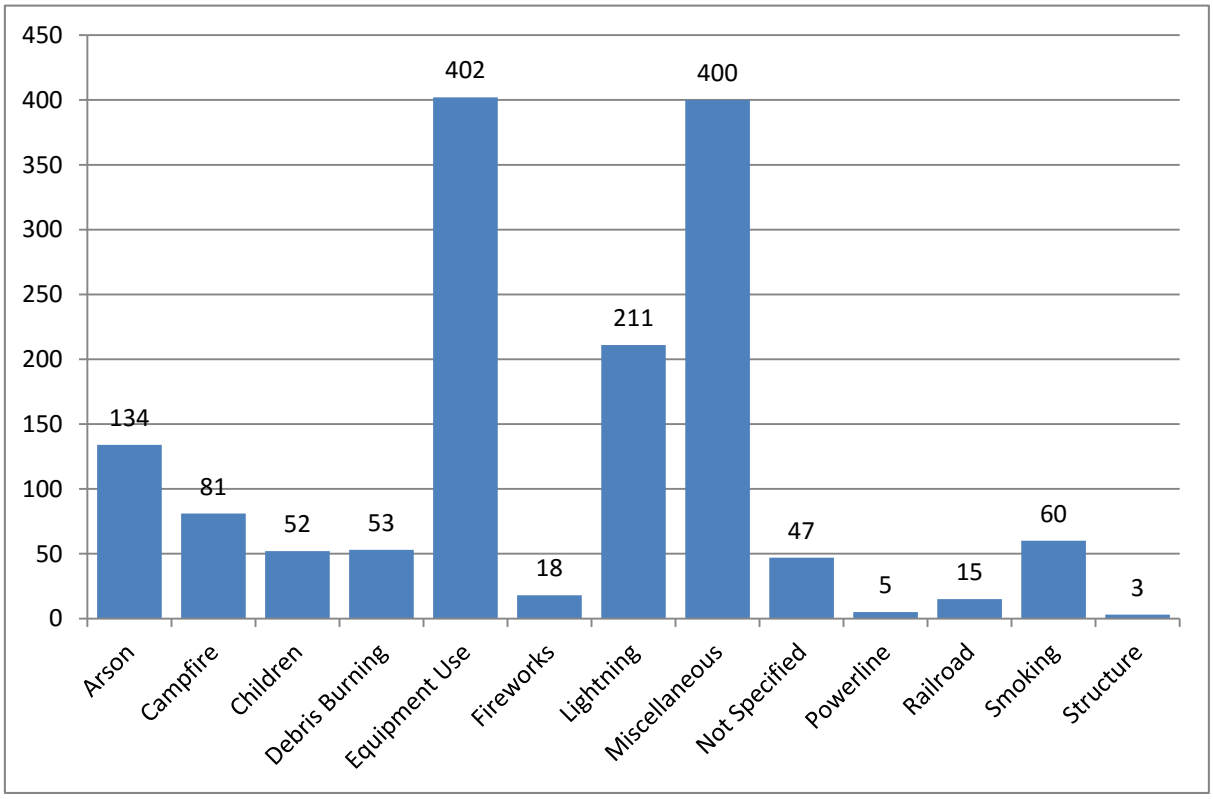
Fire occurrence, or risk, in the study area has been primarily human caused. Fire causes range from equipment use (i.e., welding, grinding, heavy equipment such as dozers, and internal combustion engines without spark arrestors), vehicle accidents/fires, campfires, railroads, smoking, electrical, playing with fire, and arson; however, lightning-caused fires do occur, especially along prominent mountain ranges in the study area during Monsoon season from June to July (BLM, 2003). Figure 5-1 depicts wildfire ignitions by cause from 1992 to 2012 and Figure 5-2 (located at the end of this chapter) shows the fire history of the study area from 1992 to 2013.

Large fires (greater than 100 acres), although infrequent, do occur in the study area. These larger wildfires are primarily wind or topography driven and dependent on invasive annual grasses after wet winters (BLM, 2003). Table 5-3 lists large fire history in the study area.

Table 5-3. Large Fire History			
Fire Name	**Year Burned**	**Agency of Origin**	**Acres Burned (Estimated Acres)**
Los Flores	2007	San Bernardino County	1,600
Willow	1999	San Bernardino National Forest	63,507
Fairview	1989	San Bernardino County	10,957
Stoddard #2	1984	San Bernardino County	2,301

Source: Short, 2014

Figure 5-1. Wildfire Ignitions by Cause (1992-2012)



Source: Short, 2014

5.2.3 Wildfire Environment

The interaction of vegetation/fuels, topography, and weather affect the likelihood of a fire starting, the speed and direction at which a wildfire will travel, the intensity at which a wildfire burns, and a firefighter's ability to control or extinguish it. Wildfires in the study area have been attributed to high winds and extensive annual grass growth after a wet winter or El Niño weather event (BLM, 2003; CAL FIRE/San Bernardino County Fire Department, 2013).

For purposes of the discussion below, the term "risk" considers the probability of an ignition, while "hazard" refers to the state of the vegetation or "fuel", exclusive of weather or the area in which a fuel is found.

Vegetation/Fuels

Vegetation is the primary fuel source for wildfires and is the most important factor in determining fire hazard and risk. Fuel types in the study area include Mojave creosote bush, scattered desert saltbush, Joshua trees, alkali scrub, native perennials, and pinyon-juniper woodlands at the higher elevations.

Typically, the pattern of fuels within the study area is broken and patchy with bare ground interspaced with the larger vegetation such as shrubs and trees. However, in years with high rainfall, the influx of non-native annual grasses occurs, especially *Bromus rubens*, producing continuous fuels in a fuelbed that is otherwise normally patchy (BLM, 2003). These grasses tend to dry out quickly, earlier in the season, and ignite more easily than larger fuels like shrubs and trees. In addition, these grasses can

significantly contribute to the amount of fuel, or fuel loading, normally found in a desert ecosystem leading to higher fire intensities.

Topography

Topography is the configuration of the earth's surface including its relief and the position of its natural and human-made features. Topography modifies general weather by channeling wind direction, inducing slope and valley winds, creating thermal belts, and producing orographic thunderstorms. Factors of topography that affect fire behavior include slope, aspect, terrain or land features, and elevation.

The topography within and adjacent to the study area is relatively flat and is characterized by broad valleys with several ridges including Daggett and Stoddard Ridges. Large alluvial fans and dry lakes/playas are also characteristics of the area. Elevations range from 5,275 feet (Sidewinder Mountain) down to around 2,600 feet (Lucerne Dry Lake). There are few ridges and mountains in the study area and, in general, these slopes range on average from 6.5 to 9.5 percent with the steepest slope reaching up to 159 percent.

Weather

Weather is the most variable element in the wildland fire environment and the least predictable. The components of fire weather are temperature, relative humidity, precipitation, wind, and atmospheric stability. These components influence fire ignition, fire behavior, fire danger, and fire suppression.

Winter days are usually in the 60 to 70°F range during the day but can drop to 5°F at night. Spring and fall temperatures are moderate and fall between these extremes. During the winter, southwest winds dominate as a function of the polar jet stream and frontal movement. During the spring and fall, the transition between these two primary stages creates an opportunity for very strong winds.

Summer days can be hot and dry, with 110°F temperatures and relative humidity in the single digits. During the summer North American Monsoon season, moisture is pulled north from the Gulf of Mexico into the Mojave Desert creating thunderstorms from mid-June through July, although most of the annual precipitation falls during winter months. Winds in the vicinity of thunderstorms can reach over 60 mph.

Weather conducive to wildfire can occur in the study area at any time of the year at the lower elevations, although the predominant season is during the spring and early summer in the lower elevations and the late spring through summer at higher elevations. Fire season characteristics and timing depend on precipitation levels (as they affect vegetative fuel accumulation) and the extent and severity of the monsoon. If winter precipitation is well above normal, the herbaceous fuel load increases fire behavior potential by creating a continuous fuelbed of annual grasses and forbs that cure in late spring to early summer. If the monsoon develops late or with reduced extent and intensity, the study area may not get wetting rain with the annual summer thunderstorms, and a high number of ignitions may occur associated with "dry" lightning.

Communities at Risk

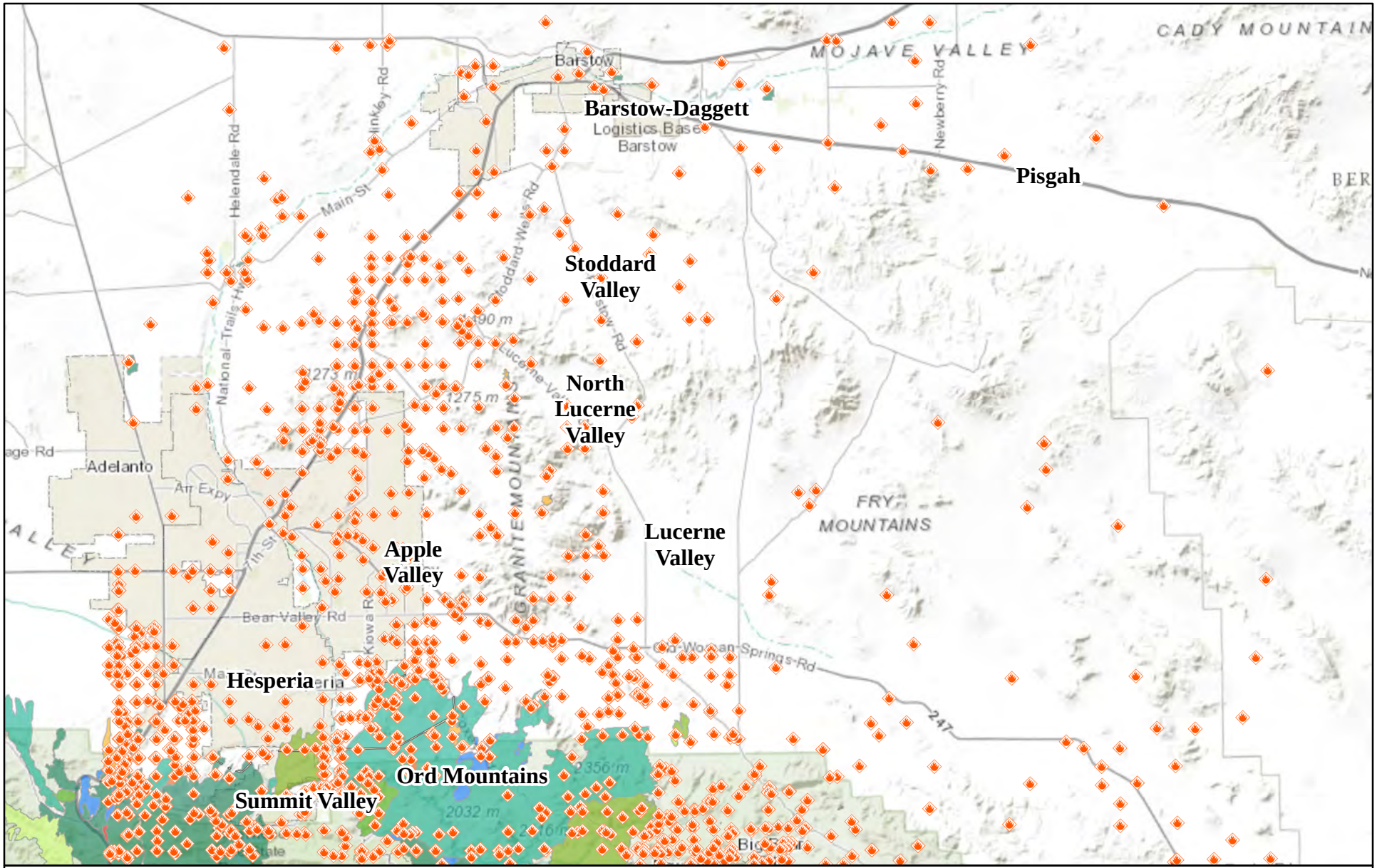
As a result of the 2000 National Fire Plan and 2004 Healthy Forest Restoration Act, the California Department of Forestry and Fire Protection (CAL FIRE) undertook the task to develop a list of "communities at risk" (CARs) and identify the level of fire threat to these communities for the State of

California. CAL FIRE used three main factors to determine which communities were at risk and their level of fire threat. These factors include: (1) high fuel hazard, (2) probability of a fire, and (3) proximity of intermingled wildland fuels and urban environments that are near wildfire threats.

The communities of Hesperia, Apple Valley, and Victorville in or near the study area have been identified as CARs (CAL FIRE, 2014). Although these communities are the only identified CARs, there are other communities and isolated structures that would be at risk in the event of a wildfire in or near the study area.

Fire Protection

Multiple agencies provide fire protection within the study area. BLM and San Bernardino County Fire Department provide the greatest coverage for fire protection, but Apple Valley Fire Protection District, Barstow Fire Protection District, and the Barstow Marine Corps Logistics Base Fire Department provide coverage to their direct protection areas or, when additional resources are required, on nearby incidents. These agencies, among others in neighboring areas, have a Mutual Aid Agreement in which the parties have agreed to furnish resources and facilities and to render services to each party of the agreement to prevent and combat any type of disaster or emergency.



Fire History
(1992-2013)

Figure 5-2