Ember Exposure Zones

Spot fires generated from embers produced by a wildland fire are a function of three elements of the wildland fire environment; firebrand sources, transport mechanism and a receptive fuelbed away from the main fire. Without all of these elements occurring within the fire environment, spot fires will not propagate and spread. A fire burning within or adjacent to the Planning Area has ready access to fuels that will support fire brand production and the convection column of a fire influenced by the prevailing winds provides the transport mechanism; however, the availability of a receptive fuelbed is highly variable.

The definition of a receptive fuelbed is a fuel that will ignite and support the spread of a wildland fire when a fire brand lands on it. This may be native or ornamental vegetation, but could also be debris found in rain gutters or flammable roofing or deck materials. Obviously roads, parking lots, lawns, some agricultural lands and bare ground limit the probability that every ember from a wildfire will cause a spot fire.

The Planning Area has a unique structural composition ranging from fire hardened stucco and tile roofed residences common in the lower foothills, to wood-sided and roofed buildings found in many of the mountain communities, including Rosario Park and Painted Cave. Native vegetation types are most prevalent in the mountain communities, while the abundance of ornamental vegetation associated with structures increases in the lower elevations of the Planning Area. This mix of native and ornamental vegetation serves as potential receptive fuels within the more densely developed portions of the Planning Area.

No matter the environmental setting, proactive steps can be taken by homeowners to harden their structure from the potential damage associated with a spot fire. Most important of these steps is compliance with California Public Resources Code (CPRC) Section 4191, which defines the standards for defensible space near a structure. More details regarding this subject can be found in Section XXXX.

This CWPP uses fire modeling to evaluate the potential ember exposure of spatially specific locations expected an under off shore winds associated with a Sundowner weather event. While spotting can occur from fires burning under onshore winds, fire intensity is typically lower on fires burning under these conditions. Lower fireline intensity leads to fewer firebrands produced and shorter transport distances for firebrands when compared to normally stronger off shore winds.

The MAXSPOT output of FlamMap is used to evaluate the maximum distances that a fire brand should travel given a 60 mph wind blowing from the north. While FlamMap is considered best available science for fire modeling, it does have limitations when it comes to evaluating chaparral dominated systems. A limitation of this model is that spotting from chaparral fuels is based on a surface fire not a crown fire. This limitation of the model means that ember exposure as presented in Figure XX is likely

underrepresented and should be used for comparative purposes rather than a specific quantified measurement of the maximum spotting distance of a wildfire. For this reason a relative scale to quantify ember exposure is used in the CWPP.

To derive the Ember Exposure map the maximum spotting distance of each pixel on the digital landscape was determined from FlamMap using a 60 mph northeast wind and the "dry" fuel moisture scenario. (3%, 4%, 5%, 30%, 60%). Using the outputs from FlamMap each pixel on the landscape was buffered using GIS to represent the maximum spotting distance. For example, a pixel with a 300-foot MAXSPOT distance was buffered 300 feet in all directions from the center of the pixel. This creates a circle on the digital landscape with a 300-foot radius. When GIS applies this concept to all pixels on the landscape, a series of overlapping circles is developed. The number of overlapping circles for any pixel is then determined and evaluated against other pixels on the landscape to establish the relative intensity of the number of possible ember sources that can provide an ember to a pixel. Pixels with a high number of potential ember sources are rated a *"High Ember Exposure Zone"* while areas where fewer external sources of embers impact a pixel are considered a *"Low Ember Exposure Zone".* The gradation between these two ember exposure extremes creates the colored coded frequency map used to evaluate the potential of an ember landing on any specific location of the landscape (Figure XX) INSERT CRYSTAL's MAP

It is important to acknowledge that it only takes a single ember to create a spot fire or to ignite flammable vegetation near a structure, therefore areas classified as a *"Low Ember Exposure Zone"* are still at risk during a wildfire.

To account for the fact that FlamMap does not fully consider ember production from chaparral fuels, a second method to evaluate spot fire potential within the Planning Area is presented. For this evaluation, BEHAVE Plus is used to determine how far an ember could be transported from the flaming front of a wildfire under a variety of wind speeds.

The point of the flaming front considered in this analysis was near the intersection of East Camino Cielo and Painted Cave Roads. Using a variety of 20-foot wind speeds, spotting distances were determined (Table XX). This table shows that under the strongest winds evaluated, improvements more than a mile downwind may be exposed to the ember cast of a wildfire.

Table XX. Maximum Spotting Distance – BEHAVE Plus

20-foot Wind Speed (mph)	Maximum Spotting Distance (miles)
30	0.8
40	1.0
50	1.2
60	1.4
70	1.7
Based on a 13-foot surface flame lengths, three torching trees and a downwind canopy height of 30 feet.	