

EAGLE RIDGE PRESERVE DRAFT FIRE MANAGEMENT PLAN



Prepared for
The Orange County Transportation Authority

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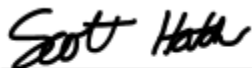
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**EAGLE RIDGE PRESERVE
DRAFT FIRE MANAGEMENT PLAN**

- Table of Contents -

EXECUTIVE SUMMARY	1
I. PURPOSE AND SCOPE OF PLAN	4
II. REGULATIONS, POLICIES AND GUIDELINES	5
A. Purchase History	5
B. Land Management Objectives Related to Wildland Fire	5
C. Regulatory Context	5
III. EXISTING CONDITIONS	7
A. Land Ownership	7
B. Natural Resources/Physical Environment	9
i. Topography and Elevation	9
ii. Climate and Weather	10
iii. Hydrology	12
iv. Soils	12
v. Vegetation Types, Protected Species	12
vi. Wildlife Types, Protected Species	15
vii. Historical Influences	15
viii. Cultural Resources	16
ix. Fire History	16
x. Recreational Resources	17
xi. Structures and Built Values at Risk	20
xii. Access	20
IV. ANALYSIS OF HAZARDS, RISK	21
A. Description of Fuel Types Present on the Preserve	22
B. Predicted Fire Behavior on the Preserve	25
i. Flame Length	26
ii. Rate of Spread	30
iii. Crown Fire Activity	33
C. Fire Hazard Severity Zone Ratings	36
V. FIRE MANAGEMENT PROGRAM	38
A. Pre-fire/Ignition Prevention	39
i. Orange County Transportation Authority Responsibilities	39
ii. Brea Fire Department Responsibilities	42
B. Wildfire Response	45
i. Orange County Transportation Authority Responsibilities	45
ii. Brea Fire Department Responsibilities	47
C. Wildfire Suppression Repair	50

i. Lead Agency Responsibilities	50
D. Wildfire Recovery	52

REFERENCES **54**

APPENDICES

- A. Fire Suppression Repair Standards and Example of Plan
- B. Glossary of Terms
- C. Environmentally Sensitive Lands Maps
- D. Wildland Urban Interface Pre-attack Plan

Acronym List

ASA – Archaeological Sensitivity Assessment
 BFD – Brea Fire Department
 BTU/lb – British Thermal Unit per pound
 CAL FIRE – California Department of Forestry and Fire Protection
 CAL OSHA – California Division of Occupational Safety and Health
 CDFW – California Department of Fish and Wildlife
 COAST – County of Orange Area Safety Taskforce
 EMP – Environmental Mitigation Program
 FHSZ – Fire Hazard Severity Zones
 FRAP – Forest Resource Assessment Program
 GPS – Global Positioning System
 IAP – Incident Action Plans
 IC – Incident Commander
 ICP – Incident Command Post
 ICS – Incident Command System
 IRC – Irvine Ranch Conservancy
 M2 – Renewed Measure M
 NCCP/HCP – Natural Community Conservation Plan/Habitat Conservation Plan
 OC Go – Rebranded Measure M2
 OC Parks – Orange County Parks
 OCFA – Orange County Fire Authority
 OCTA – Orange County Transportation Authority
 PCA – Priority Conservation Areas
 PRC – Public Resources Code
 RA – Resource Advisor
 SEMS – State Emergency Management System
 USACE – United States Army Corps of Engineers
 USFS – United States Forest Service
 USFWS – United States Fish and Wildlife Service

EAGLE RIDGE PRESERVE DRAFT FIRE MANAGEMENT PLAN

EXECUTIVE SUMMARY

In 2006, Orange County voters approved the renewal of Measure M (M2), effectively extending the half-cent sales tax to provide funding for transportation projects and programs in the County. In 2017, Measure M2 was rebranded as OC Go. As part of M2 OC Go, a portion of the freeway program revenues was set aside for the Environmental Mitigation Program (EMP). The EMP allocates funds three ways: to purchase conservation properties, to restore habitat, and to manage those lands in exchange for streamlined project approvals for 13 freeway improvement projects included in the OC Go Measure.

The M2 OC Go freeway projects have the potential to impact protected habitats and biological resources including plants and wildlife. State and federal laws require that impacts to these resources be reduced (mitigated). To do this, the Orange County Transportation Authority (OCTA) coordinated with the California Department of Fish and Wildlife (CDFW) as well as the United States Fish and Wildlife Service (USFWS) (collectively referred to as Wildlife Agencies) and developed a Natural Community Conservation Plan/Habitat Conservation Plan (Conservation Plan). Conservation properties (Preserves) that possess habitat and important wildlife species that are similar to those affected by the construction of the M2 OC Go freeway projects have been purchased from willing sellers and are included in the Conservation Plan. These Preserves will remain in a natural state and will remain protected in perpetuity from development.

The purpose and scope of this fire management plan for the 301-acre OCTA Eagle Ridge Preserve (formerly known as Hayashi Preserve) is to provide a blueprint for protecting the natural environment of the Preserve to the greatest extent possible against both wildfire and damage from suppression activities. Simultaneously, OCTA aims to provide safety to neighboring vulnerable assets. This Preserve was selected for purchase by OCTA in large part because it contains very high-quality natural resources. Consequently, preserving those resources is a responsibility and top priority. This Plan has been approved by both the Wildlife Agencies as well as the Brea Fire Department (BFD) and the Orange County Fire Authority (OCFA).

Eagle Ridge Preserve (Preserve) was identified as a Priority Conservation Area (prior to the development of the Conservation Plan) because it supports identified species covered by the Conservation Plan and associated natural communities; and contains a diversity of high-quality habitat types, including California walnut groves, ephemeral and intermittent streams supporting riparian woodland, laurel sumac scrub, and oak woodland. Its location supports local and regional biological connectivity between the Chino Hills State Park and lands owned by Orange County Parks, Cleveland National Forest, and other conserved open space. One structure (garage) was recently constructed to the North of the Preserve. Although the new structure is within 100 feet of the Preserve, OCTA worked with the city to document that fuel modification on the Preserve would not be required. The homeowner has

built the structure using non-combustible materials, committed to install a sprinkler system and will be responsible for vegetation thinning on their property.

The Preserve is located between the Puente Hills to the northwest and the Santa Ana Mountains to the south. The Preserve consists of predominantly rolling terrain dominated by a central ridgeline between Carbon Canyon and Soquel Canyon. Two principal drainages that flow in a westerly direction, Carbon Canyon Creek and Soquel Canyon Creek, are located on the Preserve: several small ephemeral drainages flow into Soquel Canyon Creek from within the property limits. Temperatures in interior valleys of Southern California, such as in the Preserve, often exceed 40 degrees Celsius¹ (104 degrees Fahrenheit). Santa Ana winds are common in the fall. The most recent fire on the Preserve was the 2008 Freeway Complex Fire, and several other large fires have spread nearby. Fuel types known as Moderate Grass and Grass-Shrub fuel types dominate the landscape.

In critical fire weather, fires burn with extreme behavior, high rates of spread and long-range spotting. The Preserve area is within a historical fire corridor that has experienced 27 Santa Ana wind-driven major fires in the last 45 years, with a total loss of 325 homes. Fire behavior modeling predicts that once a fire is ignited, fire will generally spread quite fast along the Preserve's slopes and canyons, especially under uphill wind conditions. Under this scenario, half of the Preserve is predicted to burn with flame lengths longer than 20 feet, which is likely to confound the best fire suppression efforts. Also in this uphill wind scenario, most of the vegetation on the Preserve is expected to produce torching fires during a wildfire, which would produce and distribute embers ahead of the wildfire, with some very small patches of crown fires. There are significant differences in burning characteristics between a fire of the same windspeed that burns with northeast wind versus an uphill wind, with rates of spread and flame lengths becoming much more severe in uphill wind conditions. However, strong northeasterly winds, commonly called 'Santa Ana winds', often blow faster than winds from the west.

Pre-fire vegetation treatments proposed to be implemented as part of this FMP are limited to "conducting regular maintenance of weeds along existing fire roads and maintaining safe access for firefighters on existing fire roads."² Discussions with the BFD resulted in agreement that no vegetation management will be required on the fire road and trails as only a minor benefit of doing such – in terms of fire containment – would result.

Responsibilities of OCTA, BFD, and OCFA during a wildfire are detailed in this plan. The draft FMP recommended that a Resource Advisor (RA) position be established to communicate the location of sensitive resources that, if possible, should be avoided to the Wildland Resource Planner (WRP) during and following fire agency response to an active fire incident. The OCTA staff has completed the required training (National Park Service Wildland Fire Resource Advisor training) to be certified as an RA and is ready to provide this service during an incident. Post-fire actions are guided by a CAL FIRE Fire Suppression Repair Plan (see Section V-C and Appendix A) to ensure suppression repair actions are effective. Fire

¹ Fire in California Bioregions, In: Fire in California's Ecosystems, Sugihara et al. 2006.

² Hayashi Preserve Resource Management Plan (August 2017) Executive Summary, page 2.

prevention is supported by patrols, camera placement as part of the ALERTCalifornia Consortium, and monitoring by the OCTA. Appendices offer further specifications on vegetation management standards and post-wildfire suppression repair standards.

I. PURPOSE AND SCOPE OF PLAN

The M2 Conservation Plan requires a fire management plan be created for each Preserve in consultation with the local fire department and/or the OCFA. In addition, the development of a fire management plan is specified as an Adaptive Management Objective with a Strategy/Management Action in the Conservation Plan and must also be approved by the Wildlife Agencies.

The purpose and scope of this fire management plan is to provide a blueprint for protecting the natural environment of the Preserve to the greatest extent possible against both wildfire and damage from suppression activities, while at the same time providing safety to neighboring vulnerable assets at risk. This Preserve was selected for purchase by the OCTA in large part because it contains very high-quality natural resources. Consequently, preserving those resources is a top priority. The aim of this plan is that it be easy to implement, be followed by city, county, and state officials, reinforce funding requests, and cultivate strong partnerships.

II. REGULATIONS, POLICIES AND GUIDELINES

A. Purchase History

OCTA purchased the Eagle Ridge Preserve in 2011, subsequent to the 2006 passage of Measure M2, which provided revenue for the Environmental Mitigation Program (EMP) intended in part to offset the impacts from the freeway projects that were also funded by the measure. This Preserve is one of seven Preserves that were identified as Priority Conservation Areas and selected for purchase because of their high environmental value.

This Preserve contains a diversity of high-quality habitat types, including California walnut groves, ephemeral and intermittent streams supporting riparian woodland, laurel sumac scrub, and oak woodland, and the species within them. It is bounded on the south and east by Chino Hills State Park and is near the Cleveland National Forest³ and other conserved open space lands that are part of the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) Reserve to the south. Private residential neighborhoods are west of the Preserve and separated from the Preserve by undeveloped open space.

B. Land Management Objectives Related to Wildland Fire

The county-wide OCTA Conservation Plan, finalized in 2016, encompasses all seven Preserves purchased subsequent to the 2006 passage of measure M2. An individual Resource Management Plan (RMP) was also prepared for each Preserve. This Preserve fire management plan aligns with the existing framework of policies and guidelines directing management and protection of the Preserve that has already been established in the RMP.

This plan addresses all stages of the fire cycle: ignition prevention, pre-fire vegetation management, suppression, and post-fire responses. Because of the high values at risk and their vulnerability to fire, it is important for the plans to be supported by evidence-based data and to promote best management practices regarding ecosystem resiliency, ignition prevention, and urban interface protection. Any management actions recommended and accepted by OCTA should be reflected in the RMP updates. This fire management plan will be incorporated into the RMP and is to be re-evaluated every five years and updated as conditions change.

C. Regulatory Context

The Eagle Ridge Preserve falls within the City of Brea General Plan where development is governed by the Carbon Canyon Specific Plan (City of Brea 2003). The BFD, OCFA, and CAL FIRE are all involved in fire response and control within this Preserve. This area is within a Local Responsibility Area where the BFD has jurisdictional responsibility for wildfire protection; OCFA will respond to protect adjacent State Responsibility Areas. Because of its

³ US Forest Services. 2018. The Cleveland National Forest is created!
<https://www.fs.usda.gov/detail/cleveland/learning/history-culture/?cid> Accessed April 3, 2018

inclusion in the Conservation Plan and existing natural resources, regulatory agencies that have jurisdiction over portions of the Preserve include the CDFW and USFWS.⁴

Documents that have been considered as complementing the fire management plan for the Preserve include: the OCTA Eagle Ridge RMP (titled Hayashi Preserve RMP when written), the fire management plan for the Nature Reserve of Orange County and its Strategic Implementation Guide, OCFA Strategic Unit Fire Plan, Orange County Ignition Reduction Strategy, The Carbon Canyon Community Wildfire Protection Plan, and the Community Wildfire Protection Plan for Orange County. The Orange County CWPP describes possible activities and programs that can bolster wildland fire safety for communities and natural resources throughout the portions of the County where there is a risk of wildfire; new activities and programs that affect the OCTA Preserves should be referenced in the CWPP as it is updated so that funding and implementation can be facilitated. This may be particularly useful when unforeseen circumstances occur, and funding should be expedited.

⁴ Hayashi Preserve Resource Management Plan (August 2017), Executive Summary.

III. EXISTING CONDITIONS

A. Land Ownership

The 301-acre Eagle Ridge Preserve is located within a large block of undeveloped land in northeastern Orange County, in the Chino Hills north of the Santa Ana mountains, between the Cities of Brea and Chino Hills. The Preserve and adjacent undeveloped lands constitute a significant swath of natural open space connecting Los Angeles, Orange, San Bernardino, and Riverside Counties. Specifically, the property is located in the City of Brea southeast of the Olinda neighborhood, adjacent to the south side of Carbon Canyon Road (State Route 142), east of its intersection with Valencia Avenue, and is accessed from Canyon Road, Carbon Canyon Access Road, North Spur Road, and Soquel Canyon Road. Chino Hills State Park borders the Preserve to its south and southeast; other surrounding land uses include private organizations such as Saint Joseph's Hill of Hope, Boy Scouts of America, Chino Hills Country Club, and areas of low density, rural residential development. Low density residential development in the Olinda Village and Hollydale Mobile Home Estates neighborhoods of the City of Brea is present west of the property; access to these developments do not provide access to the Preserve. A dirt access road, Carbon Ridge Road, bisects the Preserve along its main ridgeline, an unpaved trail cuts through the eastern quadrant of the Preserve at the bottom of Soquel Canyon. During the 2012 general and focused biological surveys, cattle were directly observed throughout the property, including on the ridgeline, slopes, and bottom of Soquel Canyon. Cattle paths cross the slopes throughout the property and evidence of erosion due to cattle is visible in the southwest portion of the site.

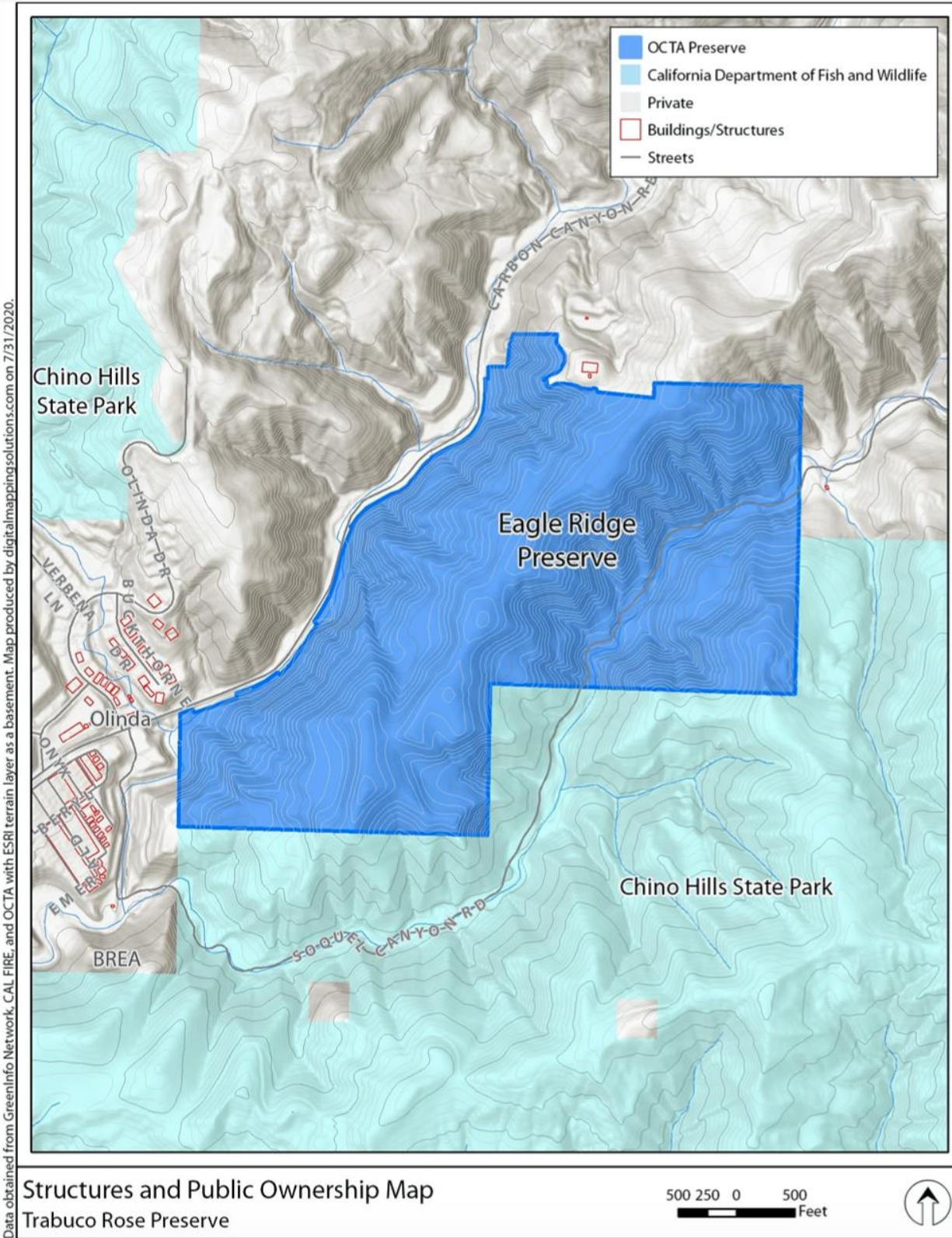


Figure 1. Structures within 1,000 feet, land ownership, and streets near Eagle Ridge Preserve.

B. Natural Resources/Physical Environment

i. Topography and Elevation: The Preserve is located in the Puente-Chino Hills formation and consists of predominantly rolling terrain. Biological surveys were conducted on the Preserve in spring/summer 2012 to establish baseline biological conditions and assess special-status species, including Covered Species, and their associated natural communities (BonTerra Consulting 2013). The majority of the information below was obtained from that report. Additional bird surveys were conducted in 2021; the results of these surveys are reflected in Appendix B, Environmentally Sensitive Lands Map.

The overall landscape is arid and sloping, vegetated with California walnut groves, coast live oak woodland, and wide swaths of chaparral; large patches of grassland occur throughout the property, especially on its southern border, and riparian areas are present in the lowlands of Carbon Canyon and Soquel Canyon (see Figure 3). According to surveys conducted in 2012 and described in the RMP, California walnut groves represent the main habitat type (~134 acres). Scrub chaparral (~59 acres) is the next most dominant type; California walnut groves – Laurel Sumac Scrub association, semi-natural herbaceous stands, Coast Live Oak woodland, and mulefat and willow thicket riparian areas are also found on the Preserve (see Table 3).

The Eagle Ridge Preserve is an important component in managing the larger ecological functions of the area and provides habitat connectivity to other key protected wildlands. Habitat is discussed further, in the context of special status species, under subsection v and vi, below.

Eagle Ridge Preserve	Acres	Percent
East	34.44	12%
North	25.02	8%
Northeast	11.59	4%
Northwest	86.95	29%
South	25.25	9%
Southeast	40.81	14%
Southwest	15.95	5%
West	55.84	19%
Total Acres	295.86	

Table 1. Summary of aspect of Eagle Ridge Preserve.

Two principal drainages that flow in a westerly direction, Carbon Canyon Creek and Soquel Canyon Creek, are located on the Preserve. Soquel Canyon Creek crosses the eastern corner of the Preserve and appears on the USGS quadrangle as a blue-line stream, several small ephemeral drainages flow into this larger drainage from within the property limits. A ridgeline runs across the center of the property in a northeast-southwesterly direction with steep slopes down to Soquel Canyon and Carbon Canyon. Elevations range from 650 to 1,260

feet above mean sea level (msl). Slope steepness ranges from 0.5 to over 100 percent, although the vast majority of the landscape ranges from strong-to-steep slope (18-100%).

Eagle Ridge Preserve	Acres	Percent
Level (0-0.5)	none	none
Nearly level (0.5 - 2)	0.63	0.2%
Very gentle slope (2 - 5)	2.35	1%
Gentle slope (5 - 9)	4.59	2%
Moderate slope (9 - 15)	12.86	4%
Strong slope (15 - 30)	54.46	18%
Very strong slope (30 - 45)	80.18	27%
Extreme slope (45 - 70)	103.13	35%
Steep slope (70 - 100)	36.67	12%
Very steep slope (> 100)	0.98	0.3%
Total Acres	295.86	

Table 2. Summary of slope steepness of Eagle Ridge Preserve.

ii. Climate and Weather: Weather conditions significantly impact both the potential for ignition, the fire's rate of spread, intensity, and direction of fire growth. The most important weather variables used to predict fire behavior are wind, temperature, and humidity.

Wind direction and velocity profoundly affect fire behavior, but wind is considered the most variable and unpredictable weather element. Wind increases the flammability of fuels both by removing moisture through evaporation and by angling the flames so that they heat the fuels in the fire's path. The direction and velocity of surface winds can also control the direction and rate of the fire's spread. Aloft winds, defined as those that blow at least 20 ft above the ground, carry embers and firebrands downwind. Embers and firebrands carried downwind can ignite spot fires that precede the primary fire front. Gusty winds cause a fire to burn erratically and make it more difficult to contain.

Santa Ana winds create the most severe fire danger and typically blow from the northeast to the southwest. Northeasterly winds are especially conducive for the spread of embers because these winds are often particularly strong and often coincide with times of low humidity.

However, winds from the west are also likely to cause a significant risk of wildfire, especially if followed by a Santa Ana wind event. Another scenario is a fire driven by a westerly wind that follows a Santa Ana event or episode. Because the northeast wind is normally associated with low humidity and high temperatures, it dries the fuels. At the end of this Santa Ana wind

condition, fog can move quickly shoreward, pushed by a brisk, high-speed westerly wind. Under these conditions, the fuels would still be dry from the previous weather conditions and burn at a high rate.

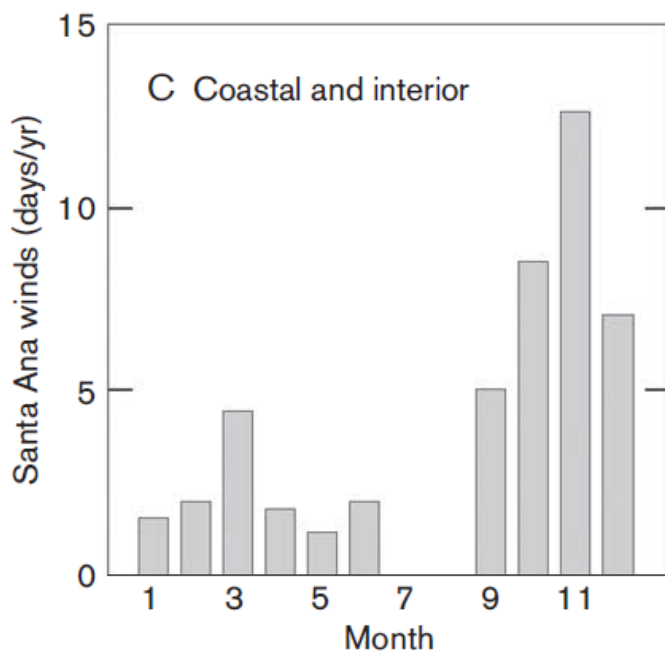


Figure 2. Average number days per month in which Santa Ana winds occur.⁵

The Preserve's location in proximity to the coast influences its weather conditions. It has the warm, dry summers and cool, moist winters characteristic of the coastal area. There are 37 days annually when the high temperature is over 90°F; August is the hottest month, with 22 days per month exceeding 90°F. The area averages about 12 inches of precipitation a year, primarily in the fall and winter. Most of the measurable rainfall generally occurs during the winter months (mid-October to mid-April). According to the Resource Management Plan for the Preserve, "Rainfall patterns are subject to extreme variations from year to year and longer-term wet and dry cycles." Moreover, "[i]n Southern California, precipitation is characterized by brief, intense storms generally between November and March. It is not unusual for a majority of the annual precipitation to fall during a few storms over a close span of time."⁶ Santa Ana winds are more frequent in the late fall, after months of high temperatures and lack of rain. Thus, while fires can occur year-round, the time of highest fire danger comprises the dry months from May to October.

Weather following a wildfire also affects recovery of the site's vegetation and habitat. Drought conditions hamper native plant re-establishment, while abundant rain promotes surface soil erosion. Both the timing and amount of rain and heat are important factors in

⁵ From *Fire in California's Ecosystems*, 2006, Sughiara, Van Wagtenonk, Shaffer Kaufman and Thode.

⁶ Bonterra Consulting. Baseline Biological Surveys Technical Report for the Hayashi Property. Appendix B pg. 4, Hayashi Preserve Resource Management Plan. 2017. OCTA, with support from ICF.

recovery; while temperatures are more constant year to year, rainfall varies widely from year to year.

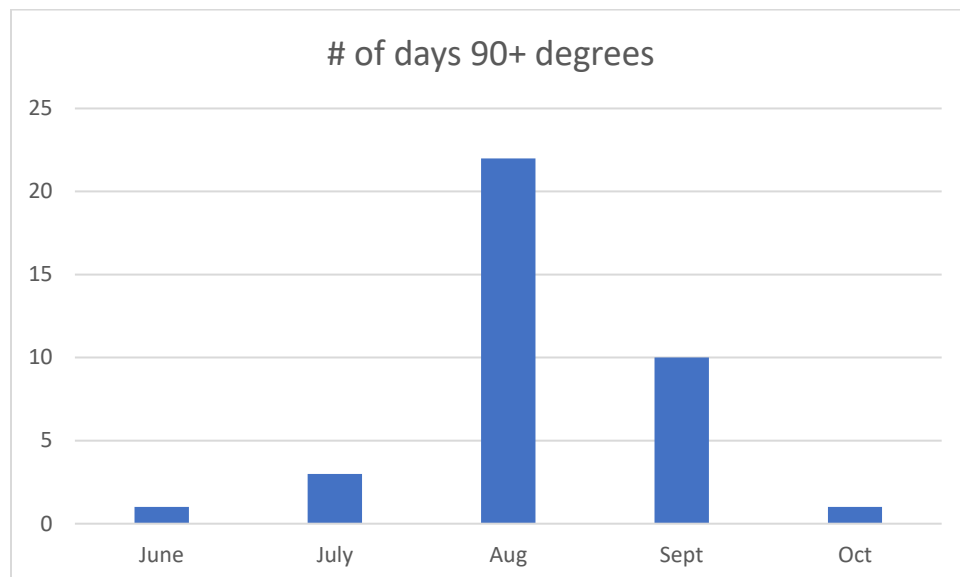


Figure 3. Number days per month in which the maximum temperature exceeds 90°F.⁷

iii. Hydrology: The Preserve is located on the Puente-Chino Hills formation, within the Santa Ana River Watershed. The site generally drains from higher elevations near the center of the property to lower elevations on the north and south sides. Two principal drainages that flow in a westerly direction, Carbon Canyon Creek and Soquel Canyon Creek, are located on the Preserve. Carbon Canyon Creek crosses the northern edge, while Soquel Canyon Creek crosses the eastern corner of the Preserve and appears on the USGS quadrangle as a blueline stream, several small ephemeral drainages flow into this larger drainage from within the property limits. All onsite drainages are tributaries to the Santa Ana River.

iv. Soils: Soil types mapped on the Eagle Ridge Preserve consist of Alo clay (15-30 percent slopes), Anaheim clay loam (15-30 percent slopes, 30-50 percent slopes, and 50-75 percent slopes), Balcom clay loam (15-30 percent slopes), Calleguas clay loam (50-75 percent slopes, eroded), Cropley clay (2-9 percent slopes), Mocho loam (2-9 percent slopes), San Emigdio fine sandy loam (2-9 percent slopes), and Soper loam (15-30 percent slopes).

v. Vegetation Types, Protected Species: Fourteen vegetation types and other land covers occur on the Preserve, including woodland, chaparral, grassland, riparian, and ruderal, developed, and disturbed areas (comprised of the dirt access road on the Preserve's central ridgeline, Carbon Canyon Ridge Road). California walnut groves cover nearly half of the Preserve; however, a large swath of Laurel Sumac Scrub vegetation passes through the center of the Preserve, along the southeast-facing ridgeline above Soquel Canyon, and an association of California walnut groves and Laurel Sumac Scrub stretches along much of the lower southeast-facing slopes below. Riparian vegetation is located on the northwestern border in Carbon Canyon Creek, as well as within the Soquel Canyon Creek drainage in the

⁷ <https://www.accuweather.com/en/us/trabuco-canyon/92679/november-weather/2178646?year=2021>

Preserve’s eastern corner, and Coast Live Oak Woodland is located on northwest-facing slopes east of and at the bottom of Soquel Canyon.

Special-status plant species documented at the Preserve in 2012 include Southern California black walnut (*Juglans californica*) and Hubby’s phacelia (*Phacelia hubbyi*).

Vegetation Types and Other Areas	Acreage
California Walnut Groves	134.0
Laurel Sumac Scrub	59.2
California Walnut Groves – Laurel Sumac Scrub Association	43.0
Semi-Natural Herbaceous Strands	41.0
Coast Live Oak Woodland	12.1
Mulefat Thicket	2.2
Ruderal (Mustards and Thistles)	2.0
Disturbed (Bare Ground)	2.0
Giant Wild Rye Grassland	1.3
Bush Mallow Scrub	1.2
Willow Thickets	1.2
Developed	1.0
Blue Elderberry Stand	0.8
Needle Grass Grassland	0.1

Table 3. Summary of Vegetation Types and other Areas from 2012 Surveys (from 2017 Hayashi Preserve Resource Management Plan).⁸

⁸ The Eagle Ridge (formerly Hayashi) RMP accounts for the discrepancy in acreage from the 2012 baseline surveys by noting “adjustments to the property boundary based on property exchange and use of more current parcel boundary information.” This may also help account for the discrepancies between the acreage indicated by this GIS-based table (301.1) with the acreage indicated in topographic tables on aspect and slope (295.86 ac) and with the acreage included in fuel model tables (293.71 ac). See Hayashi RMP, Section 2, pg. 6.

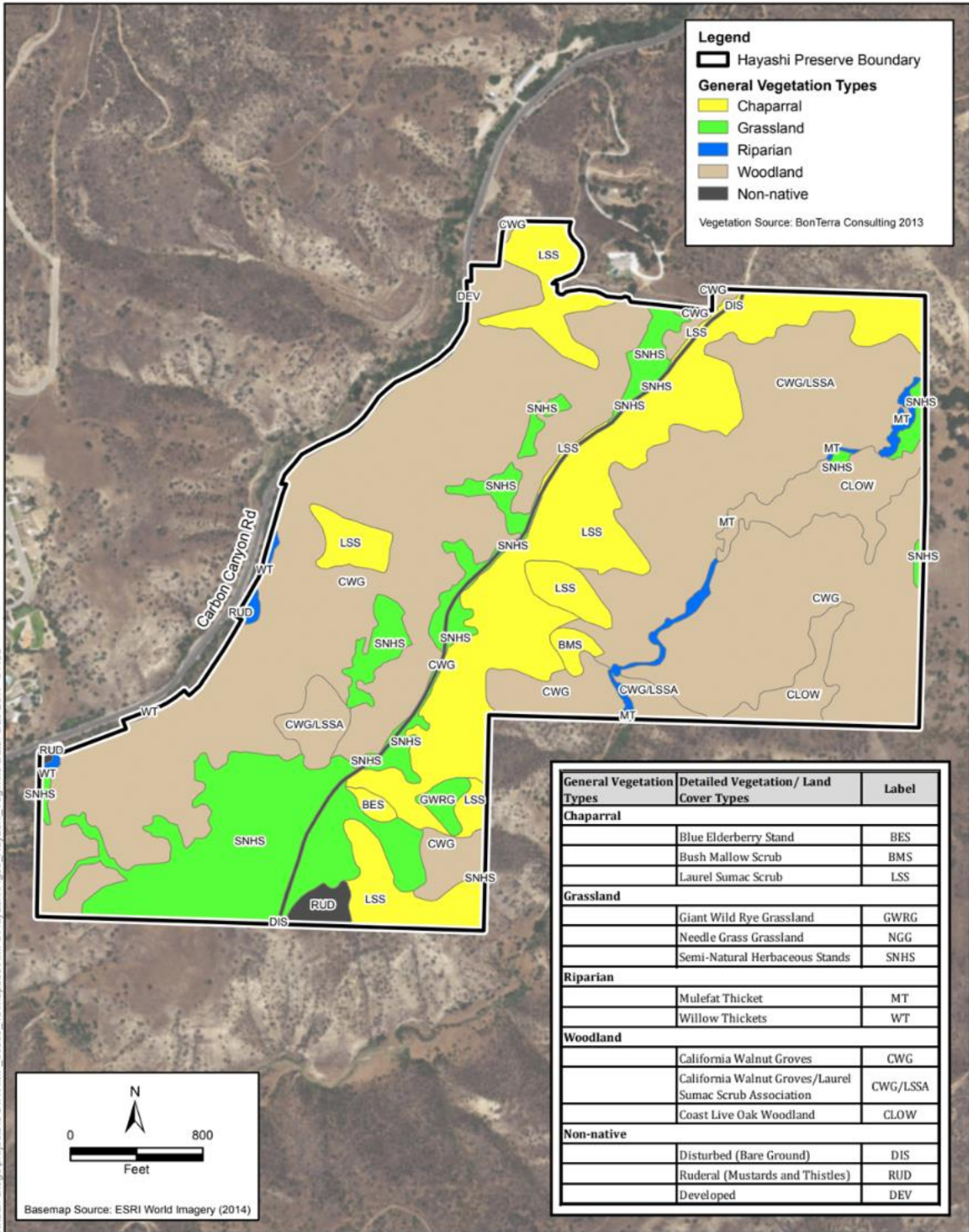


Figure 9
Vegetation Communities
Hayashi Resource Management Plan

Figure 4. Vegetation Communities (from the Hayashi Resource Management Plan).

vi. Wildlife Types, Protected Species: The Preserve provides habitat for a wide variety of wildlife species that are characteristic of scrub habitats, riparian, chaparral and woodland. All the Preserve falls within an area designated by the USFWS as Critical Habitat for the coastal California gnatcatcher (*Polioptila californica californica*).

The Preserve contributes to regional biological connectivity and wildlife movement due to its continuity with surrounding open space and park areas such as the Chino Hills State Park and the Puente-Chino Hills regional wildlife corridor, a nearly 31-mile swath of continuous wildlife habitat between the Cleveland National Forest and the west end of the Puente Hills, above Whittier Narrows. Other regional open space and park areas play a significant role in regional biological connectivity and wildlife movement, such as the adjacent Chino Hills State Park and nearby Cleveland National Forest, Irvine Land Reserve, the Soquel Canyon Creek corridor, and Central-Coastal NCCP Reserve areas, as well as other, nearby open space parcels acquired by OCTA as part of the NCCP/HCP Preserve design. The Preserve serves as an important piece of the regional link among open space areas in southern and central Orange County.

The Preserve contains several ridgelines and canyons that provide a variety of travel routes for local wildlife movement. Trails on site may also be used by wildlife for travel. Movement on site is expected to occur via these features, as well as between the Preserve and contiguous offsite habitat. Baseline studies and ongoing Preserve management have documented mule deer, mountain lion, bobcats, and coyote moving across the Preserve.

BonTerra Consulting performed focused surveys for OCTA NCCP/HCP Covered Species in 2012. Special-status wildlife species documented at the Preserve include Cooper's hawk (*Accipiter cooperii*). A yellow-breasted chat (*Icteria virens*) was observed singing in riparian habitat in lower Soquel Canyon downstream of the Preserve; it may also occur upstream on the property. Yuma bat (*Myotis yumanensis*) was documented twice in the vicinity, once north of the Preserve along the Carbon Canyon access road, and another in lower Soquel Canyon downstream of the property. Focused surveys for the OCTA Covered Species will continue to occur approximately every four years. The results of the most recent surveys completed in 2021 are reflected in Appendix B, Environmentally Sensitive Lands Maps.

vii. Historical Influences: Grazing of cattle in the Chino Hills (including the Eagle Ridge Preserve) has occurred since 1771, after the Spanish founded Mission San Gabriel. The Chino Hills were used extensively for grazing by mission cattle. During the Mexican Republic era, the hills were used as spillover grazing from such Mexican ranchos as Santa Ana del Chino and La Sierra Yorba. After Mexico ceded California to the United States in 1848, the lands within the Chino Hills were still used primarily for grazing.

A review of historic aerial photographs of the property showed evidence of grazing in 1938. Between 1938 and 1946, Carbon Ridge Road was extended from the area northeast of the Preserve, onto the Preserve, along Carbon Canyon Ridge. From 1946 through 1952, the width of Carbon Ridge Road onsite was increased, and additional smaller trails radiating from this ridge road were established.

While not formally used for grazing at this time, cattle from an adjoining ranching operation have been able to gain access to the Preserve and graze on site. During the 2012 general and focused biological surveys, cattle were directly observed throughout the property, including on the ridgeline, slopes, and bottom of Soquel Canyon. Cattle paths cross the slopes throughout the property and evidence of erosion due to cattle is visible in the southwest portion of the property.

The historic aerial research did not identify any buildings or otherwise significant structures on the site since 1938. However, along the northern boundary of the property, an offsite residence has established some structures and landscaping on the parcel adjacent to the Preserve. Between 1952 and 1965, aerial photograph review suggests that trail widening, and other disturbed areas were becoming established along the northern edge of the property. In 1980, cleared areas extending from the residential development onto the Hayashi property are evident, although no structures and/or landscape plantings have occurred in the area at this time. By 1994, the cleared areas extending onto the adjacent property have become improved by ornamental landscaping and landscape structures (arbor and fencing). In addition, a remnant radio antenna is located on the ridgeline near the northern portion of the Preserve. Vegetation management for protection of these private assets is located entirely on private property off the Preserve.

viii. Cultural Resources: An Archaeological Sensitivity Assessment (ASA) was conducted by LSA Associates, Inc. on the Preserve in 2014. The assessment included a records search, Native American coordination, field survey, and report. No archaeological resources were identified within the boundaries of the Preserve. Based on the lack of archeological resources documented in proximity to the Preserve, the negative results of the current and previous field surveys, and the geomorphological setting of the Preserve, the Preserve is not considered sensitive for the presence of archaeological resources. No further archaeological studies or monitoring are recommended.

ix. Fire History: Table 4 includes a listing of the most significant recorded fires in the vicinity of the Preserve since 1914. The oldest fire in the vicinity was the 1947 Shell Fire that burned 118 acres northwest of the Preserve. The most recent fire—that also burned the entirety of the Preserve and much of the surrounding areas—was the 2008 Freeway Complex Fire burning 30,305-acres, the largest wildland fire in the region in the past 40 years (OCFA 2008). This massive fire showcases the danger of roadside ignitions in the Preserve area, as the primary fire that formed the complex ignited near the 91 Freeway and Green River from a vehicle spark. A secondary source was an ill-maintained powerline at the Olinda Historic Museum. The Freeway Complex Fire was not an outlier in this regard: a large preponderance of all wildfires start by a road (Syphard and Keeley, 2015 and Sturtevant and Cleland 2007). Two reports published by the Hills For Everyone (Schlotterbeck and Schlotterbeck, 2019) indicates that between 1915 – 2018 14 fires (nine percent) were caused by roadside-types

of ignitions in the Chino Hills area.⁹ These reports found all areas with the highest wildfire frequency were along freeway corridors and at the Brea entrance to Chino Hills State Park.

While the cause of most of the major recorded fires are “Unknown/Unidentified” or “Miscellaneous,” except for the aforementioned Freeway Complex Fire and the 1,078-acre Yorba Linda Fire (2005, caused by “Playing with Fire”), general patterns of ignition in the greater area reveal several areas of concern. Potential sources of future ignition include unauthorized use of the site, which can lead to ignition sources such as engine activity from vehicles, smoking, and arson. Accidental ignitions occurring along Carbon Canyon Rd or at nearby residences and commercial/agricultural facilities are also a concern. Caltrans manages roadside fuels to minimize ignitions and subsequent fire spread. Residential communities are required to create and maintain defensible space for the same reasons.

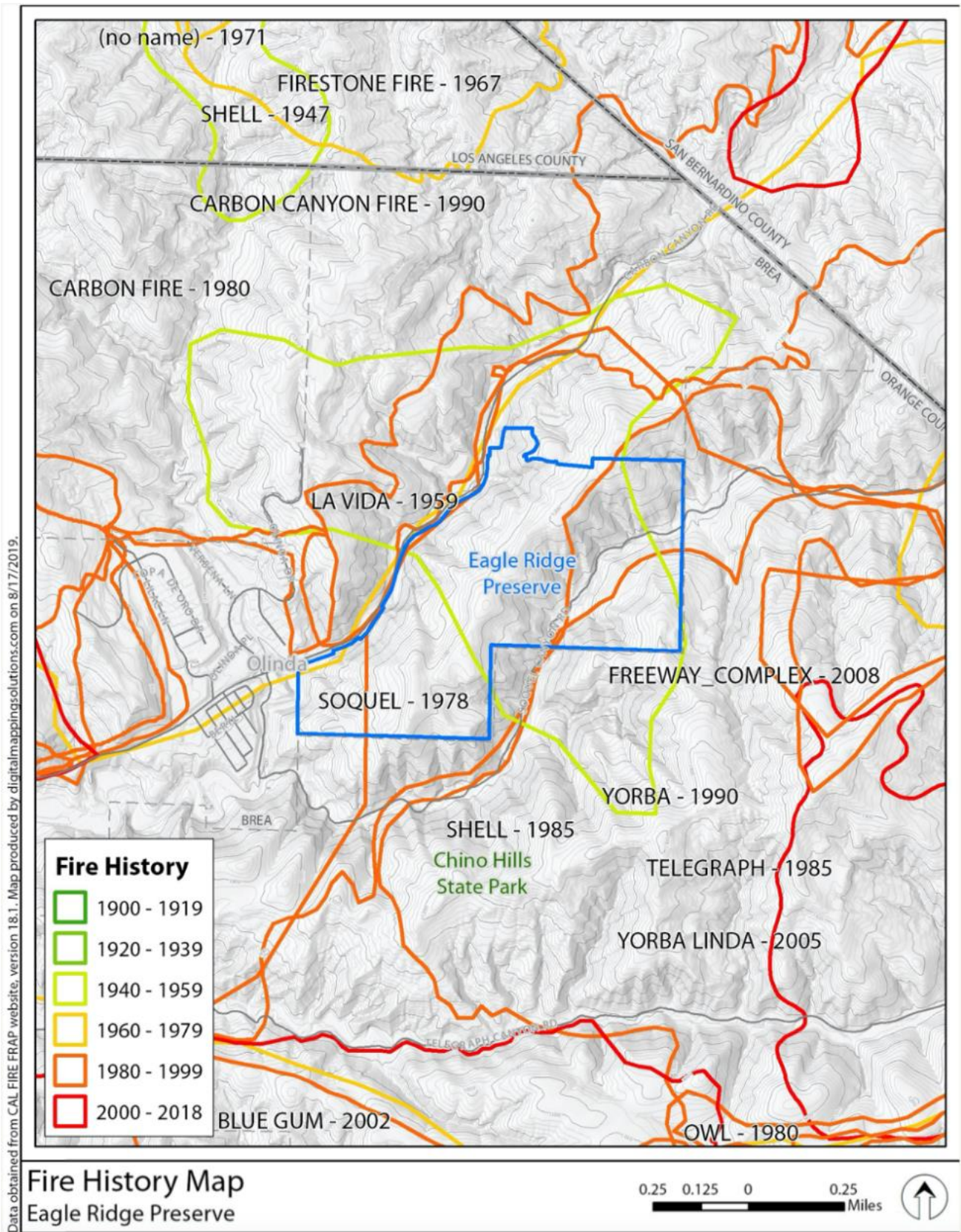
FIRE NAME	YEAR	ACRES	CAUSE
SHELL	1947	118.4	Unknown/Unidentified
LA VIDA	1959	610.6	Unknown/Unidentified
FIRESTONE FIRE	1967	236.3	Unknown/Unidentified
(no name)	1971	12.0	Unknown/Unidentified
SOQUEL	1978	3,934.4	Unknown/Unidentified
CARBON FIRE	1980	6,954.6	Unknown/Unidentified
OWL	1980	18,332.3	Unknown/Unidentified
TELEGRAPH	1985	1,634.9	Unknown/Unidentified
SHELL	1985	2,367.240	Unknown/Unidentified
YORBA	1990	7,883.5	Unknown/Unidentified
CARBON CANYON FIRE	1990	4,978.1	Unknown/Unidentified
CARBON	1994	757.4	Unknown/Unidentified
WAGON FIRE	1994	570.4	Unknown/Unidentified
BLUE GUM	2002	496.8	Miscellaneous
YORBA LINDA	2005	1,078.5	Playing with Fire
FIREWAY COMPLEX	2009	30,305.2	Vehicle
CARBON CANYON	2011	508.3	Unknown/Unidentified

Table 4. List of nearby significant wildfires since 1914; from CAL FIRE Forest Resource Assessment Program (FRAP).

x. Recreational Resources: Based on an evaluation of biological resources, safety concerns, and local land use/parking constraints, it was determined that public access on the Preserve will have to be severely limited, and may be restricted exclusively to small, structured events with the assistance of adjacent landowners for staging/parking (Hayashi Preserve RMP, 2017). Carbon Canyon Road, which forms the Preserve’s western border, bears too heavy traffic and insufficient space to facilitate public access, and the Preserve does not currently include the necessary space for adequate staging areas. The current configuration of trails does not connect to other regional public trails due to safety concerns and constraints from surrounding land ownership and limits to staging and parking areas. OCTA recognizes that opportunities to connect to regional trails and planning for regional trail networks will

⁹ These figures were arrived by combining automobile and road flares causes.

evolve and change over time. Therefore, OCTA and the Preserve Manager will participate in regional trails planning efforts to evaluate possible trail connections and anticipate how (and if) future trail connections can be made.



Data obtained from CAL FIRE FRAP website, version 18.1. Map produced by digitalmappingsolutions.com on 8/17/2019.

Figure 5. Fire history in the Eagle Ridge Preserve region.

xi. Structures and Built Values at Risk: No currently occupied structures are present on the property. However, according to the 2016 Rohde Wildland-Urban Interface (WUI) Pre-Fire Plans commissioned by the OCFA, the surrounding area is an inter-mix of community within a historical fire corridor. The area has a history of structural loss in past fires, and as discussed in the fire behavior analysis sections below, there is significant interface fire hazard from nearby developments due to the adjacent fuel types and often insufficient defensible space. There are recreational users on many nearby area trails, although no regional public trails connect to access roads or trails within the Preserve and public access to the Preserve is currently extremely limited. Figure 1 indicates the structures within a 1000-foot buffer surrounding the Preserve. No habitable structures are located within 100 feet of the Preserve boundary. A decision by the Brea City Council (2021) changed the vegetation management clearance requirements of the neighboring property owners' new garage, which would have required clearance on the Preserve. The decision maintained the habitat integrity of the Preserve and required actions only on the neighbor's property instead of requiring them on the Preserve.

xii. Access: Main access to the Preserve runs through Carbon Canyon Access Road east from Carbon Canyon Road, which borders the western edge of the Preserve. Carbon Canyon Access Road dead-ends on Carbon Ridge Road, which continues southwest to bisect the Preserve along the entirety of its main ridgeline as the primary dirt access road within the Preserve.

Beyond this access road, an unpaved trail runs along the bottom of Soquel Canyon, beginning at a gate on the Preserve's eastern border and continuing to the Preserve's southeastern edge. Chino Hills State Park, immediately south of the Preserve, has a number of public trails on site; however, none of these connect to existing roads or trails on the Preserve.

IV. ANALYSIS OF HAZARDS, RISK

This section identifies the primary risks for fire on the Preserve and the existing patterns or trends for fire in the vicinity. There is a low likelihood of ignition on the Preserve itself because of a lack of an ignition source. There is a greater risk of an ignition outside the Preserve. In addition, fires nearby are likely to burn in the same pattern and could easily travel to and within the Preserve because of continuous wildland vegetation, in part due to the lack of recent fire on the Preserve. These considerations combine to result in a moderate to high risk of a fire ignited outside the Preserve traveling onto and burning resources within the Preserve.

Some of the fuel types are not easily ignitable – specifically vegetation in woodlands or riparian vegetation – compared to annual grass or pine or eucalyptus litter. However, non-native grasslands and scrub with grass intermixed with it are prone to ignitions, especially when they are near roads or human activity. The lack of unsupervised public access limits unsafe human behaviors (i.e., illegal campfires, fireworks, etc.) which would be the likely prime source of fire ignition within the Preserve. Based on fire history, fuel types, road characteristics, and access or human activities on the site, the anticipated probability of wildfire ignition is low. The limited access and site use minimize the risk of human-caused wildfires.

Adjacent risk of ignition comes from activities associated with residential land use including vehicular use, construction, mowing, and use of mechanical mowers, barbecues, and generators, which was the source of the 2020 Silverado Fire that burned 13,390 acres and destroyed 14 homes/structures. Because Southern California Edison (SCE) is increasingly shutting off power during high fire hazard conditions for public safety, the risk of wildfire ignition from generator use may become more common in the future. In particular, there is a solitary residential property within 1000 ft of the Preserve's northwest boundary that is located in an area predicted to burn with mostly torching fire in both wind scenarios, with one small area of crown fire to the west of the home.

Another smaller area of seemingly more extreme fire behavior exists within the Preserve and near the northwest Preserve boundary, just to the south of the adjacent residential property. The predicted flame lengths and rate of spread for this area are higher. In the uphill wind scenario prediction, the area in the buffer on the west side of this property is predicted to have flame lengths greater than 20 feet and the rate of spread looks to be as high as 40.1-80 ft/minute.

Human activity associated with the mobile home park in the buffer to the southwest of the Preserve could similarly cause fires. Some areas of torching fire are predicted adjacent and to the northeast of the Hollydale Mobile home Estates. The predicted flame lengths for this area are 12.1-20 feet and rate of spread for this area is high. Fortunately, conditions most likely to cause large fires would be with Santa Ana wind conditions, from the north or northeast; this wind direction would push the fire away from the Preserve.

No human activity is adjacent to the eastern boundaries of the Preserve, which limits the chance of ignition.

The risk of a fire affecting the Eagle Ridge Preserve is influenced not only by the fuels it supports, but also by the fuels present within the surrounding landscape. Adjacent fuel types are a factor in determining the potential for fire to spread to the Preserve, especially because the Preserve is 301 acres within a larger matrix of wildland fuels. The fuel types on adjacent properties vary between low-fuel volumes and discontinuous fuels to the southwest of the Preserve (which would limit spread to the Preserve, especially under northeasterly wind conditions), to highly flammable fuel conditions north and southeast of the Preserve, which would either propel or allow continuous spread of fire to the Preserve. Figure 6 portrays the fuels within 1000 feet outside the Preserve boundary. The level of hazard will vary due to season or climate. While there is risk of fire year-round, this risk is lowest in the spring when foliar moisture is higher.

A. Description of Fuel Types Present on the Preserve

The spatial distribution of each fuel type is shown on Figure 6, which identifies unique fuel types. Fire predictions on this Preserve indicate that approximately half of the Preserve as well as adjoining areas to the Preserve would burn with extreme fire behavior (greater than 20-foot flame lengths) in uphill wind conditions, and approximately a fifth of the Preserve would burn with extreme fire behavior with a northeast (Santa Ana) wind. This is primarily due to the dominance of the Grass Shrub and High Shrub fuel types, which are predicted to exhibit extreme fire behavior. California Walnut Grove with a grassy understory is the main vegetation type throughout the Preserve and constitutes a Grass fuel type. A significant swath of Laurel Sumac Scrub (corresponding to a High Shrub fuel type) runs along the ridgeline through the center of the Preserve. As discussed below, while flame lengths are predicted to be shorter than 12 feet for this former vegetation type in northeasterly wind scenarios, it would be prudent to expect both vegetation types to exhibit more serious fire behavior in uphill wind scenarios, with rapid rates of spread throughout the Preserve. See Figures 7a and 7b for a map of predicted flame lengths on the Preserve, based on FlamMap fire behavior modeling software.

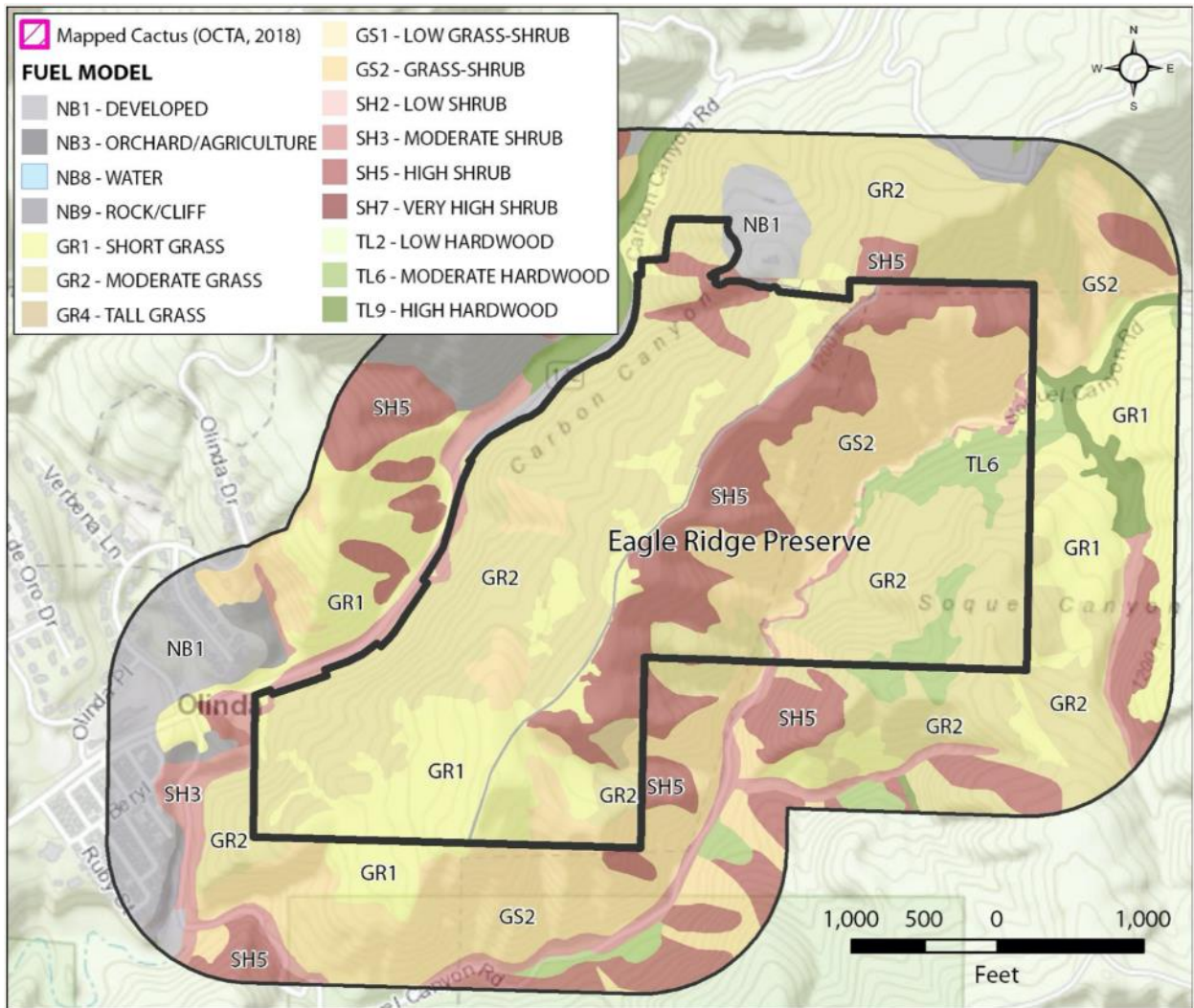


Figure 6. Eagle Ridge Preserve map showing fuel model classification based on vegetation.

Fuel Model Name and Code	Fuel Model Description	Vegetation Map Code	Acres	Percent
NB99 – Rock/Cliff	Barren	DIST/RUD/RK/BARREN	2.454	1%
GR101 – Short Grass	Short, sparse dry climate grass is short, naturally or heavy grazing, predicted rate of fire spread and flame length low	AG/I, INV	42.004	14%
GR102 – Moderate Grass	Low load, dry climate grass primarily grass with some small amounts of fine, dead fuel, any shrubs do not affect fire behavior	WW	132.042	45%
GR104 – Tall Grass	Moderate load, dry climate grass, continuous, dry climate grass, fuelbed depth about 2 feet	PG, RG	1.771	1%
GS122 – Grass-Shrub	Low load, dry climate grass-shrub shrub about 1 foot high, grass load low, spread rate moderate and flame length low	E/E, MAL, SC, WW/MC, WW/SC	56.029	19%
SH143 – Moderate Shrub	Moderate load dry climate shrub, woody shrubs and shrub litter, fuelbed depth about 1 foot, no grass, spread rate and flame low	RIP, WR	3.923	1%
SH145 – High Shrub	Low load, humid climate timber shrub, woody shrubs and shrub litter, low to moderate load, possible pine overstory, fuelbed depth about 3 feet, spread rate high and flame moderate	SC/M	43.939	15%
TL186 – Moderate Hardwood	Moderate load broadleaf litter, spread rate and flame moderate	CLO	11.549	4%
Total Acres			293.71	

Table 5. Eagle Ridge Preserve acres by fuel model and vegetation type.

In general, the fuel model assignments were based on the mapped vegetation types and associated expected surface vegetation (that would presumably carry a fire). All shrub vegetation types were assigned a shrub fuel model, tree vegetation types were assigned a tree fuel model, and grass vegetation types were assigned a grass fuel model.

B. Predicted Fire Behavior on the Preserve

Regionally, fire behavior is expected to be extreme. In critical weather, fires are expected to burn with extreme behavior, high rates of spread, and long-range spotting. The area is an intermix of community within a historical fire corridor that has experienced 27 Santa Ana wind-driven major fires in the last 45 years, with a total loss of 325 homes. In the Eagle Ridge area, Santa Ana wind-driven fires have typically originated near Highway 71/91, Sleepy Hollow, or Yorba Linda, and burn into the Carbon Canyon area. Onshore wind-driven fires occur nearly annually. Olinda Village and the Hollydale Mobile home community – quite proximate to the Preserve – is threatened under either wind scenario. Relative humidity frequently recovers quickly at low elevations at night, forming inversions and complicating firing. These inversions clear rapidly during mornings. Onshore winds return here early following Santa Ana winds. (Rohde, 2015)

A fine-scale analysis of potential fire behavior across the Preserve is useful to determine the possible effects of wildfire, and potential for spread and containment of a wildland fire. For this purpose, a worst-case scenario was used to reflect conditions during an event of high impact.

For this analysis FlamMap was used to predict fire behavior. FlamMap assumes the entire area is on fire under the same weather and fuel moisture conditions. Because environmental conditions remain constant in the modeling environment in FlamMap, the software will not simulate temporal variations in fire behavior caused by weather and diurnal fluctuations as another popular fire behavior prediction software (i.e., FARSITE). Nor will FlamMap display spatial variations caused by backing or flanking fire behavior. These limitations need to be considered when viewing FlamMap output in an absolute rather than relative sense. Nevertheless, outputs from FlamMap are well-suited for landscape level comparisons of fuel treatment effectiveness because fuel is the only variable that changes. Outputs and comparisons can be used to identify combinations of hazardous fuel and topography, aiding in prioritizing fuel treatments. (USFS, 2018)

To provide a worst-case scenario, two weather conditions or scenarios were used to predict fire behavior on the Preserve. Both scenarios use the same wind speed and fuel moisture settings; only the direction of the wind is different. The first scenario is meant to emulate a Santa Ana wind event and used winds blowing from the northeast at 20 miles per hour (mph). The second scenario aligns the wind with the slope, so the wind is blowing uphill in every location. This wind direction represents a ‘worst-case’ scenario because the fuels are pre-heated as the fire travels upslope with the wind. Foliar moisture and dead woody fuel moistures were set to the following:

- 1hr fuel moisture: 3%
- 10hr fuel moisture: 4%
- 100hr fuel moisture: 5%
- Live herbaceous fuel moisture: 70%
- Live woody fuel moisture: 70%

- Live foliar moisture in fuel types with cactus: Starting point of 200%

These fuel moistures indicate a very dry landscape and are often used for 'worst-case' scenarios. These inputs are consistent with the inputs used statewide by CAL FIRE for the creation of the Very High Fire Hazard Severity Zones¹⁰, with the exception that areas with cactus are assigned a high foliar moisture content to acknowledge the succulent nature of the fuel complex. The assessment of hazards is required by law and must judge the relative hazards throughout the state. Thus, the values used here were considered a reasonable representation of fire behavior prediction during a typical wildfire of concern.

A full weather and fuel moisture analysis is not warranted; instead, weather as an environmental input was used to reflect the worst-case conditions that remain constant across the landscape for planning purposes.

Using the above inputs of fuel characteristics, topography, weather, and fuel moisture, the following maps describe the resulting fire behavior in terms of three outputs: flame length, rate of spread, and crown fire activity (or potential).

i. Flame Length: Flame length is often correlated to the ability to control a fire. A flame length of four feet is the limit of what can be attacked with hand crews, and eight feet is usually treated as a cut-off point for strategic firefighting decisions on whether to attack the fire directly, or instead attempt control through indirect methods.¹¹ Indirect attack is a method of suppression in which the control line is located some considerable distance away from the fire's active edge.

Flame lengths are often highly correlated with natural resource impacts. Flame length is the result of one other fire prediction output: fireline intensity times a constant. Fireline intensity is the result of two fuel model inputs (heat yield or the BTU/lb of fuel and the weight of available fuel) along with one other fire prediction output (rate of spread). Flame length, reported in feet, is the numerical characteristic that encompasses the flaming front of a fire and its interaction with wind and the fire's radiation and convection heat transfer to adjacent fuel (Andrews, 2018).

There is quite a dramatic difference between the two wind scenarios regarding flames from 4.1-8 feet, 8.1-12 feet, and over 20 feet.

Flame lengths less than four feet are similar between the two wind scenarios, reaching approximately 22% of the total area in a northeast wind scenario and approximately 17% of the total area in an uphill wind scenario. These flame lengths exist in Short Grass (101) or Moderate Grass (102) both within the Preserve and in the buffer.

¹⁰ <https://bof.fire.ca.gov/media/5tepuutt/full-14-a-presentation-cal-fire-vhfsz-remodeling-effort.pdf>

¹¹ Andrews, Patricia L. and Rothermel, Richard C. 1981. Charts for Interpreting Wildland Fire Behavior. Gen. Tech. Rep INT-131. Ogden, UT. September 1982. U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station 8440. 21 p.

Flames from 4.1-8 feet are not similar between the two wind scenarios, reaching approximately 18% of the total area under northeast wind conditions but only approximately 3.5% of the total area in an uphill wind scenario. These flame lengths exist mostly in areas of Moderate Grass (102) both within the Preserve and in the buffer.

Flames from 8.1-12 feet are not similar between the two wind scenarios, reaching approximately 18% of the total area under northeast wind conditions, but only approximately 2% of the total area under uphill wind conditions.

The flames lengths from 8.1-12 feet are more similar between the two wind scenarios, reaching approximately 20% of the total area with a northeast wind and approximately 25% of the total area with uphill/Santa Ana wind conditions.

Acres with flames over 20 feet are not similar between the two wind scenarios, with approximately 21% of the total area predicted in a northeast wind scenario, and approximately 51% of the total area in uphill wind conditions.

In both wind scenarios, the flame lengths of greater than 20 feet are predicted mostly in a swath on the slopes located on the east side of the ridge within the Preserve. These areas contain High Shrub (145) toward the top of the ridge and Grass Shrub (122) lower down.

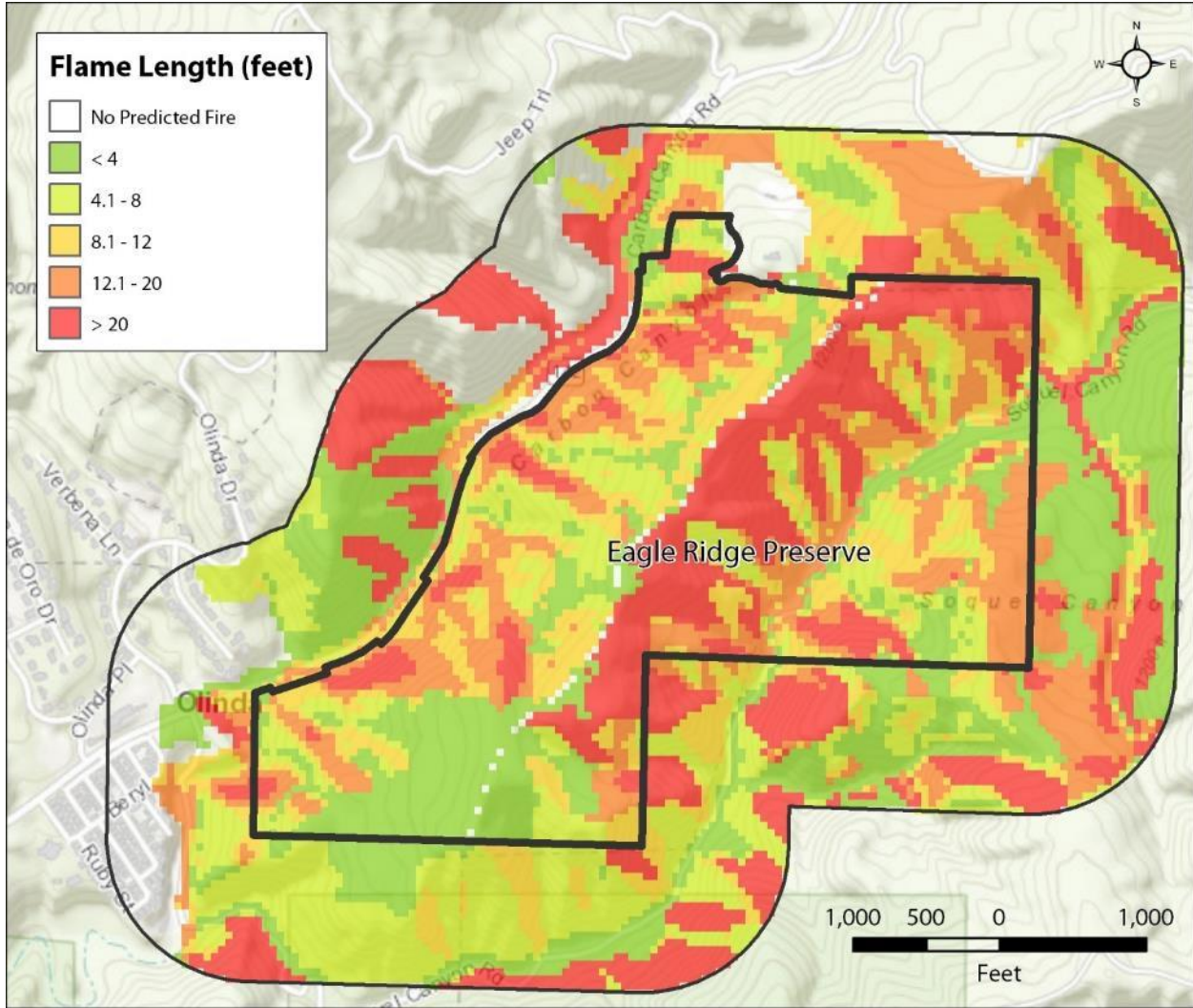


Figure 7a. Eagle Ridge Preserve map showing predicted flame length for results from the northeast wind scenario.

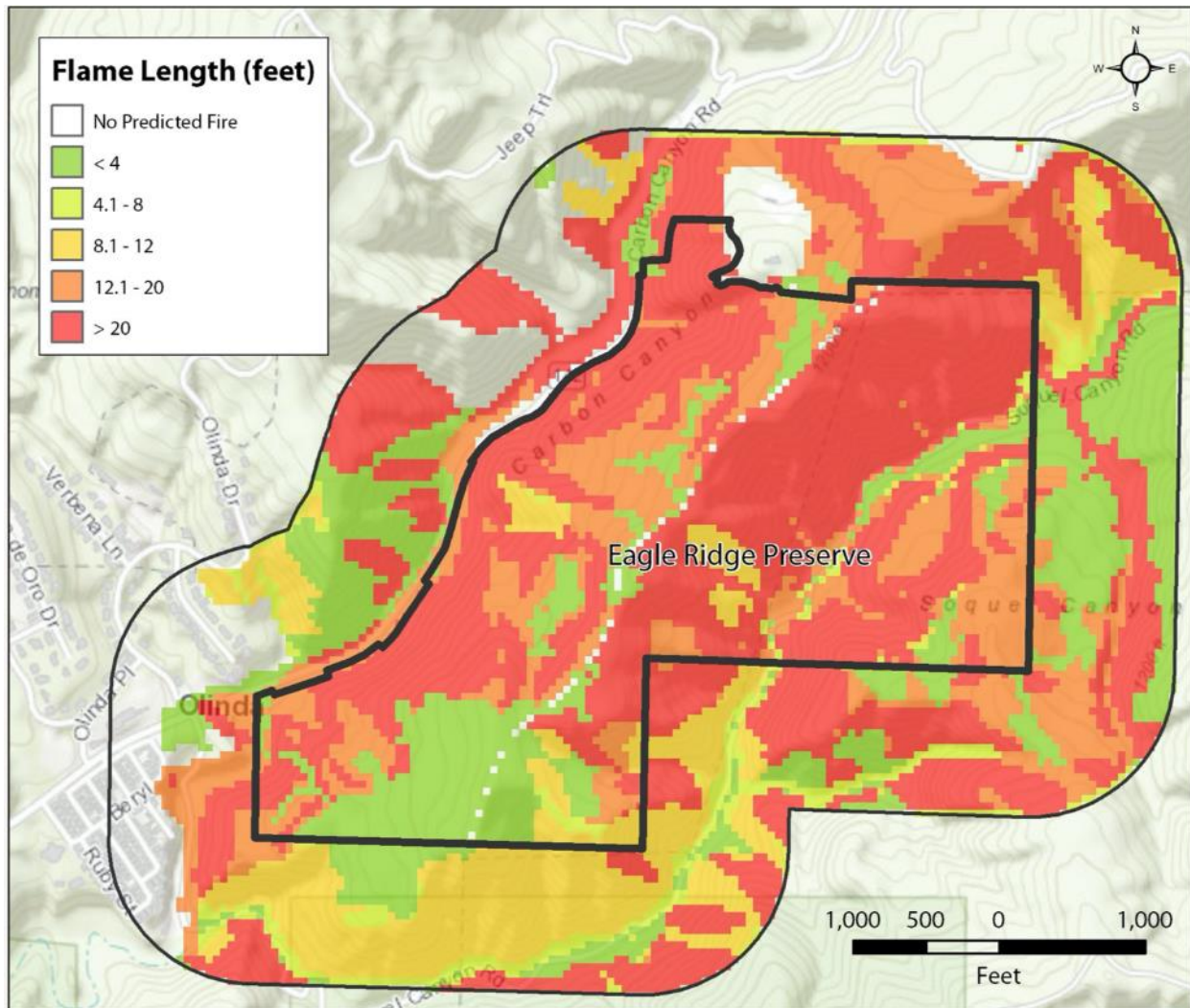


Figure 7b. Eagle Ridge Preserve map showing predicted flame length for results from the uphill wind scenario.

Flame Length	Acres
No Predicted Fire	2.60
Less than 4 feet	64.27
4.1-8 feet	53.12
8.1-12 feet	51.92
12.10-20 feet	59.07
Greater than 20 feet	62.73

Scenario I Northeast Wind (see Figure 7a)

Flame Length	Acres
No Predicted Fire	2.60
Less than 4 feet	51.14
4.1-8 feet	10.04
8.1-12 feet	5.93
12.10-20 feet	74.68
Greater than 20 feet	149.33

Scenario II Uphill Wind (see Figure 7b)

Table 7. The acreage predicted to burn with the various flame length categories, considering the total area of the Preserve. Because FlamMap assumes the entire area is on fire, the total acreage will always be the size of the Preserve as reflected in GIS mapping, 293.71 acres.¹²

¹² As noted above, the text of the RMP denotes the acreage as 301, which agrees with GIS-based tables contained in the same RMP and other GIS analyses that indicate an acreage of 301.1. However, topographic tables on slope and aspect identify a total acreage of 295.86. See Chapters 1 & 2 of the 2017 Hayashi RMP.

ii. Rate of Spread: Rate of spread, or the rate at which a fire moves across a specific fuel bed, is a much more complicated parameter to predict. Factors that influence rate of spread include energy released from the fuel wind and slope factor, density of the fuel bed, heat of pre-ignition (i.e., amount of heat required to ignite one pound of fuel), a heat source, and a heat sink along with other propagating ratios and coefficients (Andrews, 2018).

Rate of spread is the measurement is the forward rate of spread at the head of a surface fire. The metric of rate of spread is of concern when considering fire containment, response times, and evacuation. A slow-moving fire (for example, slower than 1/8th mile per hour, or 11 feet/minute) might be easily contained whereas fast-moving fire (a fire moving faster than one mile per hour, or 88 feet/minute) challenges containment and has the potential to move into high value sensitive areas before containment can occur. While a fast rate of spread does not necessarily result in a problematic fire, a fast-moving fire coupled with high flame lengths cannot be suppressed with a hand-crew.

Large differences exist between the two wind scenarios for rate of spread regarding the areas with rates of spread from 20.1-40 feet/minute and greater than 80 feet/minute, while the rate of spread from 40.1-80 feet/minute is quite similar between the two wind scenarios.

In the northeast wind scenario, approximately 22% of the total area is predicted to have a rate of spread from 20.1-40 feet/minute, while in the uphill wind scenario only less than 1% is predicted to have this rate of spread.

In the northeast wind scenario, approximately 42% of the total area is predicted to have a rate of spread from 40.1-80 feet/minute, while in the uphill wind scenario 38% is predicted to have this rate of spread.

In the northeast wind scenario, only 11% of the total area is predicted to have a rate of spread over 80 feet/minute, while in the uphill wind scenario approximately 43% is predicted to have this rate of spread.

It appears that uphill wind conditions greatly increase the highest rate of spread, especially on the slope to the east of the ridge within the Preserve and to the northeast and southeast in the buffer, as well as in some small patches to the west of the Preserve in the buffer.

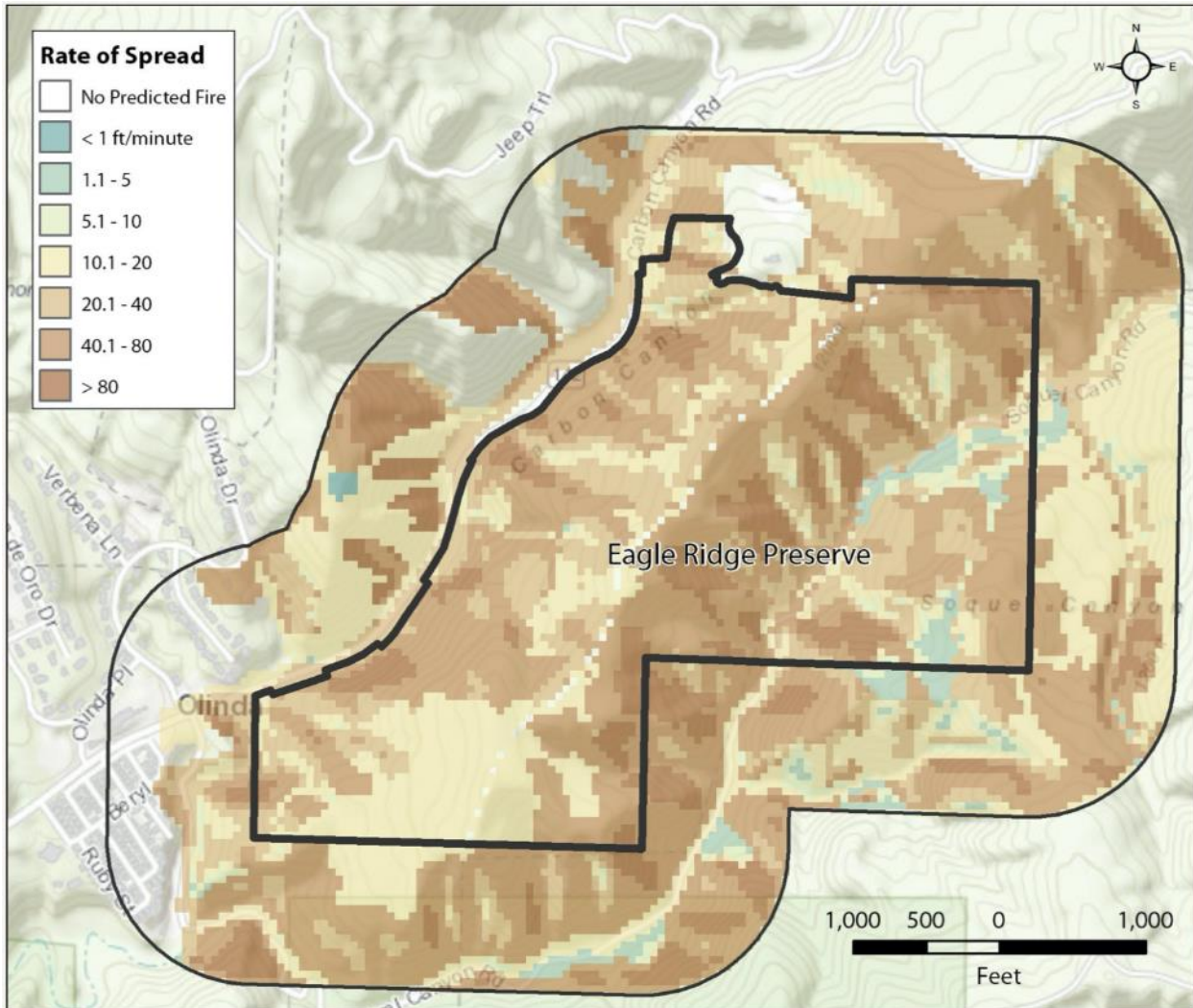


Figure 8a. Eagle Ridge Preserve map showing predicted rate of spread for results from the northeast wind scenario.

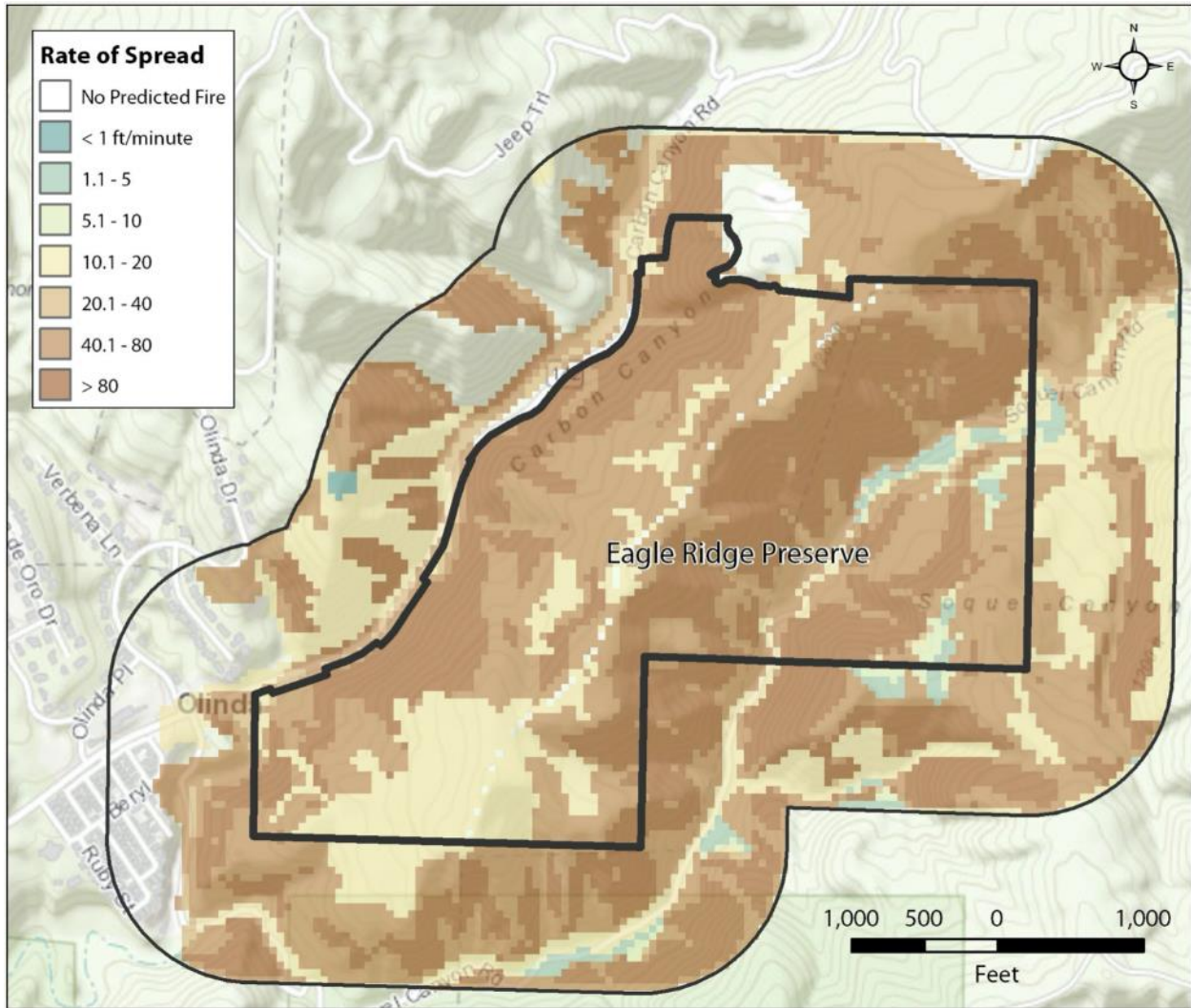


Figure 8b. Eagle Ridge Preserve map showing predicted rate of spread for results from the uphill wind scenario.

Rate of Spread	Acres
No Predicted Fire	2.60
Less than 1 ft/minute	0
1.1 – 5	7.27
5.1 – 10	3.61
10.1 – 20	59.61
20.1 – 40	65.32
40.1 – 80	124.09
Greater than 80 ft/minute	31.05

Scenario I Northeast Wind (see Figure 8a)

Rate of Spread	Acres
No Predicted Fire	2.60
Less than 1 ft/minute	0
1.1 – 5	5.78
5.1 – 10	0.84
10.1 – 20	44.77
20.1 – 40	2.48
40.1 – 80	112.13
Greater than 80 ft/minute	125.10

Scenario II Uphill Wind (see Figure 8b)

Table 8. Area burned by the various categories of fire spread rate.

iii. Crown Fire Activity: The description of crown fire activity includes four possible model outputs: surface fire, torching fire, crown fire, or no predicted fire. Surface fires are limited to fire burning in grass, short shrubs, and the understory of a treed environment, or locations with tall shrubs. The transition from a surface fire to the crowns of trees is known as torching, or 'passive crown fire.' Crown fire indicates locations where fire is expected to spread into and possibly consume the canopy of trees or shrubs. Fire spread from tree crown to tree crown is considered 'active crown fire,' and is based on rate of fire spread, the density of the tree crown, and wind speed.

Modeling how a surface fire makes the transition to some form of crown fire is based on the fireline intensity, canopy base height, and foliar moisture content.

It is important to keep in mind that crown fires and torching can occur only where there are trees and tall shrubs. Short shrub stands can burn intensely and still not torch.

When a fire burns through trees or tall shrub crowns, countless embers are produced and are distributed, sometimes at long distances. These embers can start new fires called "spot fires," which can each grow and confound the ability to control the fire from spreading. "Spotting potential" or "crowning potential" describes the propensity of vegetation to create and disperse embers that have the potential to start new fires well in advance of the main fire. In terms of ecological effects, prediction of torching or crown fire is highly correlated with fire severity and greater environmental impact.

There are a few very small areas of predicted active crowning fire behavior – only in the uphill wind scenario and within less than 1% of the total preserve area. Crowning fire that does exist is primarily within the Preserve boundary. Three spots of crowning fire behavior are in the buffer, with one tiny bit to the northwest of the Preserve in the buffer to the west of the home that is adjacent to the preserve to the north.

The short grass areas are predicted to burn with surface fire.

The crown fire activity for the two wind scenarios is very similar. In either wind scenario, approximately 77% of the area within the Preserve is predicted to have torching fire behavior.

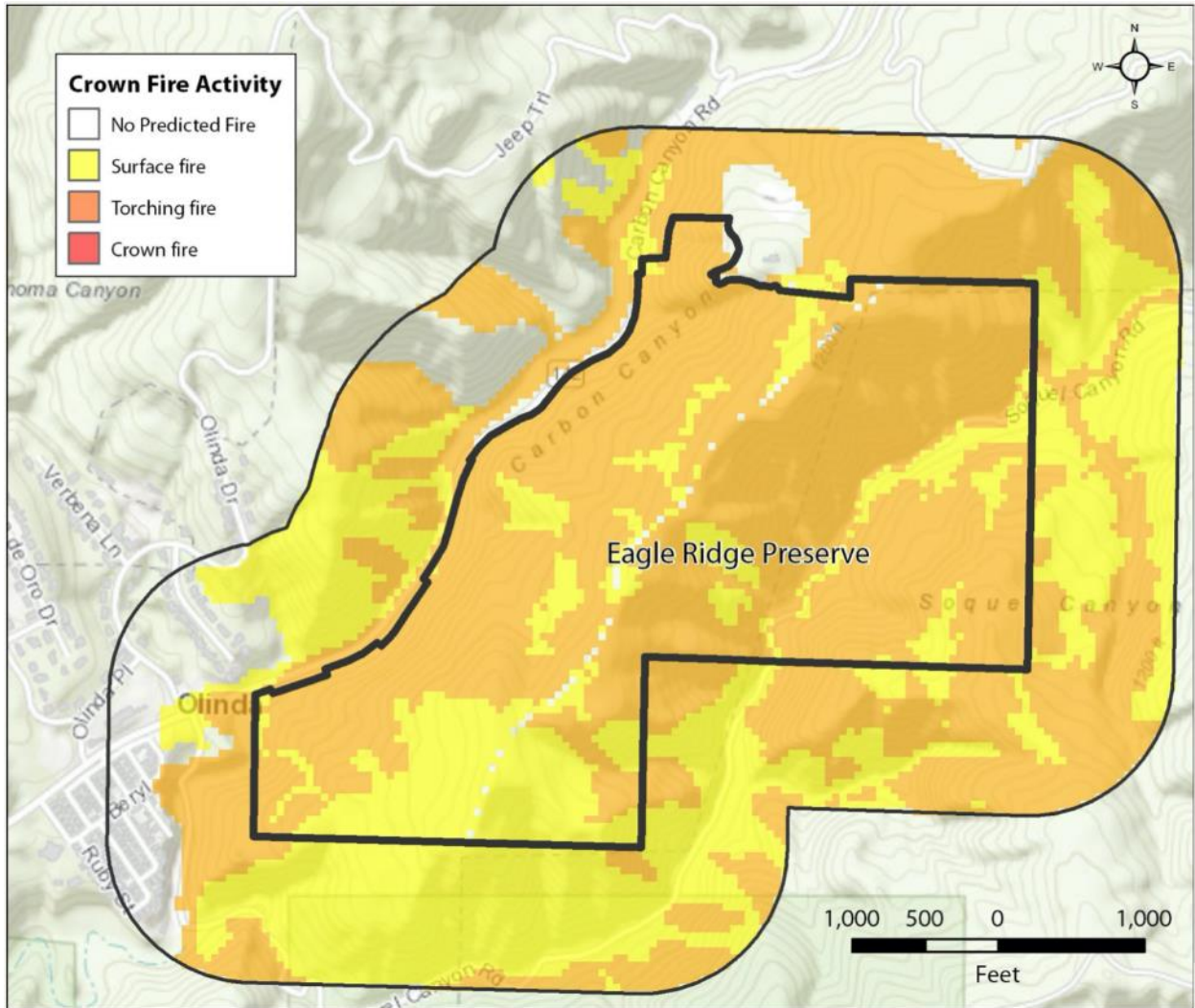


Figure 9a. Eagle Ridge Preserve map showing crown fire activity for results from the northeast wind scenario.

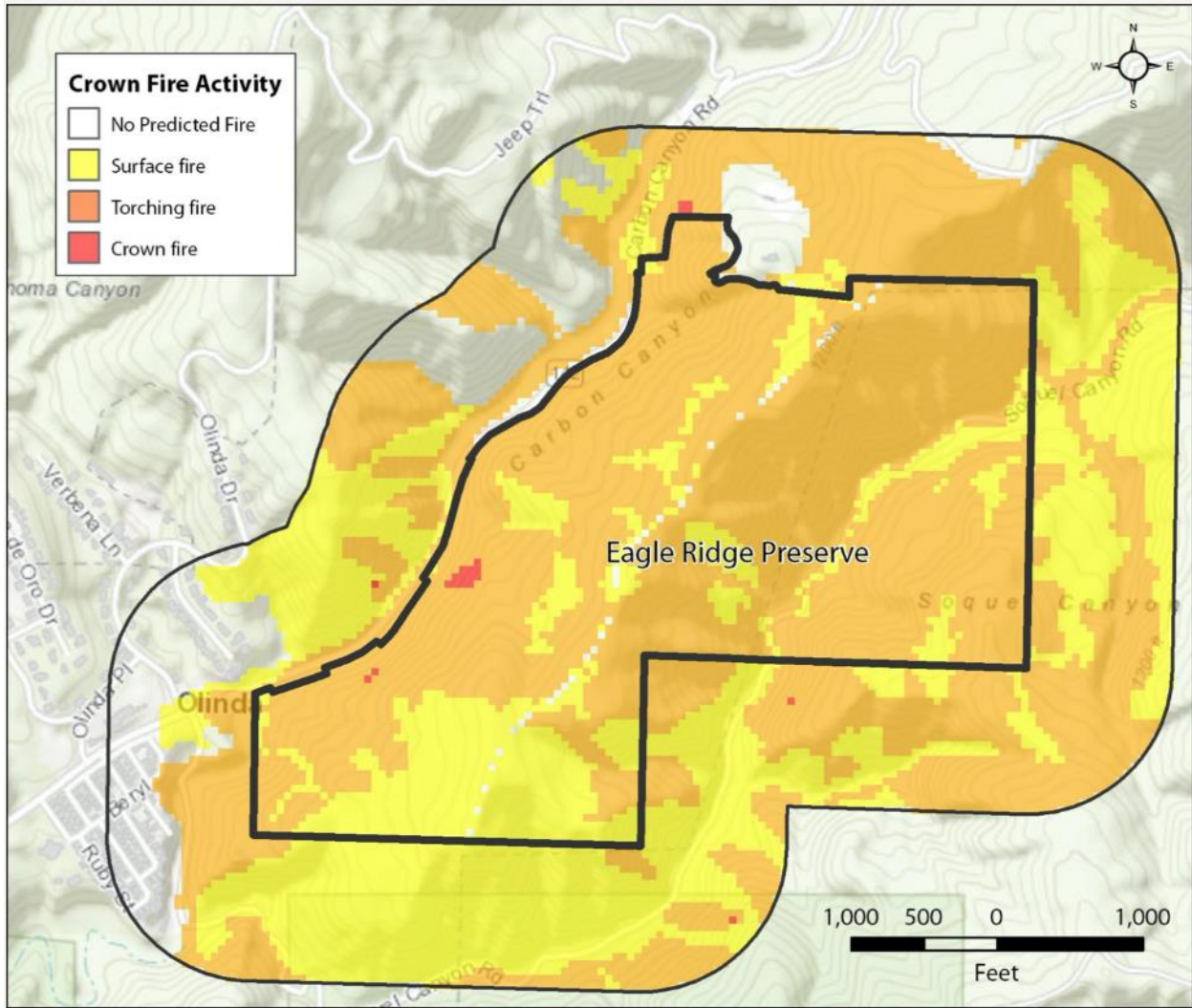


Figure 9b. Eagle Ridge Preserve map showing crown fire activity for results from the uphill wind scenario.

Crown Fire Activity	Acres
No Predicted Fire	2.15
Surface Fire	66.60
Torching Fire	224.97
Crown Fire	0

Scenario I Northeast Wind (see Figure 9a)

Crown Fire Activity	Acres
No Predicted Fire	2.15
Surface Fire	64.82
Torching Fire	226.05
Crown Fire	0.69

Scenario II Uphill Wind (see Figure 9b)

Table 9. Area burned by the various categories of fire spread rate.

C. Fire Hazard Severity Zone Ratings

Public Resources Code 4201 - 4204 and Government Code 51175-89 direct CAL FIRE to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. Fire hazard is a measure of how a fire will behave, based on a site's physical conditions. These zones, referred to as Fire Hazard Severity Zones (FHSZ), define the application of various mitigation strategies to reduce risk associated with wildland fires. The hazard is ranked in three categories: moderate, high, and very high.

Mapping is also categorized by who is responsible for fire suppression. For example, where the federal government is fiscally responsible for fire suppression, the area is categorized as a Federal Responsibility Area. The Preserve lies within a Local Responsibility Area, where the local fire department (BFD) is financially responsible for the prevention and suppression of wildfires. The BFD has jurisdictional responsibility for wildfire protection; OCFA will respond to protect adjacent State Responsibility Areas.

The entirety of the Preserve is mapped as Very High Fire Hazard Severity Zone. This rating is based on a number of inputs, including the steep slopes and large areas covered with Grass Shrub and High Shrub fuel models that are present on the Preserve.

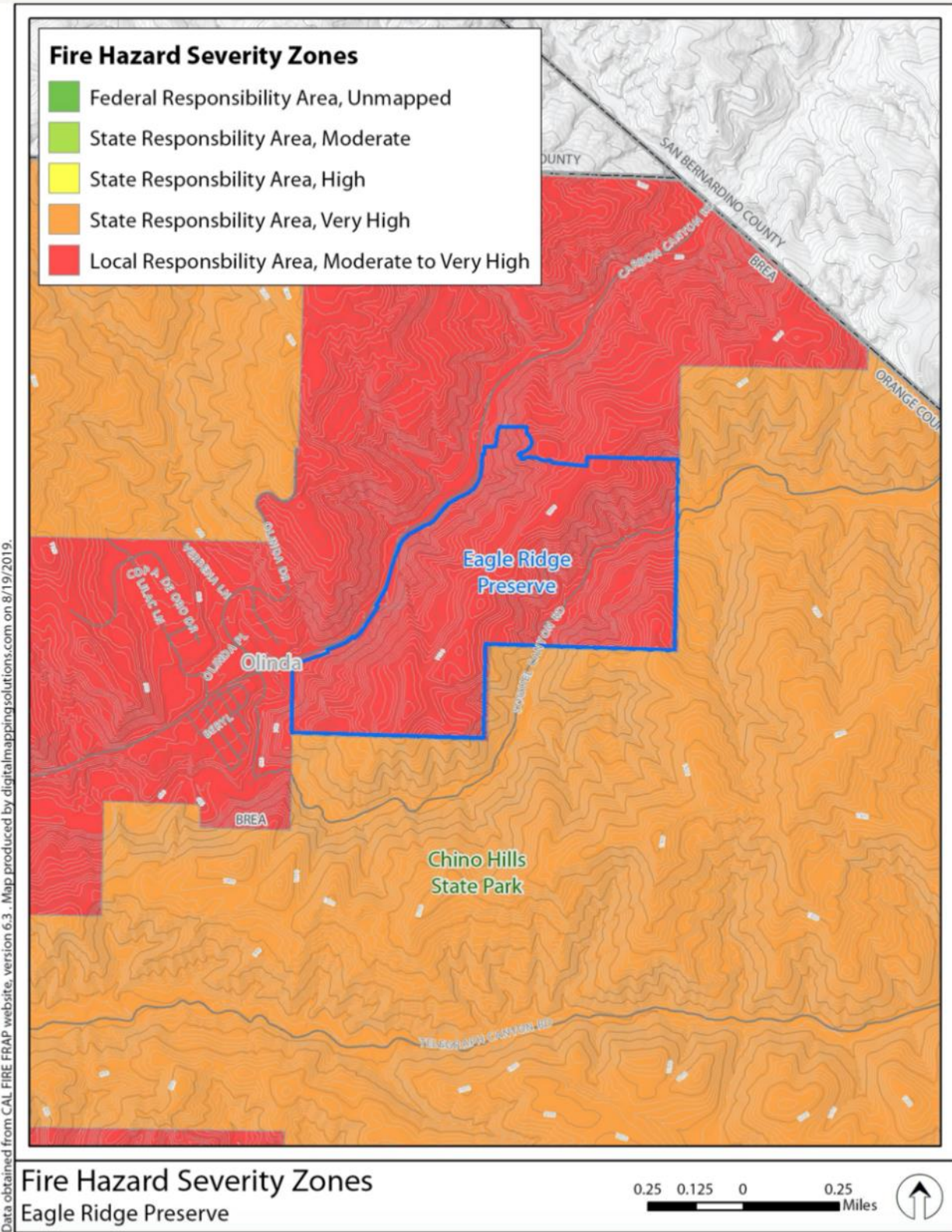


Figure 10. Fire Hazard Severity Zone map of Eagle Ridge.

V. FIRE MANAGEMENT PROGRAM

The 2016 M2 Conservation Plan (section 7.2.5.9) recognizes the need for pre-fire activities, such as brush management. Fire protection is provided through a comprehensive fire management program that is broken down into the four categories addressed below: wildfire pre-fire/ignition prevention; wildfire response; wildfire suppression repair; and wildfire recovery.

This section defines and describes the roles and responsibilities of the OCTA, OCFA, BFD, and other collaborating agencies such as Orange County Sheriff, Irvine Ranch Conservancy, and others that may be part of the Wildland-Urban Interface (WUI) Group.

OCTA benefits from relationships with other agencies. Cooperating partnerships, financial support, and other resources through the WUI (Wildland Urban Interface) Group and mostly with OCTA's relationship with the OCFA Wildland Resource Planner all support wildland fire protection of the Preserves. The Irvine Ranch Conservancy (IRC) is another cooperating partner that helps regionally to oversee and train FireWatch volunteers that patrol high-risk wildlands in order to prevent ignitions. The Hills for Everyone helps increase awareness of wildfire ignitions and the value of the Preserve. Caltrans also assists in wildfire prevention by annual roadside management to reduce the chance of ignition.

One location has cameras with views of the Preserve as part of the ALERTCalifornia network.¹³ ALERTCalifornia is a consortium of the University of California San Diego and numerous other partners providing fire cameras and tools to help firefighters and first responders. The ALERTCalifornia network is used to help:

1. Discover, locate, and confirm fire ignition.
2. Quickly scale fire resources up or down.
3. Monitor fire behavior during containment.
4. Help evacuations through enhanced situational awareness.
5. Observe contained fires for flare-ups.

The cameras are placed above CA-142¹⁴/Carbon Canyon Road at the end of N Tank Road. This location has two cameras, aimed at different angles. All cameras rotate, to enable a greater area of coverage that includes views of the Preserve.

¹³ <https://alertcalifornia.org/about/>

¹⁴ CA-142 was previously referred to as SR142.

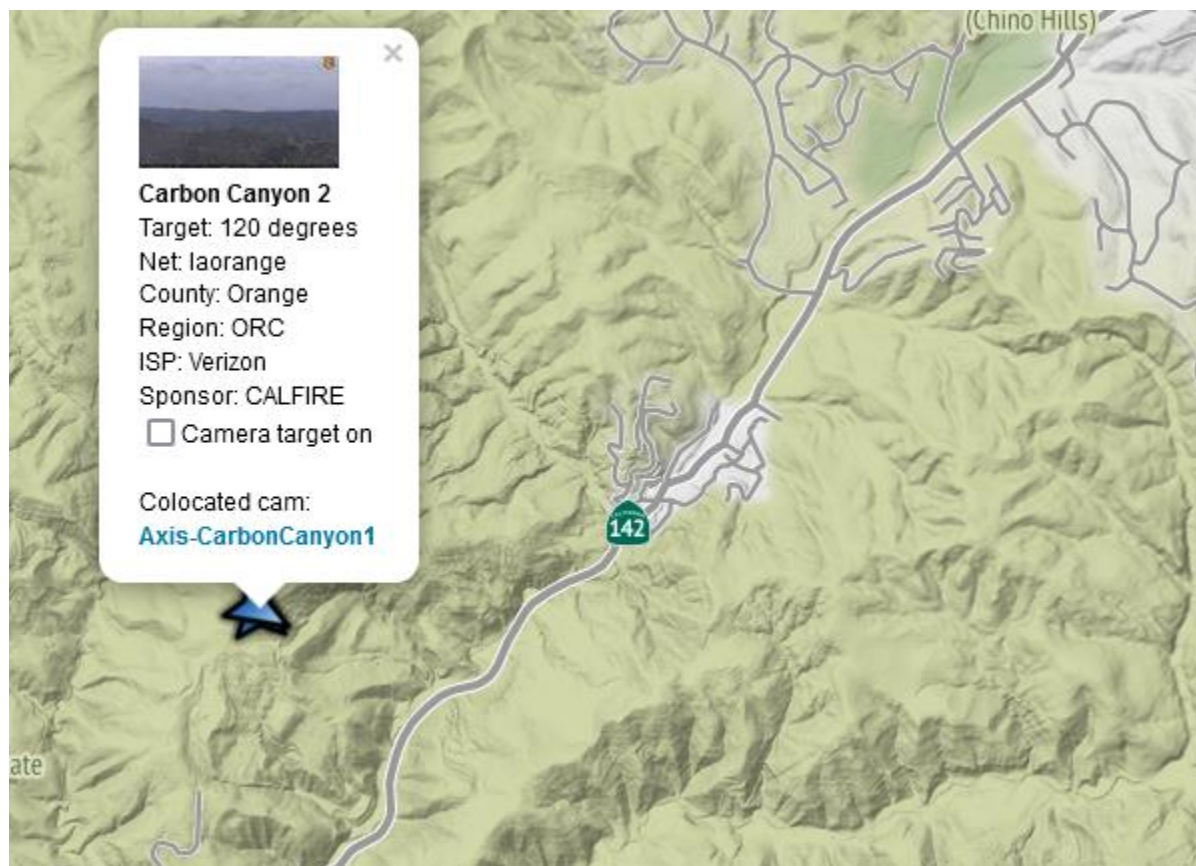


Figure 11. Location of nearby ALERTCalifornia cameras. The location, at the top of N Tank Road, hosts the two cameras. All cameras rotate during operation, thus direction of arrows on this figure are examples only.

A. Pre-fire/Ignition Prevention

Pre-fire response includes both planning and physical fire prevention activities, such as vegetation management. Responsibilities for pre-fire activities overlaps between OCTA, BFD, and neighboring landowners.

i. Orange County Transportation Authority Responsibilities

The M2 Conservation Plan (section 7.2.5.9) states, “Preserve Managers will have the responsibility for brush management on lands they manage. Preserve management for fire will include the following elements, which will be incorporated into the RMPs:

- In consultation with the Brea... Fire Department (BFD) and OCFA, prepare site-specific fire management plans as part of the preparation of RMPs for the Preserve. Include BFD contacts and guidelines for pre-fire prevention activities, fire suppression, and post-fire restoration.
- Conduct pre-fire management, as appropriate, such as the limited removal of combustible, non-native plants. Because the Preserve is within the jurisdiction of

BFD, OCFA [will work with OCTA to perform pre-fire vegetation management and does not hold OCFA responsible for the pre-fire vegetation management].¹⁵

- Establish fuel management zones. If necessary, exceptions to avoid impacts on sensitive species and habitats will be identified by the Preserve Managers, with concurrence sought from the local fire authority.
- Coordinate with surrounding landowners to ensure that adequate setbacks are established that allow fuel management zones to be established outside of the Preserve (up to 100 feet from structures and 30 feet from roads) for new structures and facilities. For new structures or facilities constructed within the Preserve, ensure that a fuel management zone is established around these structures/facilities and include these areas as impacts against the caps allowed under the Plan.
- When available, establish fuel management zones that take advantage of existing roads and disturbed or developed habitats, thus avoiding sensitive habitats. Where feasible, provide approximately 15 feet of horizontal clearance to enable fire authority vehicle access to major access roads within the Preserve.
- Clear vegetation outside of the avian breeding season (as described in Section 7.3.1, “Species and Habitat Management,” above), unless a preconstruction nesting survey determines that no nesting birds will be affected by clearing activities. If clearing must occur at a time or in a manner that may affect nesting birds, the Preserve Manager will consult with the Wildlife Agencies to review any issues prior to the initiation of activities.
- Avoid impacts on narrow endemic plant populations during fire road maintenance operations and the clearing of fuel management zones. However, if high fuel load levels develop in a given year, mowing/trimming may have to occur to meet fire management requirements.
- If clearing must occur at a time or in a manner that may adversely affect sensitive resources, the Preserve Manager will consult with the Wildlife Agencies and fire agency to minimize impacts prior to project initiation.
- Work with the BFD to ensure that wildfire suppression activities are conducted in ways that sustain long-term ecosystem health and reduce impacts on sensitive species.
- Conduct emergency post-fire erosion control where necessary. Repair and restore fences, trails, culverts, and landscaped contours to pre-fire conditions. Monitor post-fire recovery closely and immediately remediate new problems associated with erosion, sedimentation, invasion by nonnative species, etc.
- Plan all post-fire actions, such as restoration, invasive species removal, erosion control, or trail stabilization, in consultation with the Wildlife Agencies prior to project initiation.”

The RMPs address invasive plant and wildlife species, as well as insect pests that affect trees and other native vegetation in the Preserves. These fungal and insect pests can weaken and kill native trees. The dead, sick, or weakened trees create an additional hazard in the form of

¹⁵ The bracketed text does not appear in the M2 Conservation plan; rather, it is an updated agreement between the OCTA and OCFA, developed as a result of this FMP. The zones were delineated with OCFA, in the Eagle Ridge Preserve, no vegetation management was identified.

increased volumes of dry fuel that are distributed from the ground to the tree crown. This hazard may justify pre-fire action to remove dead trees or branches to prevent ignitions and unnaturally high fire intensity and fire spread rates.

The RMPs commit the OCTA Preserve Manager to monitor and address potential infestations of invasive insects and other pathogens that can threaten native habitat. In addition, the OCTA Preserve Manager will stay current on the latest information and science of invasive insects or other pathogens (e.g., invasive shot hole borer and goldspotted oak borer) and monitor for signs of infestations as part of general stewardship monitoring. If an infestation is identified, the Preserve Manager will coordinate with the OCTA NCCP/HCP Administrator and Wildlife Agencies on appropriate control actions.

The RMP for the Eagle Ridge (then Hayashi) Preserve also specifies duties regarding pre-fire management: “The Brea... Fire Department (BFD), Orange County Fire Authority (OCFA) and Cal Fire are all involved in fire control within the Preserve, and their first priority will be to protect life and property. The Preserve Manager will work closely with these entities, as well as CHSP (Chino Hills State Park) to identify fire management guidelines... Prior to adoption of the FMP, fire management in the Preserve will consist primarily of conducting regular maintenance of weeds along existing fire roads, and maintaining safe access for firefighters on existing fire roads.”¹⁶ Additionally, “[t]he Brea... Fire Department (BFD) will provide oversight regarding future necessary fire management activities, such as fire access roads.”¹⁷

The M2 Conservation Plan establishes a Strategy/Management Action that “[t]he FMP will include maps of cactus patches and strategies to minimize direct impacts to cactus patches during fire suppression efforts, if feasible.” This mapping was completed in 2019; there are no cactus patches mapped on the Eagle Ridge Preserve.

OCTA has the responsibility to meet with BFD representatives to inform them of the conditions on the Preserve (because the entire Preserve is considered sensitive habitat), and express preferences for suppression strategies, as required by the M2 Conservation Plan. While the Incident Commander (IC) has complete authority for suppression decisions, the entire Preserve contains high-quality habitat, and no locations are mapped as suitable for placement of a dozer line during response to a fire incident. Current access within the Preserve is adequate for fire response and possible containment. The OCTA developed a map of environmentally sensitive areas. The Environmentally Sensitive Lands map (Appendix C) informs the BFD of riparian and cactus scrub areas and locations of rare and sensitive species to avoid and is an important component to inform the decision-making process during a wildfire¹⁸.

OCTA conducts community outreach with wildfire prevention messages, including the impact of flying embers and the limited, but essential, need for vegetation management and

¹⁶ Hayashi Preserve Resource Management Plan (August 2017), Executive Summary, pg. 2.

¹⁷ Hayashi Preserve Resource Management Plan (August 2017), Section 3, pg. 1.

¹⁸ The RMP mentions OCFA in regards to suppression, however, BFD is the jurisdiction which will interact with OCTA during fire suppression.

access. This is done at OCTA wilderness preserve hikes, and participation in cooperating agency events. OCTA participates in the County of Orange Area Safety Taskforce (COAST) and the Orange County Ignition Prevention Working Group, a subset group of COAST. Closure of the Preserve to the public is an effective method of preventing wildfire as human activities are closely correlated to wildfire ignition.

ii. Brea Fire Department Responsibilities

The BFD pre-fire/ignition prevention responsibilities are spearheaded by the BFD Fire Prevention Bureau staff and the OCFA Wildland Pre-Fire Management staff, including the Wildland Resource Planner. The responsibilities of the BFD Fire Prevention Bureau staff and particularly the OCFA Wildland Resource Planner include conducting vegetation management as approved by OCTA, coordinating with regulatory agencies such as the Wildlife Agencies, and enforcing compliance with vegetation management requirements for adjacent landowners. After coordination with BFD, it was determined that no vegetation management would be required within the OCTA Preserve. While no habitable structures are located within 100 feet of the Preserve, should any additional such structures be approved nearby, OCTA and BFD will ensure that any vegetation management needed for an adjacent structure be conducted on the adjoining parcel where the structure is proposed and shall not extend onto the OCTA Preserve per Section 7.2.5.9 of the Conservation Plan. Vegetation management is prohibited under future conservation easements except as otherwise allowed under the RMP and FMP.

The BFD is trained per the National Wildfire Coordinating Group qualifications. These qualifications span firefighting techniques as well as incident management.

As part of pre-fire activities, the OCFA commissioned a set of Wildland-Urban Interface Pre-Fire Plans for portions of the wildland-urban interface in the County served by OCFA. These plans identify risks, hazards, and infrastructure that supports fire suppression, such as access and water sources. The portion of the Carbon Canyon Wildland Urban Interface Pre-Fire Plan that covers the Preserve appears in Figure 12. A potential choke point/entrapment was identified on Carbon Canyon Road on the northwest boundary of the Eagle Ridge Preserve. Erratic fire behavior was also anticipated at the west end of the ridge in adjacent Chino Hills State Park (Rohde 2016). A choke point is mapped at the western half of the northern boundary, on Carbon Canyon Road. A site of erratic fire behavior is located south of the preserve, on its western flank. A staging area is near the Preserve, in Olinda Village. This is co-located with a Safety Zone and a water pumping station.

The Plans also identified the following access roads: Carbon Canyon Road (SR142) extends five miles northeast from Lambert Road in Brea to Sleepy Hollow, and then into Chino Hills. It is extensively used by commuter traffic. Olinda Village is mid-canyon, and Sleepy Hollow is just east of the San Bernardino County line. Truck trails enter Chino Hills State Park at Telegraph and Soquel Canyons.

These Pre-Fire Plans identified several Safety Factors:

- Fire Fighter Safety is Level 2 (moderate risk) due to marginal safety zones.

- Civilian Safety is Level 2 (moderate risk) with evacuation if time permits.
- Air Safety is Level 1 (highest risk) due to restrictions from steep canyons.
- Hazardous Materials is Level 1 (highest risk) due to bulk Liquid Petroleum Gas and chemicals.
- Entrapment is Level 1 (highest risk) due to steep canyon topography.

The plans also identify preferred tactics for containment and evacuation. Liaisons and important areas of avoidance are also identified.

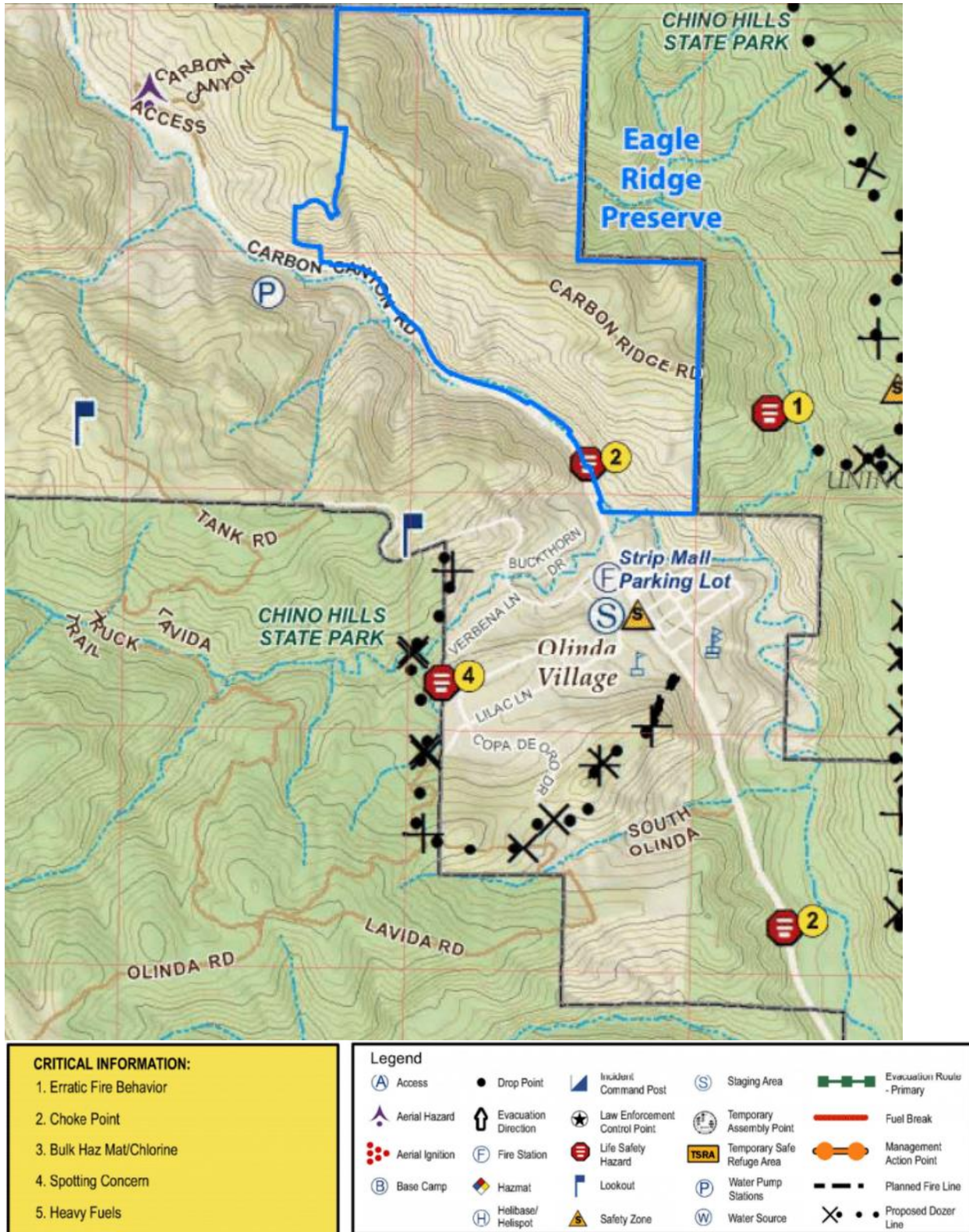


Figure 12. Tactical map of the Eagle Ridge Preserve.

B. Wildfire Response

Fire suppression is defined as all work involved in extinguishing a fire following its detection. The basic practices involved in suppression require reconnaissance, hot-spotting, and initial attack, location and construction of firelines, control, mop-up and patrol, and declaring the fire contained and controlled.

The primary objective of fire suppression on OCTA lands is to control wildfires to protect public safety while causing the least damage to OCTA Preserve resources. Natural resources will be taken into consideration where feasible. Fireline placement is determined on a number of factors, including time, fuels, topography, and available resources. The 2016 M2 Conservation Plan states, "The FMP will identify wildfire suppression activities and strategies, access points, fire hydrants, and potential staging areas. The FMP will emphasize a fire suppression strategy of controlling any smaller fires on site if possible. Larger fires coming from outside the Preserve and moving across the Preserve may require control tactics within the Preserve. In these instances, BFD will establish defenses within and nearby any adjacent homes to protect life and property. The Preserve Manager, Conservation Plan Administrator, and BFD¹⁹ should collaborate to define the least damaging suppression strategy within the FMP and delineate this preferred area(s) graphically." Determining the least damaging suppression strategy includes weighing, for example, the impact of possible damage from soil disturbance from dozer lines with those of a possible larger fire size (and potential for facilitation of invasive plant species) due to the backfire.

For the Eagle Ridge Preserve, BFD will assume responsibilities delineated for the OCFA in the original M2 Preserves Conservation Plan. Additionally, the Resource Management Plan associated with the M2 Preserves Conservation Plan states: "The Brea-Fullerton Fire Department (BFD) will provide oversight regarding future necessary fire management activities, such as fire access roads. BFD, and in some situations OCFA and/or CalFire, will also respond to active fires to prevent the loss of human life and property and other resources. These activities fall into two categories, regular maintenance activities and emergency activities." Section 3.2.5 further states that "[t]he Brea-Fullerton Fire Department is responsible for fire control within the Preserve, and their first priority will be to protect life and property. OCTA will work closely with CFD to identify fire management guidelines, including specific fire and brush maintenance zone specifications and access route locations that minimize impacts on sensitive biological resources, and will identify areas that should be avoided to preserve sensitive biological resources. This information will be included in the Fire Management Plan." No pre-fire activities identified in this Fire Management Plan. Environmentally Sensitive Resources appear in Appendix C of this plan.

i. Orange County Transportation Authority Responsibilities

Firefighting organizations operate under the Incident Command System (ICS). ICS is part of the State Emergency Management System (SEMS). OCTA will have the Field Operations

¹⁹ The RMP mentions OCFA in regards to suppression, however, BFD is the jurisdiction which will interact with OCTA during fire suppression.

Guide to the Incident Command System (#ICS-420-1), available from the Office of Emergency Services.

When wildfire and suppression activities are expected to impact OCTA lands it is essential to establish liaisons to monitor, supply special management zone information, or direct these activities. Information obtained at the Incident Command Post (ICP) or from the Incident Action Plans (IAP) may be inaccurate because firefighters are unfamiliar with the area and ownership, or the information may not be transferred to new personnel at shift changes. A rapidly changing fire perimeter magnifies all communication problems. If an uncontained wildland fire is either threatening or on OCTA lands, the OCTA Preserve Manager will act as a Resource Advisor (RA) and coordinate and communicate with the WRP to prevent unnecessary damage to Preserve resources.

The OCTA RA will be the individual responsible for overseeing management of the Preserve if and/when management of the Preserve responsibility is transferred to another entity. That individual will take the required training, and wear suitable personal protection gear, so that they will be able to go behind the fireline, escorted by fire personnel, if necessary. An OCTA Operations staff member should receive the same training and equipment, so that they will be able to reconcile technical considerations and OCTA land management goals with BFD and OCFA firefighters in an expedient manner. Once notified of a wildfire, the OCTA RA will report to the WRP and advise that position of sensitive features and landowner preferences on outcomes. The OCTA RA will also request activities, such as a truck-washing facility, that would reduce resource impact of the wildfire during suppression, mop-up, and rehabilitation. The BFD Incident Commander (IC) has complete authority for suppression strategy and outcomes and will take the landowner's preferences into advisement.

The role of OCTA staff depends on the nature of the wildland fire. All OCTA employees have the responsibility of gathering information about the wildfire because any employee may discover and receive a report of a wildfire. The employee should immediately call 911.

Upon arrival at the wildfire, OCTA will have several duties. In order of priority the duties are:

1. If necessary, OCTA staff would request OC Sheriff to assist with evacuations. This activity is necessary when unauthorized members of the public are at the fire scene.
2. Request an off-site truck-washing facility to be operated by the contracted entity. The most likely location of this facility would be at the OCFA staging area.

Responsibilities and Requirements of the Resource Advisor: The RA will check in at the ICP, contact the WRP. The RA will attend all incident planning and briefing meetings and inform the WRP of OCTA's sensitive resources. This will be a question at a wildfire because it is the duty of the IC to inquire about any special management concerns of the affected landowners. The IC will rely on the WRP to work with the RA and relay any special management concerns. The RA will obtain and study the IAP. The RA can offer alternative locations for control lines when sensitive resources are threatened. The RA must know the Preserve ownership, sensitive areas, and contents of the fire management plan. The RA must have official identification, mobile phone or radio, and a copy of the fire management plan, and a RA certification.

Emergency Evacuation: OCTA staff or contractors that may be within the Preserve during an uncontained wildfire must either be evacuated from the Preserve or brought to a “safe area.” This Preserve is not part of an evacuation route for any adjacent parcels. In no circumstance should members of the public be brought to the Preserve during a wildfire incident. Evacuation routes will be dependent on conditions, circumstances, and staffing. The evacuation order is a command decision under ICS, which is carried out by the Orange County Sheriff department. In the Eagle Ridge Preserve, the preferred evacuation route to vacate the Preserve is along Carbon Ridge Road north to Carbon Canyon Access Road, which connects to Carbon Canyon Road to the east of the Preserve. See Appendix D, Wildland-Urban Interface Pre-Attack Plan.

ii. Brea Fire Department Responsibilities

The OCFA, BFD, and Cal Fire are responsible for providing fire protection for the Eagle Ridge Preserve. As shown in Table 11, the nearest fire station is BFD Station #4, at 170 Olinda Place (1.1 miles from the Preserve), which is equipped with vehicles suitable for wildland fire response and can reach Eagle Ridge Preserve in approximately 2 minutes. BFD Station 3 is located at 2600 E. Santa Fe Road, 2.6 miles from the Eagle Ridge Preserve, and is expected to be able to respond to a fire in approximately four minutes. Brea Fire Department Station 2, at 200 N. Brea Blvd., is 4.0 miles and 13 minutes from the entry to the Preserve off Carbon Canyon Rd. Station 1 is further, at 5.3 miles from the same place, with an expected response time of 11-15 minutes.

The WUI Pre-attack Plan (Rohde, 2016) identifies all infrastructure that supports wildland fire response in and around the Preserve. There are several types of water sources available for fire response near the Preserve. There is good municipal fire flow, pressure, and supply, except at the highest homes in Olinda Village. There are hydrants on all residential streets, but there is no water in wildland areas. Use of trailer community private hydrants should be avoided. There are critical pump stations on Carbon Canyon Road 1 mile east of the State Park Discovery Center, and near Olinda Drive, 3500 Valley View Circle, and 4009 Paso Fino Way. Loss of any of these pump stations can lead to zone system failure, so provide protection to these pump stations and Diemer Plant. Employee access to Diemer Plant should be allowed.

Nearest Fire Station	Service Area	Fire Station Address	Route	Distance	Estimated Time
STATION #1	BREA	555 Berry St.	Via E Lambert St to Carbon Canyon Rd	5.3 miles	11-15 minutes
STATION #2	BREA	200 N. Brea Blvd.	Via E Lambert St to Carbon Canyon Rd	4.9 miles	10 - 15 minutes
STATION #3	BREA	2600 E Sante Fe Rd, Brea, CA 92821	Via Carbon Canyon Rd	2.6 miles	< 5 minutes
STATION #4	BREA	170 Olinda Place, Brea, CA 92823	Via Carbon Canyon Rd	0.6 mile	< 5 minutes
STATION #34	PLACENTIA	1530 N. Valencia Ave., Placentia 92870	Via Valencia	5.5 miles	10 - 15 minutes
STATION #10	YORBA LINDA	18422 E. Lemon Dr., Yorba Linda 92886	Via CA-90/CA-142	6.6 miles	10 - 15 minutes
STATION #5	FULLERTON	2555 Yorba Linda Blvd, Fullerton, CA 92931	Via Bastanchury Rd	7.4 miles	10 - 15 minutes
STATION #32	EAST YORBA LINDA	20990 Yorba Linda Blvd., Yorba Linda 92887	Via Bastanchury Rd	9.7 miles	15 - 20 minutes
Nearest Fire Service					
Station	Area	Fire Station Address	Route	Distance	Estimated Time
STATION #1	BREA	555 Berry St.	Via E Lambert St to Carbon Canyon Rd	5.3 miles	11-15 minutes
STATION #2	BREA	200 N. Brea Blvd.	Via E Lambert St to Carbon Canyon Rd	4.9 miles	10 - 15 minutes
STATION #3	BREA	2600 E Sante Fe Rd, Brea, CA 92821	Via Carbon Canyon Rd	2.6 miles	< 5 minutes
STATION #4	BREA	170 Olinda Place, Brea, CA 92823	Via Carbon Canyon Rd	0.6 mile	< 5 minutes
STATION #34	PLACENTIA	1530 N. Valencia Ave., Placentia 92870	Via Valencia	5.5 miles	10 - 15 minutes
STATION #10	YORBA LINDA	18422 E. Lemon Dr., Yorba Linda 92886	Via CA-90/CA-142	6.6 miles	10 - 15 minutes
STATION #5	FULLERTON	2555 Yorba Linda Blvd, Fullerton, CA 92931	Via Bastanchury Rd	7.4 miles	10 - 15 minutes
STATION #32	EAST YORBA LINDA	20990 Yorba Linda Blvd., Yorba Linda 92887	Via Bastanchury Rd	9.7 miles	15 - 20 minutes

Table 11. Location of nearby fire stations and response times to the Eagle Ridge Preserve.

In the event of a fire, OCFA will commence suppression activities consistent with the primary goal of saving lives. OCFA will provide support to identify and protect natural and cultural resources to the best of their ability. Mapping indicating all Environmentally Sensitive Lands on the Preserve, as in Appendix C, was created with input from the OCTA RA and was developed to be used as a tool to aide in sensitive resource avoidance and minimization. The OCFA will notify OCTA of a wildfire. The OCFA Wildland Resource Planner will be a liaison between the landowner (OCTA) and the IC as needed. The Wildland Resource Planner will also be responsible for coordination with neighboring landowners: the USFS, Orange County Parks, and private landowners.

EMERGENCY RESOURCE NEEDS - FIRST SIX HOURS (In addition to Initial Attack Resource)			
Fire Ordering Point: ORC Dispatch: (714)573-6522 *COP METRO Net Dispatch (714)533-1305		Law Enforcement Ordering Point: BPD: (714)990-7911 OC S/O: (714)288-6963 Chino Hills State Park: (951)442-2969	
Engines: The number range reflects the number of "minimum" to "preferred" resources.		Law Enforcement: 100 officers, Brea PD, OC S/O, and CHP to evacuation, traffic control, and security. IC-Lt., Capt. State Parks to evac. Chino Hills State Park. Consider adding SBCo S/O.	
Type 1 Strike Teams: 8-10	Type 3 Strike Teams: 3-5	Water Tenders: 5	
Crews Single: 6-8 STs:	Dozers Single: 2-4 STs:	Overhead: 4-5 Div. Sup.: 4-5	
Aircraft: Type 1 Helicopter (Large): 1 Type 3 Helicopter (Light): 1 Type 2 Helicopter (Med.): 3 Air Tankers: 4		Logistics Open EOC to support aggressive fire or significant evacuation need. Consider responder fuel, water, and food needs. File F-MAG application with CAL-OES. Consider activation of CERT team for evac. assistance. Notify public works to assist in traffic management, Red Cross and Animal Control to assist in evacuation. Liaison with SCE regarding powerline issues.	
WUI Engine Deployment - High Risk 1 engine/2-4 perimeter structures, 1 engine/isolated structures 2 engines/ multi-family structures		Other Dozer restrictions: use on ridge lines or to expand existing TT's only, avoid use in canyon bottoms (arch. sites). Seek resource guidance from Chino Hills State Park (951)442-2969	
WUI Engine Deployment - Moderate Risk 1 engine/2-4 perimeter structures, 1 engine/isolated structure, 2 engines/multi-family structure			
WUI Engine Deployment - Low Risk 1 strike team/2 blocks of perimeter hom			

Figure 13. Expected emergency resource needs identified in the Wildland Urban Interface Pre-Fire Plan (2016) for a wildfire in/near Eagle Ridge Preserve. OCFA has requested that OCTA contacts be included in the applicable plan for the Eagle Ridge Preserve.

C. Wildfire Suppression Repair

i. Lead Agency Responsibilities

The responsibility for wildfire suppression remediation is linked to the lead agency in the wildfire incident. Because the entirety of the Preserve is within the Local Responsibility Area of Brea, Brea would be immediately engaged in fire suppression and response, and when possible, wildfire suppression repair. The RMP for the Preserve specifies the following post-fire responsibilities for the BFD, assuming it would be the lead agency: "Restoration of dozer lines by BFD will include, but not be limited to, recontouring lines, removing berms, scattering previously cut brush over lines, and potentially replanting available cactus pads. These activities will be agreed upon and coordinated between BFD and Preserve Manager."²⁰

The above statement of responsibility is updated by this fire management plan. The City of Brea will assess the need for rehabilitation and determine on a case-by-case basis, to act on the identified needs. This assessment will be based on risk and cost to the City and other entities and will be considered jointly by the cooperating agencies. If OCFA is the Lead Agency, it would be responsible for wildfire suppression repair. In practice, OCFA may conduct wildfire suppression remediation because that agency has the equipment and qualifications to do so. The workload depends on the size and intensity of the fire and the extent of fire suppression actions and will be detailed in the IRP (see Appendix B for an example). The authority to complete suppression repair work lies with the Public Resources Code (PRC), including PRC 4675, and PRC 4676(a,b). Policy derived from these statutes is provided in the CAL FIRE Handbook. This policy and authority provide for repairs necessary to prevent further resource damage.

If wildfire suppression repairs are conducted by OCFA equipment operators, they will be performed prior to move-out, and generally include:

- Preparation of an IRP.
- Recontouring areas of the Preserve where fire suppression occurred, especially in sensitive areas, prime habitat or areas previously restored.
- Installing waterbars (ditches cut at an angle into the soil) on dozer firelines.
- Removing soil and organic debris from streams where fire lines crossed and applying mulch or other fine organic material on fire line approaches where appropriate.
- Bringing road drainage structures back to pre-fire condition.
- Treating/reducing large concentrations of downed trees (slash) near roads and structures.
- Repairing damaged land improvements (e.g., water pipes, fences, gates) related to suppression activities.
- Addressing public safety issues, such as flagging/marking hazard trees threatening roads or structures for removal by professional fallers, and mapping/reporting downed power and phone lines.

²⁰ Hayashi Preserve Resource Management Plan (August 2017), Section 3, pg. 26.

Repair activities will focus on minimizing erosion and minimizing the introduction of invasive plant species. Mitigations described in the IRP apply to constructed fire lines, watercourse crossings, access roads, drop points, helispots and any other locations disturbed by fire suppression activities. The mitigations are intended to reduce downslope effects. Of particular concern are potential water quality impacts, damage to private roads, and cultural resources. The intent is to utilize resources assigned to the incident for repair with operators that have knowledge of activities that occurred during control operations. A Repair Specialist will be assigned to ensure that work is done as required and according to the IRP. Additional specialists may be used if the need arises. These general standards will be applied except where site-specific needs are identified, and alternative repair actions are developed and agreed upon.

Bare soil that has been moved by suppression activities to form fire control lines and safety zones must be returned as closely as possible to the original grade. Side-cast fill material will be pulled up into the cut zone, outsloped and packed to resemble the original contour as much as possible. Berms shall be pulled back across the surface of the disturbed soil and scattered to take advantage of the native seed present within the material. All material and debris that was pushed into riparian vegetation shall be removed and placed on stable repository sites. Temporary fire camps, helispots, and other sites shall be removed, and the site returned to its natural state.

The creation of fire lines by heavy equipment on slopes can often be a source of considerable erosion and if OCFA is conducting the repairs they are expected to follow the IRP and recontour with heavy equipment in specific scenarios. This recontouring will be performed prior to the move-out of equipment that was used for fire suppression. Some erosion control measures will be required where suppression activities have exposed mineral soil.

All existing roads and trails, which have been modified by suppression activities, will be returned to their original condition after the fire, unless full re-contouring is necessary. Roads shall be outsloped where possible. On roads, mechanical equipment shall create holes for drainage through the older berms at natural drainage areas. All berm material cleared via this process shall be pulled onto the road surface, scattered, and packed.

After re-contouring of soil, if necessary, the exposed soil shall be covered with unburned (or blackened, cold) organic matter. Shallow seed furrows that will retard overland water flow will be created by lightly dragging the toothed edge of a McCloud across the slope. Existing downed material and available debris will be scattered on top of raked area. Walking on the raked area will be avoided throughout this process.

New hand and dozer fire control lines create opportunities for unauthorized visitors to use as trails and may result in increased erosion. Dozer fire control lines or handlines that connect with roads or trails shall be fully recontoured, covered, and visually hidden for a distance of 200 feet using existing downed natural material.

D. Wildfire Recovery

OCTA is responsible for and will determine if post-fire restoration activities that are not part of the IRP prepared by the OCFA are necessary. OCTA would be responsible for such activities as vegetation seedings and planting vegetation (as necessary), or installation of erosion barriers, straw wattles, and other forms of erosion control. If seeding is determined to be necessary, the seed mix should consist of native species collected from within the Preserve. If the collection of seed from within the Preserve is not possible, coordination and approval of alternative seed sources from CDFW and USFWS will be obtained.

No permanent erosion control devices will be installed. Temporary erosion control devices can be installed when erosion has been exacerbated by artificial structures or landscape features upslope that cannot be corrected and seeding or planting will not stabilize the accelerated erosion within one year.

If any significant cultural resource sites have been exposed by wildfire, OCTA should work with a qualified archeologist to design specifications or procedures to cover and block access to the sites.

A tree hazard assessment may be necessary after a fire. If any trees along roads or trails have been damaged or killed by wildfire they will be inspected, and safety risks mitigated by a licensed arborist.

Following a major wildfire, care should be taken to avoid inadvertent introduction of non-native plant species and pathogens to the Preserve. Exotic species may become established and spread quickly in the low competition, nutrient-rich post burn soils. Surveillance of control lines and other areas of soil disturbance will be a focus of post-fire activities as part of the implementation of the Invasive Species Management Plan. Equipment and tools should be cleaned before entering the Preserve.

Decisions regarding placement of restoration areas should keep in mind that locations near previous fire roads or dozer lines may be used again during response to future wildfires so will have a higher vulnerability to recurrent disturbance.

The M2 Conservation Plan acknowledges that a single wildfire is not a Changed Circumstance, but a Changed Circumstance is triggered when fires burn the Preserve frequently:

“A Changed Circumstance fire event will be defined as one that exceeds the ability of the Preserve Manager’s standard staff/equipment to control and occurs over the same area(s) more frequently than the expected recovery interval. Exceeding the ability of the Preserve Manager means that the available fire-management resources (as described/listed in the RMP) cannot contain or control the fire and additional firefighting resources are required to control and contain the fire. The effects of fire frequency may vary by proximity to the coast, elevation and aspect, time of year, and other factors. Based on the fire history of Orange County and experience on similar Preserves, for this Plan,

the repeated frequencies triggering Changed Circumstances is *three fires within a 50-year span on the same area of a Preserve. If four fires occur within a 50-year time span, this would be considered an Unforeseen Circumstance*" (italics provided).

If frequent wildfires burn the Preserve, the Preserve Manager or a qualified individual will develop specific actions to be implemented, which will be included in an updated FMP. Possible responses to a Changed Circumstance fire may involve the following, per the M2 Conservation Plan:

- "Revise standard fire prevention procedures by the land management entities on Preserves.
- Collaborate with local fire agencies to assess and revise specific fire-related practices in Preserve Areas (fire breaks, vegetation management, etc.).
- Revise Preserve management as outlined in the RMP regarding public access, use, and fire information.
- Install temporary erosion control features.
- Increase invasive (particularly fire-facilitating) species control and native plant reseeding or planting.
- Revise vegetation monitoring in potential fire-prone areas and post-fire areas.
- Implementing an altered monitoring regime (more frequent, different methods) to evaluate the response of Covered Species and their habitats to the fire event."

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APPENDICES

- A. Fire Suppression Repair Standards and Example of Plan
- B. Glossary of Terms
- C. Environmentally Sensitive Lands Maps
- D. Wildland Urban Interface Pre-attack Plan

APPENDIX A: FIRE SUPPRESSION REPAIR PLAN
XXXXXX INCIDENT
CAXXX – 00XXXX
Date

GENERAL SUPPRESSION REPAIR POLICY

Suppression damage is defined as adverse impacts to resources caused by firefighting efforts. The authority to complete suppression repair work lies with the Public Resources Code (PRC), including PRC 4170 and 4170.5, PRC 4675, and PRC 4676(a,b). Policy derived from the statutes is provided in the CAL FIRE Handbook. This policy and authority provide for repairs necessary to prevent further resource damage.

Mitigations described within this plan have been developed to apply to constructed fire lines, watercourse crossings, access roads, drop points, helispots and any other locations disturbed by fire suppression activities. These mitigations are intended to be used to reduce the overall effects that may occur downslope. Of particular concern are potential water quality impacts, damage to private roads, and cultural resources. The intent is to utilize resources presently assigned to the incident for repair with operators that have knowledge of activities that occurred during control operations. A Repair Specialist will be assigned to ensure that work is done as required and according to the Fire Suppression Repair Plan. Additional specialists may be used if the need arises. These general standards will be applied except where site-specific needs are identified and alternative repair actions are developed and agreed upon.

ROADS

Roads that were used during fire control operations will be assessed for the need for grading and watering. Roads that have been substantially damaged by fire control traffic will be graded and watered.

Roads will be drained. Where rolling dips existed prior to the fire, they will be reinstalled. Berms created during fire control will be removed. Drivable waterbars will be used where necessary.

Culvert inlets and outlets will be cleaned out as needed. Material shall be deposited above the anticipated “high-water” mark.

Previously abandoned roads that were reopened for fire control will be drained and blocked to prevent vehicle access. Berms created during fire control will be removed. Drainage structures will be re-installed.

Slash piles adjacent to public roads will be treated for hazard reduction. Piles will be pulled apart and scattered. If necessary, slash will be lopped or otherwise treated as agreed upon. Slash treatment will be conducted in consultation with landowners.

DOZER LINE

Waterbreaks will be installed on all constructed or used dozer lines using the following criteria:

Waterbreaks and/or rolling dips shall be used to reduce the volume and velocity of water by directing it off of fire lines as soon as possible at controlled locations.

Waterbreaks should be deep enough to significantly reduce the chance of being destroyed by off-highway vehicle use. Waterbreaks on dozer lines will be at least 18" deep.

Waterbreak spacing:

Gradient:	0-25%	26-50%	>50%
Spacing:	100'	75'	50'

If the fireline is wider than one dozer line (12'), or several come together, the distance between waterbars will be reduced, since the drainage area is different than that accounted for in the spacing tables above.

In areas where tractor fire lines cannot be drained by installation of waterbreaks, the equipment operator will "tractor pack" woody vegetation into the soil surface to prevent surface erosion.

The Repair Specialist may identify areas where additional soil stabilization measures are required. These areas will be clearly flagged on the ground, and necessary work shall be conveyed and clearly explained to the equipment operator(s).

Where fire lines are built down long ridges, waterbreaks will be constructed in opposite directions (in a herring bone configuration - / \ / \ / \ /) to prevent water from accumulating on one side of the line, except where inappropriate for slope stability.

The outfall end of all waterbreaks shall be opened by hand if necessary. Tractors should not open the outfall of the waterbreak if sidecast material would lead to additional erosion. The Repair Specialist should review those areas of specific concern to ensure sidecast material is minimized.

Waterbreaks should be located to discharge into natural vegetation. Where this is not possible, rocks or slash should be placed at the discharge point to effectively dissipate water, if feasible. If slash is used, it shall be hand-packed or tractor packed to make effective contact with the ground.

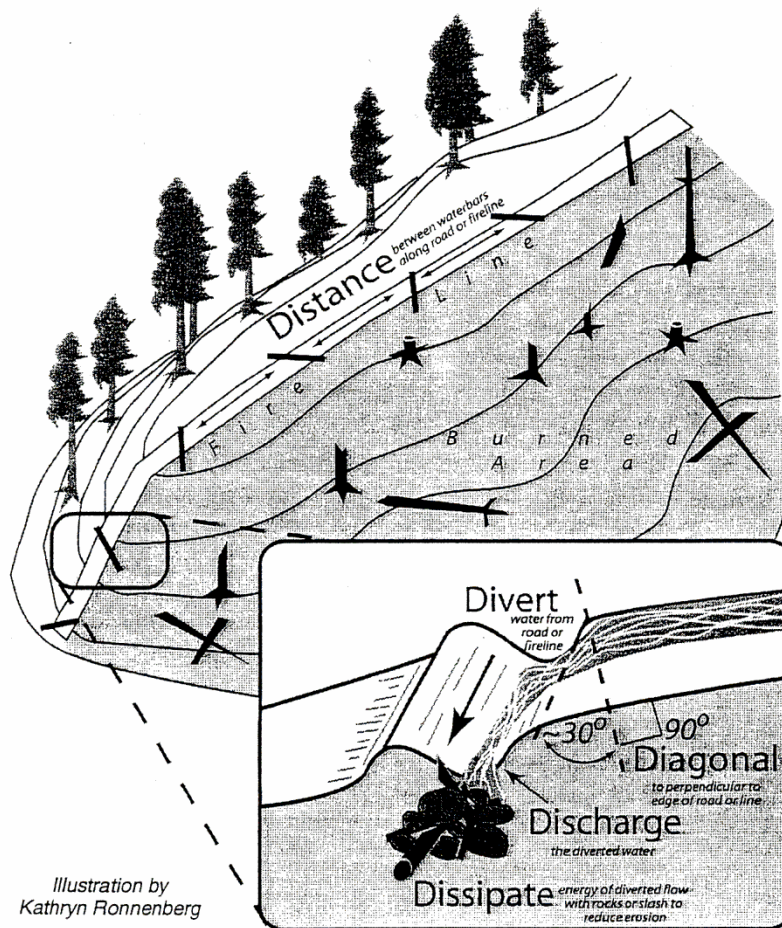
Spacing will be modified to take advantage of natural features that will reduce the water's erosive energy.

Waterbreaks should cross the fire line at an angle of approximately 30 to 45 degrees (i.e., 30 to 45 degrees off of perpendicular).

Please refer to the following waterbreak schematic.

Waterbreak schematic:

(Source: Furniss, The Five-D System for Effective Fireline Waterbars)



HAND LINE

Install waterbreaks as needed based on slope and soil erodibility.

All waterbreaks shall be installed diagonally with a minimum depth of 6". Waterbreaks shall be constructed to allow for drainage at the discharge end into non-erodible material.

WATERCOURSE CROSSINGS

All slash, soil, and debris deposited into watercourses resulting from fire suppression activities shall be removed and stabilized above the high-water line. Depending on site conditions, dozers, excavators, or hand crews may be used.

Mulch will be applied within 50' of watercourses. Tractor packed slash is the preferred mulch where available. Coverage will be at least 75%. Where slash is not available, weed free straw will be used. Coverage will be at least 90% and 2" deep. In site-specific locations where steep slopes, highly erodible soils, or other factors are present, mulch may be applied up to 100' from the watercourse, as agreed upon.

DROP POINTS/STAGING AREAS/SAFETY ZONES

Smooth berms and ensure drainage.

INFRASTRUCTURE

Repair gates and fences damaged by fire control activities. Repairs will be conducted in consultation with landowners.

Other infrastructure, such as water pipes, will be evaluated and repaired as agreed upon and in consultation with the landowner.

ARCHAEOLOGICAL, CULTURAL, OR HISTORIC SITES

Any repair of archaeological, cultural, or historic sites will be planned and conducted in consultation with the landowner, CAL FIRE archaeologist, and tribal representatives. Site specific treatments will be agreed upon prior to commencing repair action.

OTHER

Remove all trash from the fire lines and other affected areas.

Remove flagging related to suppression or suppression repair.

Prepared by: _____
XXXXXXX, Suppression Repair Technical Specialist

Approved by: _____
XXXXXXX, Plans Section Chief

Approved by: _____
XXXXXXX, Incident Commander
 SEE ATTACHMENTS FOR SITE SPECIFIC WORK

EXAMPLE OF FIRE SUPPRESSION REMEDIATION PLAN
SANTIAGO FIRE
CA-ORC-18-64103
Suppression Repair Plan for SRA Lands
 June 12, 2018

General

- Repair any water lines and culverts that may have been damaged due to suppression activities where feasible.
- Remove berms and barriers created by fire control access and suppression efforts.
- Pack out all trash.
- Report any damages or needs to the Fire Suppression Repair Division Group Supervisor. Comp Claims will be notified if the damage cannot be fixed immediately.

Staging Areas/Safety Zones

- New Construction: pull berms, resurface, cross drain, remove debris resulting from use and lop and scatter or chip on site, and abandon (if applicable).
- Existing: Repair to original condition; cross drain, remove debris resulting from use and lop and scatter or chip on site (if applicable).

Roads

- Grade to original road prism where necessary.
- Clean culverts plugged with soil and debris resulting from fire control activities.
- Breach/remove berms to facilitate drainage.

Firelines

Dozers:

- Where excessive berms are formed, back blade onto control line surface.
- Back blade or pull organic debris onto surface and scatter evenly over control line at designated sensitive areas.
- Construct waterbars.

Handlines

- Where excessive berms are formed, pull berms onto control line surface.
- Pull organic debris onto lines and scatter evenly over control line surface at designated sensitive areas.
- Construct waterbars to the same standard as dozer lines (see above).

Install waterbars on all constructed or used dozer lines, roads, and handlines using the following criteria (at every listed distance):

<u>Slope%</u>	<u>0-10</u>	<u>11-25</u>	<u>26-50</u>	<u>>50</u>
Dozer line and Handlines	100'	75'	50'	50'
Road	200'	150'	100'	75'

*All waterbars should be installed diagonally with a minimum cut of 6" into existing grade, and minimum height of 18" from the bottom of the trench to backfill top. Waterbars should be installed at all approaches to watercourse crossings. Waterbars shall be constructed to allow for drainage at

the discharge end into non-erodible material and into the green where feasible. **All waterbars to be constructed at 30 degrees, angled downhill.**

Watercourses

- All watercourse issues shall be reported to the Suppression Repair Group Supervisor immediately, before any work may begin.
- All slash, soil, and debris deposited into watercourses resulting from fire suppression activities shall be removed and stabilized.
- All loose soil must be pulled away from the watercourse and stabilized.

Slash Piles

- Piles within 150' of permanent structures, public trails, or public roads will be lopped and scattered within 18" of soil surface, or chipped where feasible.
- Piles outside of the 150' fire safe zone shall be retained for wildlife cover.

Archaeological or Historic Sites (if discovered)

- All potential sites shall be avoided.
- Impacted sites will be reported to the Fire Suppression Repair Group Supervisor.
- If sites are encroached upon, work will stop immediately; **if there is no threat of fire spread**, and the Division/Group Supervisor shall be notified.

Specific Repair Plan for SRA and State DPA Areas (Assessment is ongoing)

- **Division A**
 - Archaeologist/Suppression Repair Specialist: survey dozer lines for potential archaeological artifacts or sites.
 - Handlines: remove berms, pull cut organic debris onto line, and construct waterbars where needed.
 - Safety zones and pullouts: pull berms, resurface, cross drain, remove debris and trash resulting from use and scatter or chip debris on site, and abandon (if applicable).
 - Dozer lines: remove berms, construct waterbars, and pull cut organic debris from the berms onto line for erosion control.
 - Repair fences as needed.
- **Division M/Z**
 - Archaeologist/Suppression Repair Specialist: survey dozer lines for potential archaeological artifacts or sites.
 - Handlines: remove berms, pull cut organic debris onto line, and construct waterbars where needed.
 - Dozer lines: remove berms, pull cut organic debris from the berms onto line for erosion control, and construct waterbars.
 - Repair fences as needed.

APPENDIX B: GLOSSARY OF TERMS

Backfire – A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire or change the direction of force of the fire’s convection column.

Bulk Density – Weight per unit volume. For fuels, this is usually expressed as pounds per cubic foot; for soils, grams per cubic centimeter.

Canopy – The stratum containing the crowns of the tallest vegetation present (living or dead), usually above 20 feet.

Canopy Base Height – The lowest height above the ground above which there is sufficient canopy fuel to propagate fire vertically. It is a measure of a group of trees, not an individual tree. This measurement incorporates ladder fuels, such as tall shrubs and small trees.

Convection – (a) The transfer of heat by the movement of a gas or liquid; convection, conduction, and radiation are the principal means of energy transfer; (b) As specialized in meteorology, atmospheric motions that are predominantly vertical in the absence of wind (which distinguishes this process from advection), resulting in vertical transport and mixing of atmospheric properties.

Containment – (a) The status of a wildfire suppression action signifying that a control line has been completed around the fire, and any associated spot fires, which can reasonably be expected to stop the fire’s spread; (b) The act of controlling hazardous spilled or leaking materials.

Contained – The status of a wildfire suppression action signifying that a control line has been completed around the fire, and any associated spot fires, which can reasonably be expected to stop the fire’s spread.

Controlled – The completion of control line around a fire, any spot fires therefrom, and any interior islands to be saved; burned out any unburned area adjacent to the fire side of the control lines; and cool down all hotspots that are immediate threats to the control line, until the lines can reasonably be expected to hold under the foreseeable conditions.

Crown Fire – A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Crown Fire Activity – See Crowning Potential. The presence of a crown fire or torching in any one area.

Crowning Potential – A probability that a crown fire may start, calculated from inputs of foliage moisture content and height of the lowest part of the tree crowns above the surface. See also “spotting potential.”

Defensible Space – The area adjacent to a structure or dwelling where wildfire prevention or protection practices are implemented to provide defense from an approaching wildfire or to minimize the spread of a structure fire to wildlands or surrounding areas.

Dozer Line – Fireline constructed by the front blade of a dozer.

Extreme Fire Behavior – “Extreme” implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Fire Behavior – The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Behavior Modeling – The mathematical algorithms that describe the physical properties associated with the rate and volume of heat transfer, or ignitability.

Firebrand – Any source of heat, natural or human made, capable of igniting wildland fuels. Flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or by gravity into unburned fuels.

Fire Hazard Severity – Fire hazard severity zones are based on the combination of vegetation, topography, weather, crown fire potential, ember production and movement, and the likelihood of an area burning. Buildings constructed in Very High Fire Hazard Severity Zones are required to be built using fire-resistive features.

Fireline – The part of a containment or control line that is scraped or dug to mineral soil; (b) For purposes of pay administration for hazardous duty, a fireline is defined as the area within or adjacent to the perimeter of an uncontrolled wildfire of any size in which action is being taken to control fire. Such action includes operations, which directly support control of fire (e.g., activities to extinguish the fire, ground scouting, spot fire patrolling, search and rescue operations, and backfiring).

Fireline Intensity – (a) The product of the available heat of combustion per unit of ground and the rate of spread of the fire, interpreted as the heat released per unit of time for each unit length of fire edge. The primary unit is BTU per second per foot (BTU/sec/ft) of fire front; (b) The rate of heat release per unit time per unit length of fire front. Numerically, it is the product of the heat yield, the quantity of fuel consumed in the fire front, and the rate of spread.

Fire Suppression – All work and activities connected with control and fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Flame – A mass of gas undergoing rapid combustion, generally accompanied by evolution of sensible heat and incandescence.

Flame Length – The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity.

FlamMap – A software program that simulates potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.), fire growth and spread and conditional burn probabilities under constant environmental conditions (weather and fuel moisture).

Flaming Front – That zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing or involves the burning out of larger fuels (greater than about three inches in diameter). Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front.

Foliar Moisture Content – The weight of water compared with the weight of cellulose, expressed as a percentage. A 100 percent moisture content is found when that portion of a plant has equal weights of water and cellulose.

Fuel – Any combustible material, especially petroleum-based products and wildland fuels.

Fuelbed – An array of fuels usually constructed with specific loading, depth, and particle size to meet experimental requirements; also, commonly used to describe the fuel composition.

Fuel Model – Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified. Vegetation is grouped into a set of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.

Fuel Modification – Manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling and burning).

Fuel Reduction – Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

Fuel Type – An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.

Grass Fuel Model – See “Fuel Model.” Grassy vegetation that has similar suite of species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions. Grass fuel models are associated with fast fire rate of spread, high intensity, but low heat output when the grass has dried.

Heat of Preignition – The amount of heat required to ignite one pound of fuel.

Heat sink – A substance that absorbs or dissipates heat. In a wildfire, a heat sink is typically unburned fuel. More moist and the bigger material are greater heat sinks.

Hotspotting – Checking the spread of fire at points of more rapid spread or special threat. Is usually the initial step in prompt control, with emphasis on first priorities.

Ignition – The action of setting something on fire or starting to burn.

Incident Command System (ICS) – A standardized on-scene emergency management concept specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

Indirect Attack - A method of suppression in which the control line is located some considerable distance away from the fire's active edge.

Initial Attack (IA) – A planned response to a wildfire given the wildfire's potential fire behavior. The objective of initial attack is to stop the fire and put it out in a manner consistent with firefighter and public safety and values to be protected.

Long-range spotting – Large glowing firebrands are carried high into the convection column and then fall out downwind beyond the main fire starting new fires. Such spotting can easily occur ¼ mile or more from the firebrand's source.

Mop Up – Extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area has burned, to make a fire safe, or to reduce residual smoke.

Radiation – (a) Propagation of energy in free space by virtue of joint, undulatory variations in the electric or magnetic fields in space, (i.e., by electromagnetic waves); (b) Transfer of heat in straight lines through a gas or vacuum other than by heating of the intervening space.

Rate of Spread – The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually, it is expressed in chains or acres per hour for a specific period in the fire's history.

Response time – The time between notification of a wildfire and the arrival of firefighters at the scene.

Retardant – A substance or chemical agent which reduces the flammability of combustibles.

Shaded Fuel Break – Fuel breaks built in timbered areas where the trees on the break are thinned and pruned to reduce the fire potential yet retain enough crown canopy to make a less favorable microclimate for surface fires.

Shrub Fuel Model – See “Fuel Model.” Shrubby vegetation that has similar suite of species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions. Shrub fuel models typically are associated with fast fire rate of spread, high intensity, especially when the shrub vegetation is old.

Spot Fire – Fire ignited outside the perimeter of the main fire by a firebrand.

Spotting – Behavior of a fire producing sparks or embers that are carried by the wind and which start new fires beyond the zone of direct ignition by the main fire.

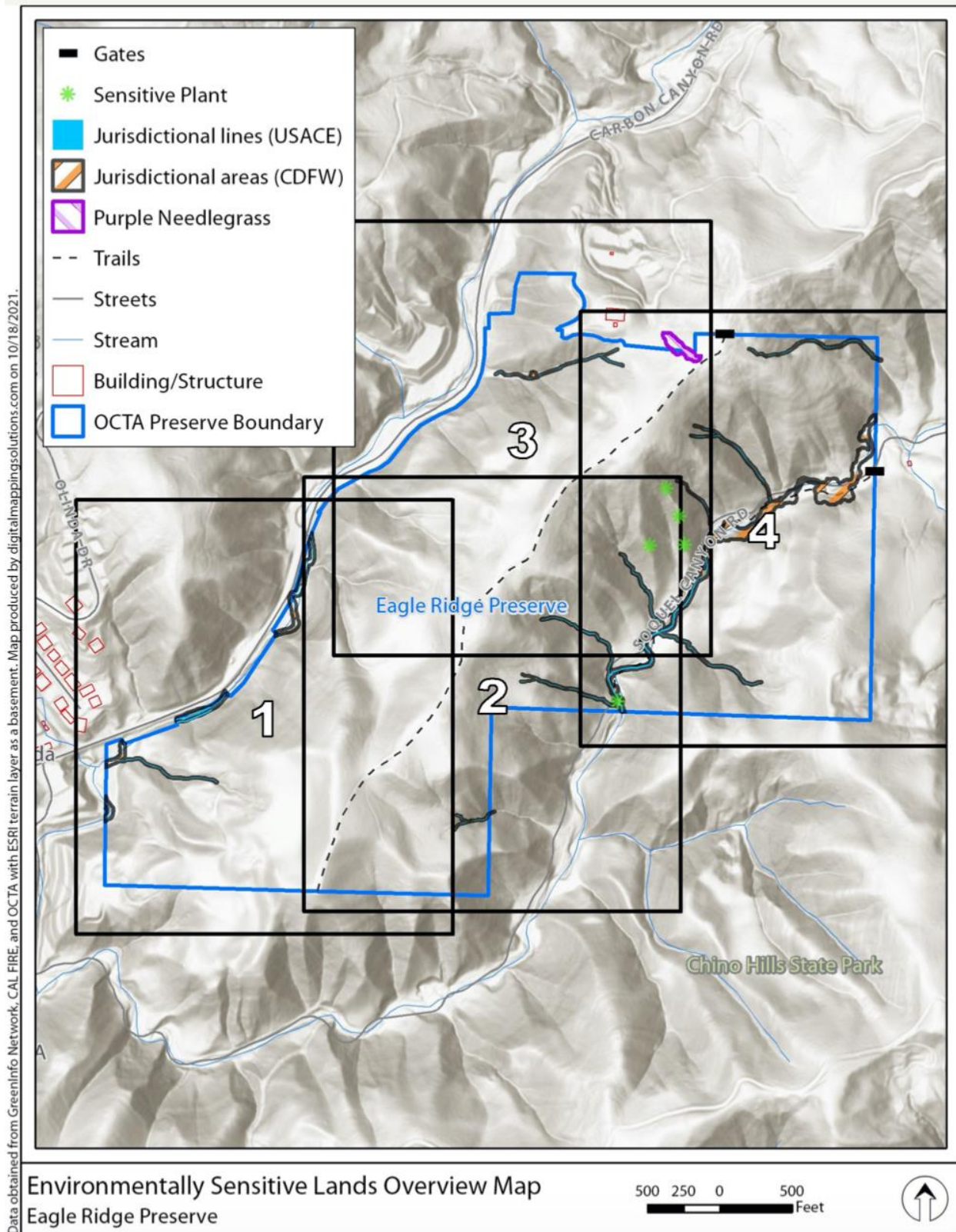
Torching – The burning of the foliage of a single tree or a small group of trees, from the bottom up.

Unified Command – In ICS, unified command is a unified team effort which allows all agencies with jurisdictional responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies. This is accomplished without losing or abdicating authority, responsibility, or accountability.

Vegetation Treatment – Activities that modify the vegetation, often to reduce the fire hazard. Manual labor, machinery, prescribed fire and herbicide use are all used as vegetation treatments. Vegetation treatment may achieve several types of goals, such as the installation of defensible space, shade fuel breaks, or fire breaks.

Waterbar – A shallow channel or raised barrier, e.g., a ridge of packed earth or a thin pole laid diagonally across the surface of a road or trail so as to lead off water, particularly storm water. (Frequently installed in fire lines on steep slopes to prevent erosion.)

APPENDIX C: ENVIRONMENTALLY SENSITIVE LANDS MAPS EAGLE RIDGE PRESERVE



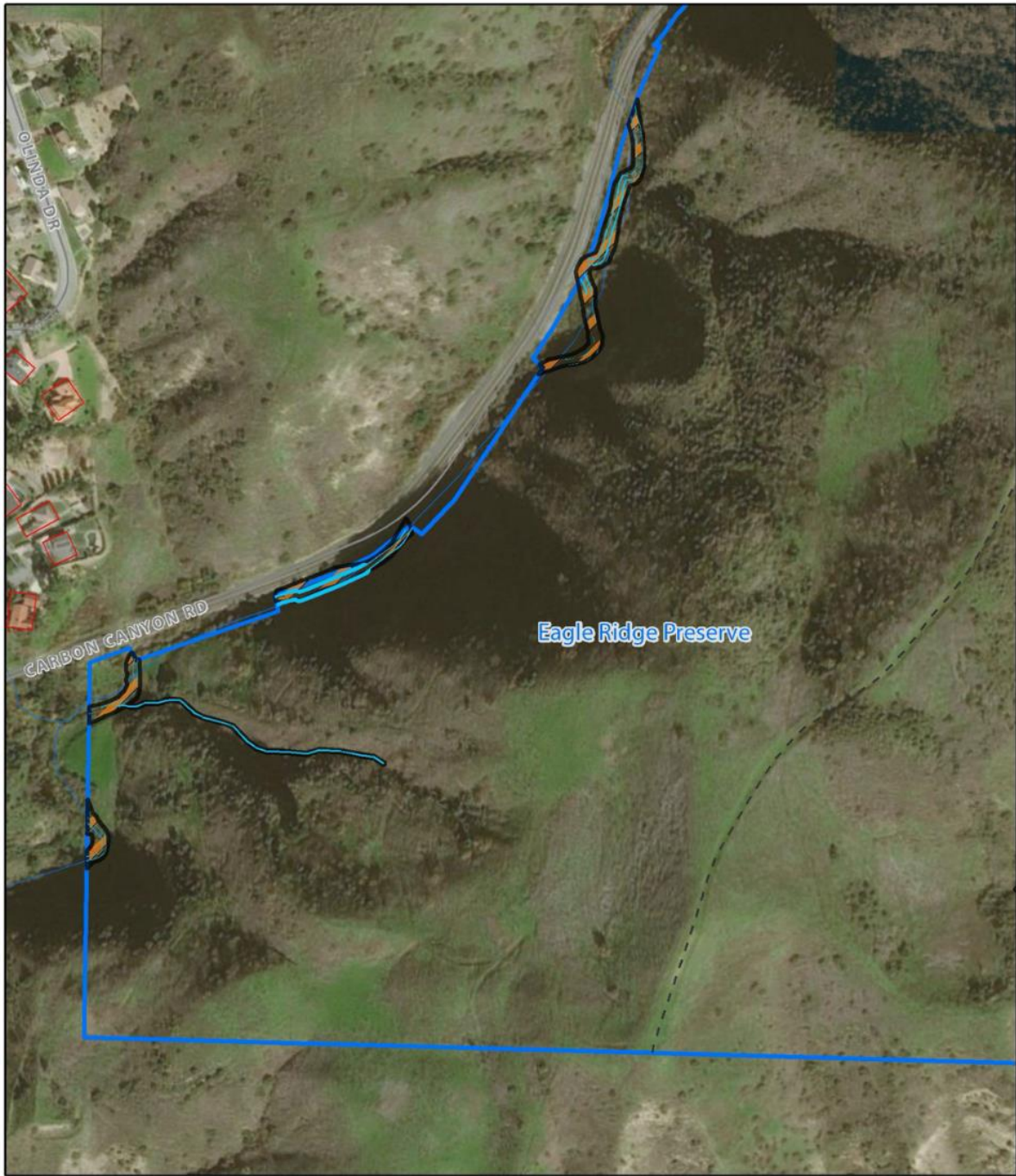
Environmentally Sensitive Lands Detailed Map Page 1 of 4

Eagle Ridge Preserve

100 0 100
Feet



Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 10/18/2021.



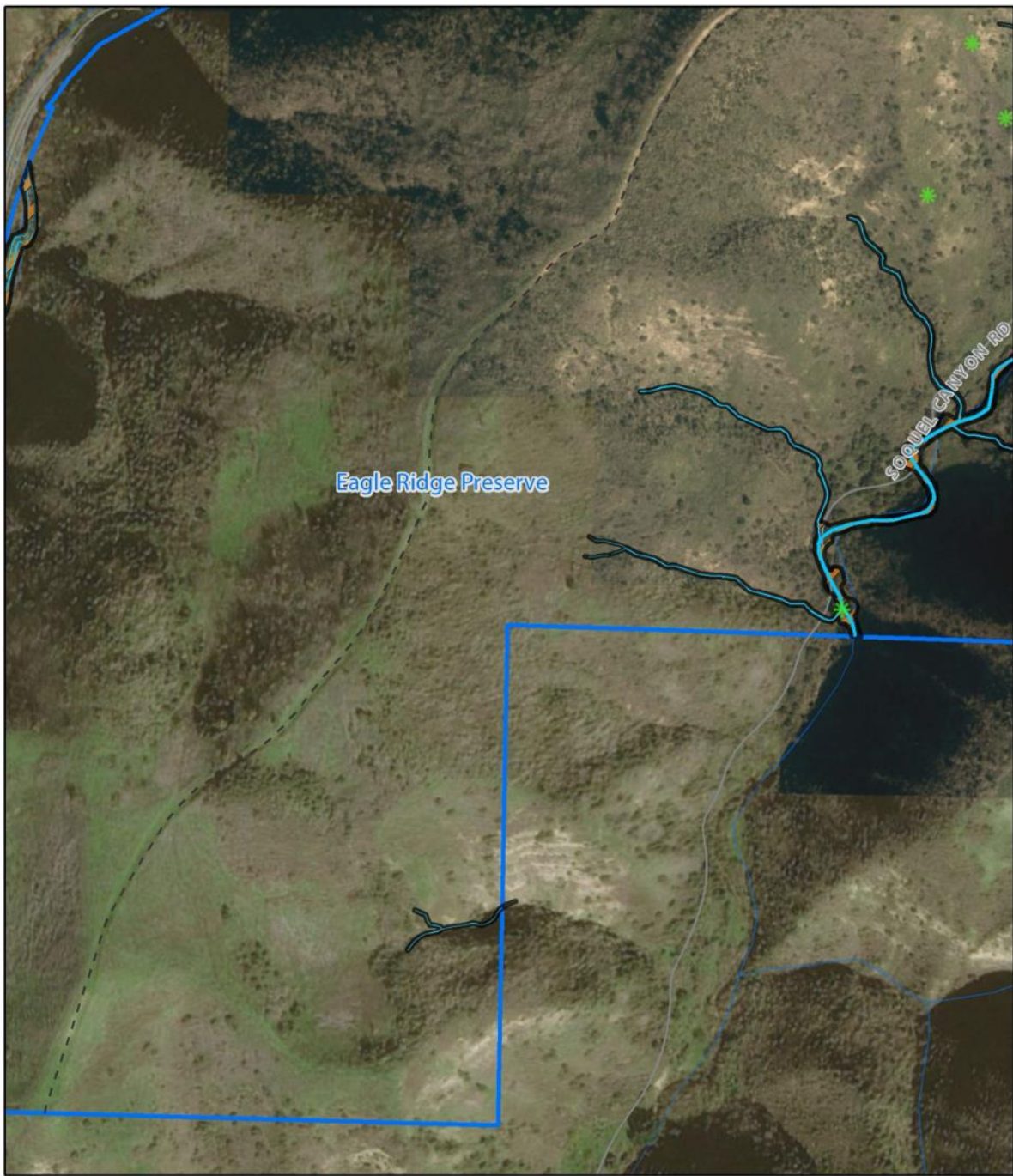
- Jurisdictional lines (USACE) - - Trails
- Building/Structure
- OCTA Preserve Boundary
- Jurisdictional areas (CDFW)
- Streets
- Stream

Environmentally Sensitive Lands Detailed Map Page 2 of 4
Eagle Ridge Preserve

100 0 100
Feet



Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 10/18/2021.



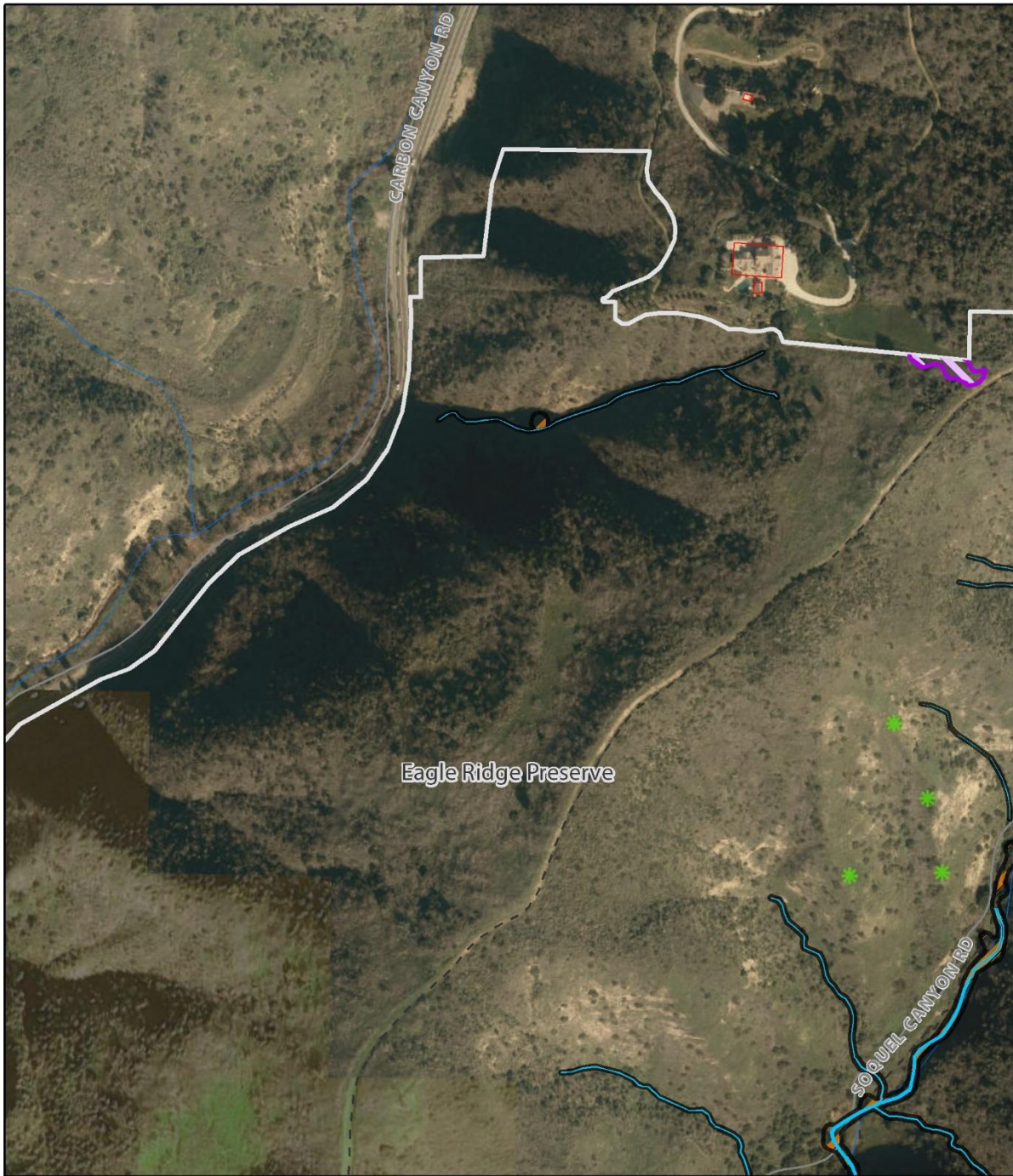
- Sensitive Plant
- Jurisdictional areas (CDFW)
- Streets
- OCTA Preserve Boundary
- Jurisdictional lines (USACE)
- Trails
- Stream

Environmentally Sensitive Lands Detailed Map Page 3 of 4 Eagle Ridge Preserve

100 0 100
Feet



Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 3/25/2022.



- * Sensitive Plant
- Jurisdictional areas (CDFW)
- Trails
- Building/Structure
- Jurisdictional lines (USACE)
- Purple Needlegrass
- Streets

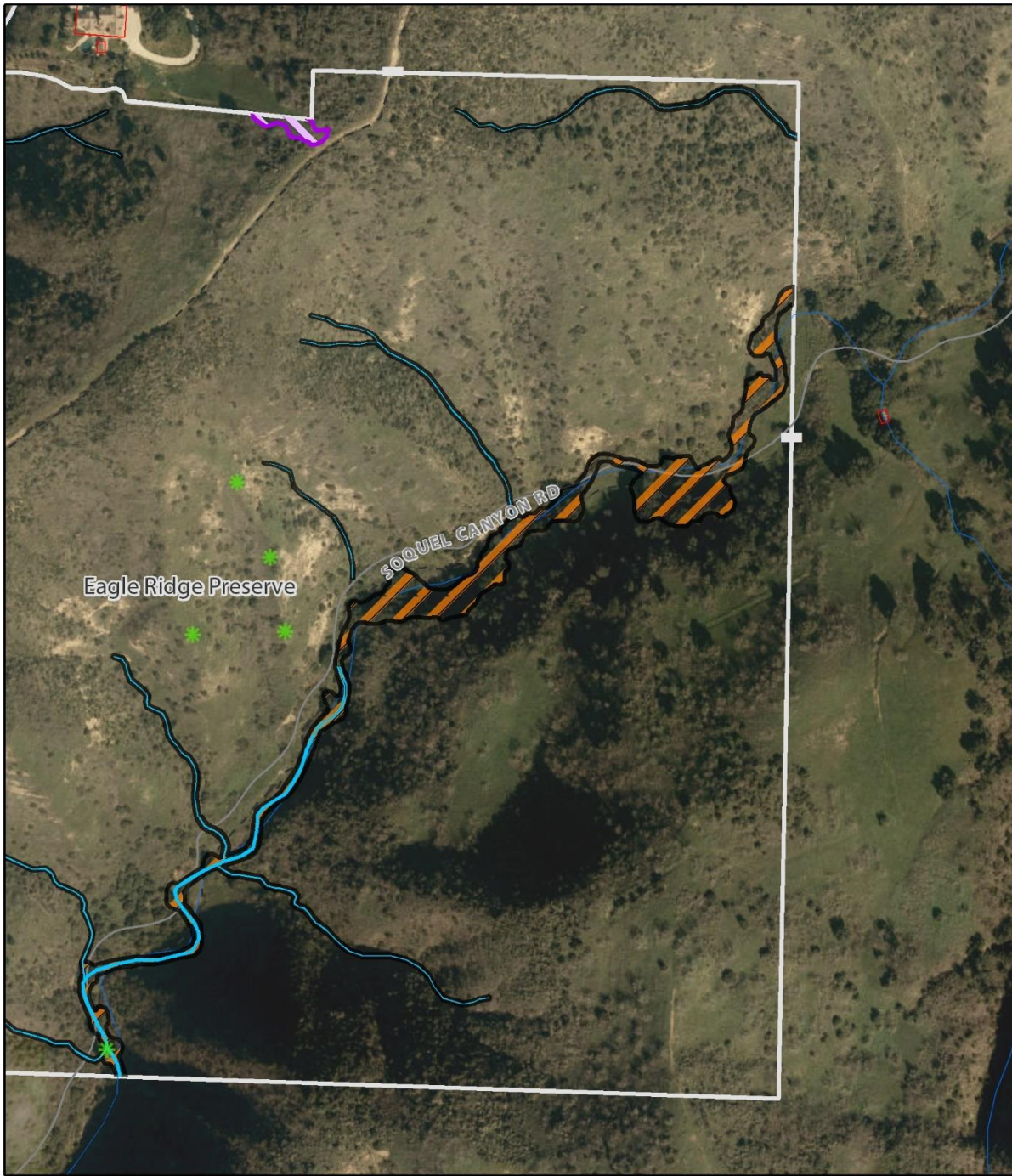
Environmentally Sensitive Lands Detailed Map Page 4 of 4

Eagle Ridge Preserve

100 0 100
Feet





Data obtained from GreenInfo Network, CAL FIRE, and OCTA, with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 3/25/2022.





- Gates
- Jurisdictional lines (USACE)
- Purple Needlegrass
- Streets
- * Sensitive Plant
- Jurisdictional areas (CDFW)
- - Trails
- Building/Structure

APPENDIX D: WILDLAND URBAN INTERFACE PRE-ATTACK PLAN²¹

²¹ *Rohde and Associates, 2015. Wildland Urban Interface Pre-attack Plan. Prepared for the Orange County Fire Authority*

	WUI Name: CARBON CANYON			0337C																																																																																															
	Location: Brea, Yorba Linda, & Unincorporated Area			Insp'd Date: 10/14/15 By: Rohde & Assoc.																																																																																															
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<p>Response Safety Interface community within an historical major fire corridor. Interface & spur-ridge homes. History of loss to canyon perimeter homes (& in adjacent Sleepy Hollow -San Bernardino Co.). Hazmat in oil fields, oil & gas pipelines throughout area. Defensible space around most structures. Trail users in Chino Hills SP. Good communications access- Use OCFA/SOLAR Plan. Large interagency IA response.</p>																																																																																																			
<p>Aviation Hazards Transmission power lines in Carbon Canyon, crossing the canyon (ridge to ridge) at high altitude. Four 300' radio transmission towers on ridge above Tonner Canyon at SR57. Multiple agency aircraft on IA in this area.</p>			<p>Potential Choke Points/Entrapments All perimeter or high streets in Olinda Village (Lilac, Copo De Oro, Olinda, end of Verbenia, etc.), and trailer community on the east side of Carbon Cyn. Rd. at Olinda Village. Sleepy Hollow is a very high risk community along Carbon Cyn. Rd. immediately north of the plan area in San Bernardino Co.</p>																																																																																																

BRIEFING INFORMATION			UNIFIED COMMAND			
Fuels	Grass and coastal sage scrub, grass-oak woodlands, and riparian in river bottoms. Combustible ornamental vegetation around some homes.		Potential Incident Command Post Location	1. Carbon Canyon Regional Park, 4442 Carbon Cyn. Rd. 2. Brea Jr. High, 400 N. Brea Blvd., Brea 3. Yorba Regional Park, 7600 E. La Palma, ANA 4. Green River Golf Course (SOLAR -IA), 5215 Green River Rd., Corona		
Last Year(s) Burned	2008 Freeway Complex Fire with large structural loss. Areas west of SR57 and upper Tonner Canyon have not had a major fire since 1970.			Unified Command Participants	Brea FD/PPD, OCFA, OCSD, LAC, Chino Valley Fire, SBCoS/O, Cal-Fire CHP, and SOLAR	
Expected Fire Behavior	In critical fire weather, fires burn with extreme behavior, high rates of spread, & spotting. This community is within an historical fire corridor that has experienced 27 Santa Ana wind driven major fires in the last 45 yrs., with a total loss of 325 homes. Santa Ana wind driven fires typically originate near Hwy. 71/91, Sleepy Hollow, or Yorba Linda & burn into this area. Onshore wind-driven fires occur nearly annually. Olinda Village is threatened under either wind scenario. Relative humidity frequently recovers quickly at low elevations at night, forming inversions and complicating firing. These inversions clear rapidly in mornings. Onshore winds return here early following Santa Ana's.		Staging Areas		1. Carbon Canyon Regional Park, 4442 Carbon Cyn. Rd. 2. Brea Jr. High, 400 N. Brea Blvd., Brea 3. Brea Fire Station 4, 170 N. Olinda Pl., Brea. (Olinda Village) 4. Western Hills Country Club, 1800 Carbon Canyon Rd., Chino Hills 5. MWD Diemar Plant, 3972 Valley View, Yorba Linda	
Topography	Carbon Canyon (649 ft. elev. at Olinda) is a major drainage within the Chino Hills. It is surrounded by ridge lines between 750 and 1,200 ft. elev. Brea is on the south and Chino Hills is on the north, with Olinda Village and Sleepy Hollow situated as inner-canyon communities.			LARGE FIRE DEVELOPMENT FACTORS		
Access	Carbon Canyon Rd. (SR142) extends 5 mi. N/E from Lambert Ave. in Brea, to Sleepy Hollow, and then into Chino Hills. It is extensively used by commuter traffic. Olinda Village is mid-canyon, and Sleepy Hollow is at the San Bernardino Co. line. Truck trails enter Chino Hills State Park at Telegraph and Soquel Canyons.		<i>Weather</i>			
Special Hazards	<ul style="list-style-type: none"> * Many recreational trail users within canyons. * MWD Diemer Water Facility, 3972 Valley View, YBL- bulk hazmat storage (Chlorine gas, liq. Oxygen, etc.). (714)528-7231. (Safety Zone located here) * So Cal Gas 40 inch high pressure gas main traverses N. side of Diemer Plant 		Temperature	>80 degrees F		
			Relative Humidity	<10 %		
Safety Zones/ Temporary Safe Refuge Areas	Wind Speed	Avg: 35-50 MPH Gusts: 50-80 MPH		Fuel Moisture		
	Seasonally dry or long term drought					
	<i>Fire Behavior</i>			Rate of Spread		
	Type		Location	Limits of Use	9,900-15,444 ft./hr.	
	SZ		Retreat into urban neighborhoods, north or south	Fire entrapment potential-Carbon Cyn. Rd	Spotting	
SZ		Large school fields, sports fields, regional parks, golf courses, horse arenas	All areas	>1 mile		
SZ		Strip mall parking lot, 100 Olinda Pl.	Olinda Village area	Flame Length		
SZ		Western Hills Country Club, 1800 Carbon Canyon Rd.	N/B evacuation from canyon	Avg. 4-11 ft. Peak: 30-40 ft.		
SZ		State Park Discovery Center, Carbon Cyn. Rd. at Telegraph Cyn.	State Park trail users	* Peak flame lengths occur when fire growth is in alignment with heavy fuel, slope and wind.		
Water Supply			WUI ARRANGEMENT			
Good municipal fire flow, pressure, and supply- except at highest homes in Olinda Village. Hydrants on all residential streets. No water in wildland areas. Avoid use of trailer community private hydrants! Critical pump stations: Carbon Cyn. Rd. 1 mi. E/O the State Park Discovery Center, and near Olinda Dr., 3500 Valley View Cr. & 4009 Paso Fino Wy. - loss can lead to zone system failure. Provide protection to these pump stations and Diemer Plant. Allow employee access to Diemer Plant.			Interface: x	Intermix: x	Urban: x	
			Suburban: x	Rural:	Other:	

	WUI Name: CARBON CANYON					0337C
	Location: Brea, Yorba Linda, & Unincorporated Area					
	Topo: Yorba Linda, CA					
Risk Assessment	Tactical Plan	Tactical Map	Area Map	Aerial Map	Additional Info	
RECOMMENDED STRATEGIES & TACTICS (FIRESCOPE/PACE)						
Primary Plan (Offensive) Offensive and aggressive attack on flanks, with aircraft holding fire on slopes and away from structures. Limited evacuation of fire perimeter homes. Watch for spots into adjacent canyons or ornamental vegetation. Coordinate immediately and unify command with large inter-agency response force. Protect water pump stations on Carbon Canyon Rd. (see water supply, p.1)			Alternate Plan (Offensive) Evacuate perimeter homes along wildland perimeter ahead of the fire, or shelter-in- place at homes with adequate defensible space. Watch for spotting ahead. Deploy to prep-and-defend homes. Use fire-front-following tactics for those without defensible space. Stay maneuverable when safe to protect multiple homes. Use firing tactics as a structure protection measure with IC approval only. Watch for downed powerlines near burning homes. Protect water pump stations on Carbon Canyon Rd. and Diemer Plant. (see water supply, p.1)			
Contingency Plan (Defensive - Responder Safety) Firefighters and law enforcement seek temporary refuge around homes with good defensible space or on wide streets in front of homes. Gather civilians trapped in plan area with you. Escort civilians from area only when safe to maneuver, cross-canyon roads may be compromised by fire movement. Select prep. and defend homes for stands against fire or fire-front-follow. Consider anchor-and-hold tactics for blocks of multiple homes on fire. Expect new spot fires occurring at long range. Expect fire to potentially spread through finger canyons between homes. Watch for downed powerlines near ignited homes. Use extreme caution in Sleepy Hollow area.			Emergency Plan (Defensive) Evacuate populations to surrounding urban areas. Use caution when defending homes with little defensible space, exposure to heavy fuels, or heavy ornamental vegetation. Move from completed structural defense locations to new sites that offer good defensible space and firefighter safety only when roads are safe for maneuver. Fire-front-follow in highly exposed streets/entrapment risk areas. Prioritize evacuation over fire control. Be vigilant for long-range spotting. Be vigilant for development of fire whirls or other extreme fire behavior that may compromise safety. Use extreme caution in Sleepy Hollow area.			
Perimeter Control Plan:		2 blade dozer line established around Olinda Village (2008). Legacy dozer lines on Gilman Pk. Ridge S/E of Carbon Cyn. (see map). Widen existing road/re-open dozer lines & fire out, restrict dozer use elsewhere. Many major oil & gas pipelines cross the area & hazmat exists in oil fields- use caution, especially if oil field infrastructure or wells are involved. Clear these areas for hazmat prior to close entry. Firing from truck trails has a hx. of success, however Telegraph Cyn. is narrow & difficult to fire/hold below the MWD Facility. Large firing ops. have gone poorly when lots of fire was laid in Santa Anas, & onshore winds returned.				

EVACUATION PLAN			
Primary Evacuation Plan			
Activate Alert OC & San Bernardino Co. TENS. Evacuate civilians from affected perimeter areas, moving N. or S. into urban areas depending on fire trajectory. Evacuate Olinda Village & Sleepy Hollow (San Bernardino Co.) first. Evacuate BSA Camp in Tonner Canyon early. Evacuate wildland perimeter streets in Brea & Yorba Linda N/O Valley View/Wabash, & homes N/O Lambert/Carbon Cyn. Rd. east to SR57. Shelter-in-place staff of MWD Water Plant. Move large animals early or stage in regional parks.			
Evacuation Trigger Point			
Initiate evac. for any developing major fire under strong Santa Ana winds anywhere in the Chino Hills (including: Hwys. 71/91 or Hwy. 71/Euclid, City of Chino Hills, Yorba Linda, or Chino Hills SP). Initiate evac. for onshore wind driven/ developing major fires in Tonner Cyn., Carbon Cyn., Telegraph Cyn., Soquel Cyn., the Brea-Olinda landfill, or W/O Gilman Peak.			
Temp. Evacuation Assembly Points (Human & Animal)			
1. Brea Community Center, 695 Madison Ave. 2. Valencia High School, 500 Bradford Ave., Placentia Equestrian: County Fair Grounds: 88 Fair Dr., Costa Mesa			
POPULATION & STRUCTURES AT-RISK		STRUCTURAL TRIAGE	
Population	16,975	Threatened/ Non-Defensible	15%
Planning Unit Acreage	3,246	Sleepy Hollow & perimeter of Olinda Village	
Structures	5,813	Threatened/Defensible	65%
		Non-Threatened	20%
		W/ Defensible Space	85%
EMERGENCY RESOURCE NEEDS - FIRST SIX HOURS (In addition to Initial Attack Resource)			
Fire Ordering Point: ORC Dispatch: (714)573-6522 *COP METRO Net Dispatch (714)533-1305		Law Enforcement Ordering Point: BPD: (714)990-7911 OC S/O: (714)288-6963 Chino Hills State Park: (951)442-2969	
Engines: The number range reflects the number of "minimum" to "preferred" resources.		Law Enforcement: 100 officers, Brea PD, OC S/O, and CHP to evacuation, traffic control, and security. IC-Lt., Capt. State Parks to evac. Chino Hills State Park. Consider adding SBCo S/O.	
Type 1	Type 3	Water	
Strike Teams: 8-10	Strike Teams: 3-5	Tenders: 5	
Crews	Dozers	Overhead: 4-5	
Single: 6-8 STs:	Single: 2-4 STs:	Div. Sup.: 4-5	
Aircraft: Type 1 Helicopter (Large): 1 Type 3 Helicopter (Light): 1 Type 2 Helicopter (Med.): 3 Air Tankers: 4		Logistics Open EOC to support aggressive fire or significant evacuation need. Consider responder fuel, water, and food needs. File F-MAG application with CAL-OES. Consider activation of CERT team for evac. assistance. Notify public works to assist in traffic management, Red Cross and Animal Control to assist in evacuation. Liaison with SCE regarding powerline issues.	
WUI Engine Deployment - High Risk 1 engine/2-4 perimeter structures, 1 engine/isolated structures 2 engines/ multi-family structures		Other Dozer restrictions: use on ridge lines or to expand existing TT's only, avoid use in canyon bottoms (arch. sites). Seek resource guidance from Chino Hills State Park (951)442-2969	
WUI Engine Deployment - Moderate Risk 1 engine/2-4 perimeter structures, 1 engine/isolated structure, 2 engines/multi-family structure			
WUI Engine Deployment - Low Risk 1 strike team/2 blocks of perimeter hom			