

PACIFIC HORIZON PRESERVE DRAFT FIRE MANAGEMENT PLAN



Prepared for
The Orange County Transportation Authority

November 2023



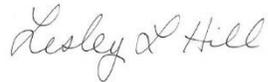
*Submitted by
Carol L. Rice
Wildland Res Mgt*

*Cheryl Miller
Cheryl Miller, RLA*

*Esther Mandeno,
Digital Mapping Solutions*

This plan has been reviewed and is approved by the following authorities:

Recommended for approval by:



Lesley Hill
Orange County Transportation Authority
Environmental Mitigation Program, Project Manager

Approved:



Dan Phu
Orange County Transportation Authority
Sustainability Planning Manager



Niko King
Laguna Beach Fire Department
Fire Chief



Scott Hatch
Orange County Fire Authority
Wildland Resource Planner

**PACIFIC HORIZON 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	18
xii. Access	18
IV. ANALYSIS OF HAZARDS, RISK	19
A. Description of Fuel Types Present on the Preserve	20
B. Predicted Fire Behavior on the Preserve	23
i. Flame Length	24
ii. Rate of Spread	28
iii. Crown Fire Activity	31
C. Fire Hazard Severity Zone Ratings	34
V. FIRE MANAGEMENT PROGRAM	36
A. Pre-fire/Ignition Prevention	37
i. Orange County Transportation Authority Responsibilities	37
ii. City of Laguna Beach Responsibilities	39
B. Wildfire Response	43
i. Orange County Transportation Authority Responsibilities	43

ii. City of Laguna Beach Fire Department Responsibilities	44
C. Wildfire Suppression Repair	47
i. Orange County Transportation Authority Responsibilities	47
ii. City of Laguna Beach Fire Department Responsibilities	48
D. Wildfire Recovery	50

REFERENCES **53**

APPENDICES

- A. Treatment Protocols for Fuel Management Zones Subject to Coastal Development Permitting
- B. Fire Suppression Repair Standards and Example of Plan
- C. Glossary of Terms
- D. Environmentally Sensitive Lands Maps
- E. Wildland Urban Interface Pre-attack Plan

Acronym List

ASA - Archaeological Sensitivity Assessment
BTU/lb - British Thermal Unit per pound
CAL FIRE - California Department of Forestry and Fire Protection
CAL/OSHA - 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
SMSP - Silverado-Modjeska Specific Plan
GPS - Global Positioning System
IAP - Incident Action Plans
IC - Incident Commander
ICP - Incident Command Post
ICS - Incident Command System
IRC - Irvine Ranch Conservancy
LBFD - Laguna Beach Fire Department
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
SCE - Southern California Edison
SEMS - State Emergency Management System
USACE - U.S. Army Corps of Engineers
USFWS - United States Fish and Wildlife Service

PACIFIC HORIZON 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 151-acre OCTA Pacific Horizon Preserve (formerly known as Aliso Canyon 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 Laguna Beach Fire Department (LBFD).

Pacific Horizon 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 chaparral, grassland, coastal sage scrub, and cliff and rock habitat. Its location supports local and regional biological connectivity between lands owned by Orange County Parks, the City of Laguna Beach, and other conserved open spaces. A residential neighborhood is close enough to the western boundary of the Preserve to warrant modifications to the vegetation for structure protection.

The Preserve is located in the steep, coastal hills of South Laguna and consists of predominantly hilly terrain. Temperatures in coastal valleys of Southern California, such

as in the Preserve, rarely exceed 90 degrees F, with coastal conditions moderating temperatures within the Preserve.¹ The Preserve area sees critical fire behavior less than two weeks per year due to the coastal influence. Santa Ana winds, which influence the Preserve area, are common in the fall. While the Preserve and its vicinity have not burned in several decades, the May 11, 2022 Coastal Fire burned 35 acres of the lower part of the Preserve. Fuel types designated as High Shrub dominate the Preserve and surrounding wildlands. There are no fire roads on the property, though fire engines can access the Preserve using existing dirt trails on the property along with nearby paved roads. Bulldozers were used within the Preserve to contain the 2022 Coastal Fire although these are not anticipated to be used again and the pathways have been rehabilitated to the extent possible.

In rare critical fire weather, fires burn with extreme behavior, high rates of spread, and long-range spotting. Fire behavior modeling predicts that once a fire is ignited, fires will generally spread quite fast throughout the Preserve. The vast majority of the Preserve is predicted to burn with flame lengths longer than 20 feet, which is likely to confound the best fire suppression efforts. Most of the vegetation on the Preserve is expected to torch during a wildfire, producing and distributing embers ahead of the wildfire. There are significant differences in the characteristics of fires modeled with the same windspeed that burn with a northeast wind versus a fire that burns with an uphill wind, with much higher rates of spread and somewhat longer flame lengths predicted in uphill wind conditions. However, these strong northeasterly winds, commonly called 'Santa Ana winds,' often blow faster than winds from the west.

Pre-fire treatments include vegetation management within the Preserve where it is adjacent to a residential neighborhood. This vegetation management zone encroaches slightly onto the Pacific Horizon Preserve (Appendix A). OCTA, in coordination with the Lbfd, has established guidelines and boundaries for vegetation management around this neighborhood. The Lbfd's goal for providing defensible space for these properties is to maintain slope stability through the selective thinning of existing vegetation within a maintenance zone that extends 100 feet from habitable structures.

Responsibilities of both OCTA and Lbfd 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 Incident Command staff 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 a 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 B) to ensure suppression repair actions are effective. Fire 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.

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

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 which in this case is the LBFD. 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 for OCTA. The aim of this plan is that it be easy to implement, be followed by county and state officials, reinforce funding requests, and cultivate strong partnerships.

II. REGULATIONS, POLICIES AND GUIDELINES

A. Purchase History

OCTA purchased the Pacific Horizon Preserve in April 2015, 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 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 chaparral, grassland, coastal sage scrub, and cliff and rock as well as the species within them. It is bounded on the north and east by the Orange County Parks (OC Parks)-owned Aliso & Wood Canyons Wilderness Park (AWCWP), and to the southwest by open space owned by the City of Laguna Beach. The Preserve is situated within an area of contiguous conserved open space lands extending to the Preserve's north, east, south, and southwest, including areas that are part of the Central and Coastal Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) Reserve, and the City of Laguna Beach-owned Moulton Meadows Community Park near the Preserve's northwest border. Private residential neighborhoods along Barracuda Way and Lorette Drive border the Preserve to its west, while the southeastern edge of the property is adjacent to The Ranch at Laguna Beach and the Ben Brown Golf Course.

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 agency responsible for fire response and control within this Preserve is the LBFD. Because of its inclusion in the Conservation Plan and existing natural resources, regulatory agencies that have jurisdiction over portions of the Preserve include the CDFW, USFWS, the

U.S. Army Corps of Engineers (USACE), and the State Water Resources Control Board (SWRCB). The Pacific Horizon Preserve also falls within the jurisdictional boundaries of the City of Laguna Beach General Plan and is additionally within a Local Responsibility Area.

Documents that have been considered as complementing the fire management plan for the Preserve include: Orange County Ignition Reduction Strategy, the Community Wildfire Protection Plan (CWPP) for Orange County, and the OCTA Pacific Horizon RMP (titled Aliso Canyon Preserve RMP when written). The Orange County CWPP describes possible activities and programs that can bolster wildland fire safety for both 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.

III. EXISTING CONDITIONS

A. Land Ownership

The 151-acre² Pacific Horizon Preserve is located in the steep, coastal hills of South Laguna, east of Pacific Coast Highway in the City of Laguna Beach. The property is part of the “Laguna Greenbelt,” which encompasses 22,000 acres of largely undeveloped land surrounding the City of Laguna Beach. Predominant topographic features of the area are Hobo Canyon and its flanking ridges and the south-facing slopes of Aliso Canyon, which is located just east of the Preserve. Surrounding land uses include a dense adjacent residential development along Barracuda Way and Loretta Drive, The Ranch at Laguna Beach, the Ben Brown Golf Course, Moulton Meadows Park, and the AWCWP. The City considers Hobo Canyon, particularly its surrounding ridges, including the Moulton Meadows marine terrace and the continuous south-facing slope of Aliso Canyon down to the Ben Brown Golf Course, to be the single-most significant habitat block in Laguna.

The Preserve can be accessed from dirt trails that extend onto the Preserve from the City-owned Moulton Meadows Park to the northwest, from AWCWP to the east, and trails that occur on City of Laguna Beach property to the southwest. Some of the dirt trails on the Preserve lands have been decommissioned since the Preserve’s acquisition by OCTA. Most of the trails on the property are included in the trail network of the Laguna Beach General Plan Open Space/Conservation Element as “trails on private property.”

² The main text of the RMP notes the acreage alternatively as 150 or 151. Multiple tables contained within the RMP, based on GIS analysis, indicate the acreage as 151.14. See 2017 Aliso Canyon RMP, Chapters 1 and 2.

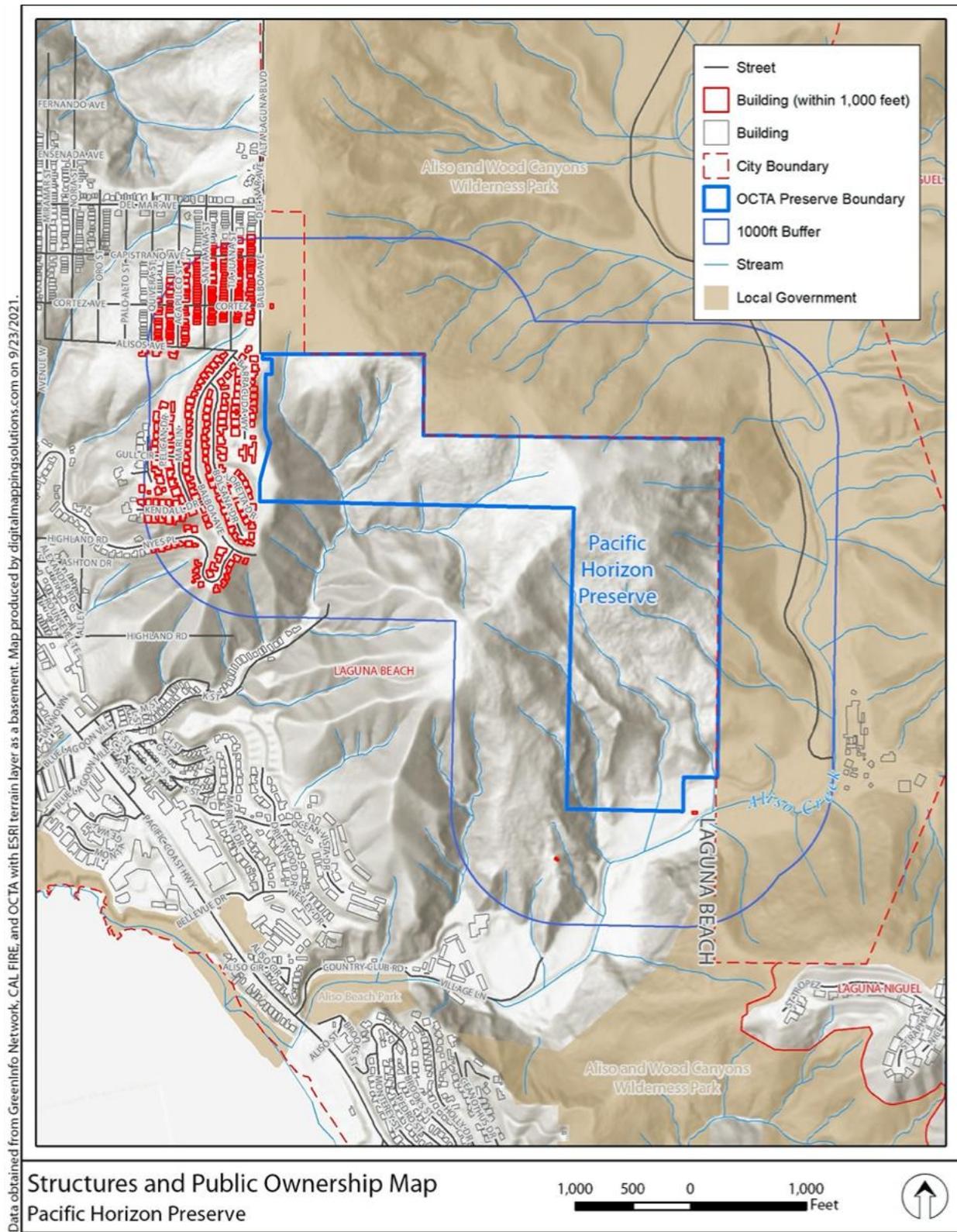


Figure 1. Land ownership, structures within 1000 feet, and easements adjacent to Pacific Horizon.

B. Natural Resources/Physical Environment

i. Topography and Elevation: The Preserve is located within the San Joaquin Hills in coastal Orange County and consists of ridgelines and rolling terrain. Biological surveys were conducted on the Preserve in spring/summer 2015 to establish baseline biological conditions and assess special-status species, including Covered Species, and their associated natural communities (BonTerra Psomas 2015). The majority of the information below was obtained from that report.

The overall landscape is hilly, vegetated with a mosaic of scrub, chaparral, grassland, cliff and rock habitat, and developed/nonnative areas (see Figure 3). According to surveys conducted in 2015 and described in the RMP, Southern Mixed Chaparral represents the main habitat type (~78 acres). Mixed Sage-Chaparral Scrub Ecotone (~45 acres) is the next most dominant type; mixed sage scrub, coyote brush scrub, ornamental/developed, cliff-rock, disturbed mixed sage scrub, disturbed, ruderal, annual grassland, mixed sage-cactus scrub, needlegrass grassland, clustered tarweed field, and Elymus grassland vegetation types are also found on the Preserve (see Table 3).

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

Pacific Horizon Preserve	Acres	Percent
East	30.13	20%
North	1.61	1%
Northeast	11.88	8%
Northwest	4.82	3%
South	34.26	23%
Southeast	47.18	31%
Southwest	13.83	9%
West	8.38	6%
Total Acres	152.09	

Table 1. Summary of aspect of Pacific Horizon Preserve.

Aliso and Wood Canyons Regional Park borders the west side of the plan area and is a part of the San Joaquin Hills. Elevations range from 40 feet above mean sea level (msl) at the southeastern edge of the Preserve to 840 feet above msl at the northwestern edge. The wastewater facility just southeast of the Preserve in Aliso Canyon sits at 100 feet. The site consists of a main ridgeline (Aliso Ridge) running roughly north-south through the narrow middle of the property with canyons (Hobo and Aliso Canyons) draining steep slopes to either side. Slope steepness ranges from 0.5-100+ percent, although the vast majority of the landscape ranges from strong-to-extreme slope (15-70%).

Pacific Horizon Preserve	Acres	Percent
Level (0-0.5)	none	none
Nearly level (0.5 - 2)	0.17	0.1%
Very gentle slope (2 - 5)	0.63	0.4%
Gentle slope (5 - 9)	1.43	1%
Moderate slope (9 - 15)	6.94	5%
Strong slope (15 - 30)	47.18	31%
Very strong slope (30 - 45)	49.99	33%
Extreme slope (45 - 70)	36.39	24%
Steep slope (70 - 100)	9.24	6%
Very steep slope (> 100)	0.11	0.1%
Total Acres	152.09	

Table 2. Summary of slope steepness of Pacific Horizon 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.

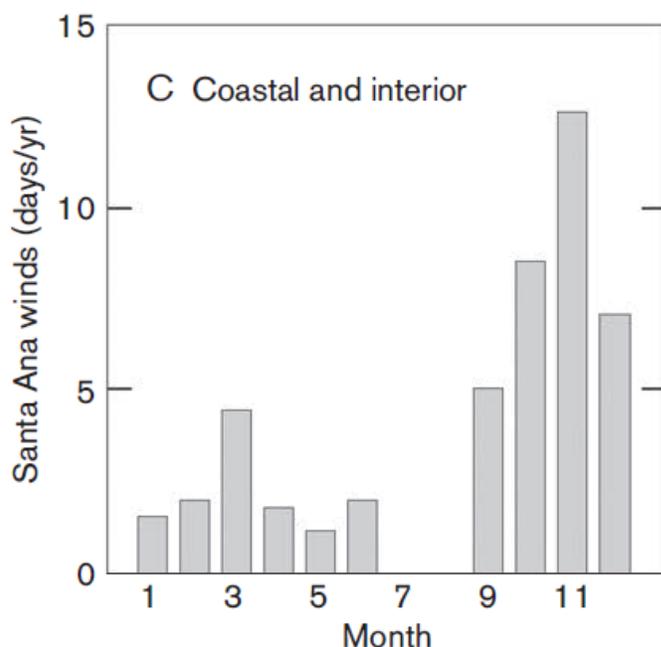


Figure 2. Average number days per month in which Santa Ana winds occur.³

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, although critical fire weather only occurs approximately two weeks per year in the Preserve vicinity (Rohde 2016). The average daily temperature in the Preserve area is approximately 69 degrees F in the summer and 56 degrees F in the winter. Between 1928-2022, there was an average of 2 days annually when the high temperature exceeded 90 degrees F; August is the hottest month, averaging 1 day per month exceeding 90 degrees F.⁴ The area averages about 13.8 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 RMP 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."⁵ 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 is during 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

³ From *Fire in California's Ecosystems*, 2006, Sugihara, Van Wagtendonk, Shaffer Kaufman and Thode.

⁴ National Weather Service, San Diego, CA Weather Forecast Office. Monthly summarized data, 1928-2022, Laguna Beach, CA. <https://www.weather.gov/wrh/climate?wfo=sgx>

⁵ Bonterra Consulting. Baseline Biological Surveys Technical Report for the Aliso Canyon Property. Appendix B pg. 4, Aliso Canyon 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.

iii. Hydrology: The Preserve is located in the steep, coastal hills of South Laguna, with a main ridgeline running through the middle of the property and canyons draining steep slopes to either side. Two unnamed blue-line streams occur in the northwestern portion of the property, with smaller drainage features present in the canyon bottoms. These canyons are part of the 498-square-mile Aliso-San Onofre Watershed. The upper reaches of Hobo Canyon are mapped by the National Wetlands Inventory as temporarily flooded Riverine and Palustrine wetlands. This area acts as the final open space connection between the south end of the Laguna Greenbelt, Aliso and Wood Canyons Wilderness Park, and the sea.

iv. Soils: The dominant soil type on the Preserve is Cienega sandy loam (15 to 30 and 30 to 75 percent slopes, eroded). Other soil types mapped on the Preserve are Alo clay (25 to 30 and 30 to 50 percent slopes), Capistrano sandy loam (2 to 9 percent slopes), Chesterton loamy sand (2 to 15 and 15 to 30 percent slopes), Cienega-rock outcrop complex (30 to 75 percent slopes), Soper loam (30 to 50 percent slopes), and Soper gravelly loam (15 to 30 and 30 to 50 percent slopes).

v. Vegetation Types, Protected Species: Fourteen vegetation types and other habitat types occur on the Preserve, including chaparral, scrub, grassland, cliff and rock habitat, and disturbed areas.

Special-status plant species documented at the Preserve in 2015 include Catalina mariposa lily (*Calochortus catalinae*), intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), Orange County Turkish rugging (*Chorizanthe staticoides* var. *chrysacantha*), bushrue (*Cneoridium dumosum*), paniculate tarplant (*Deinandra paniculata*), western dichondra (*Dichondra occidentalis*), lance-leaved dudleya (*Dudleya lanceolata*), many-stemmed dudleya (*Dudleya multicaulis*), spiny redberry (*Rhamnus crocea*), and big-leaved crownbeard (*Verbesina dissita*).

Vegetation Types and Other Areas	Acreage
Southern Mixed Chaparral	78.18
Coyote Brush Scrub	2.79
Mixed Sage Scrub	17.77
Disturbed Mixed Sage Scrub	1.25
Mixed Sage-Chaparral Scrub Ecotone	44.59
Mixed Sage-Cactus Scrub	0.29
Annual Grassland	0.79
Elymus Grassland	0.05
Needlegrass Grassland	0.11
Clustered Tarweed Field	0.09
Cliff/Rock	1.56
Ornamental/Developed	2.43
Ruderal	1.00
Disturbed	0.24

Table 3. Summary of Vegetation Types and other Areas from 2015 Surveys (from 2017 Aliso Canyon Preserve Resource Management Plan).

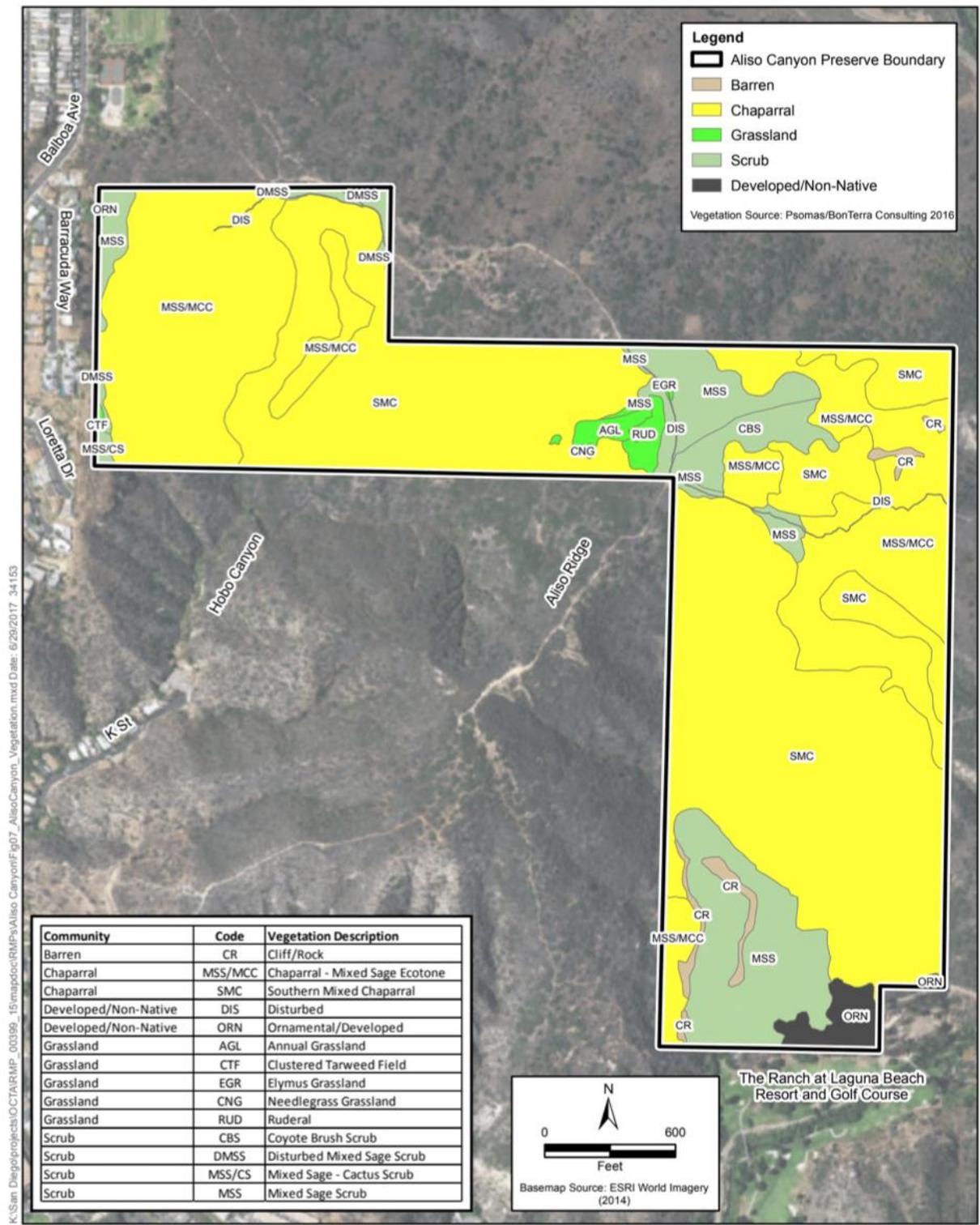


Figure 7
Vegetation Communities
Aliso Canyon Resource Management Plan

Figure 3. Vegetation Communities (from 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, chaparral, grassland, cliff and rock habitat, and wetlands. The Preserve is not located in proposed or final critical habitat for any federally listed species, though Critical Habitat for the coastal California gnatcatcher (*Polioptila californica californica*) is located south and southeast of the Preserve.

The Preserve contributes to regional biological connectivity and wildlife movement due to its relatively undeveloped landscape both on and surrounding the Preserve and its continuity with surrounding open space and park areas. The Preserve is contiguous with approximately 4,500 acres of undeveloped open space in AWCWP to the north and east. The southern boundary of the western half of the property is contiguous with approximately 171 acres of open space as part of the Driftwood Estates and Pacific Triangle dedications. Wildlife movement is relatively unhindered across these areas, with minimal barbed wire fencing and trails along the property boundary and no major roads or development. To the south, wildlife movement between the Preserve and the wilderness park on the northern-facing slopes of Aliso Canyon is hindered to some extent by the upper portion of The Ranch at Laguna Beach Resort and Golf Course; however, wildlife is still expected to cross this area, especially at night when the golf course is closed. While there are patches of open space in canyons west of the northern end of the Preserve, these areas are separated from the Preserve by Balboa Avenue and residential development. Wildlife traveling to these canyons from the Preserve may cross Balboa Avenue in an approximate 150-foot corridor at the northwestern end of the property or travel south of the Preserve within Hobo Canyon and across slopes supporting residential development across Nyes Place.

The Preserve contains numerous ridgelines and canyons (such as the upper end of Hobo Canyon) that provide a variety of travel routes for local wildlife movement. Trails on site may also be used for movement. Movement is expected to occur on the Preserve, as well as between the Preserve and contiguous offsite habitat. Baseline studies and ongoing Preserve management have documented mule deer on the Preserve; other large mammals expected to move across the Preserve include mountain lion, bobcats, and coyote.

Special-status wildlife species documented at the Preserve include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), and coastal California gnatcatcher. Focused surveys for coastal California gnatcatcher were performed on site for OCTA by CDFW in 2015. Subsequently, focused surveys for the OCTA covered species will continue to follow the schedule included within the RMP.

vii. Historical Influences: The Tongva Native Americans originally inhabited the Aliso Creek and Laguna Lakes area (LBHS 2015). Juan Rodriguez Cabrillo arrived in 1542, but the land did not undergo significant change until the establishment of the California missions by Junipero Serra and the advent of a ranching culture. According to the City of Laguna Beach General Plan Open Space/Conservation Element (Laguna Beach 2006), the city was one of the only coastal Southern California areas excluded from the Mexican land grants of the 1840s, which resulted in it being subject to homestead claims in the 1880s. In the late 1880s and early 1900s, it became popular as a vacation and resort town, and much of the flatter

property was subdivided. Development in the late 1950s and mid-1960s primarily occurred in the more accessible ridgelines, hilltops, and hillsides.

A review of historic aerial photographs of the property shows that, in general, vegetation communities have not been significantly altered since 1939. The residential development at the northern end of the Preserve was in the process of being built in aerial photographs from 1967. Structures in Aliso Canyon at the southern end of the property are evident in 1963 aerials. Buildings or otherwise significant structures are not identified in historic aerials on the property.

At the time of the Bonterra Psomas baseline biological reports conducted in 2015, the Preserve was being used by hikers and mountain bikers. The trails on the property are included in the trail network of the Laguna Beach General Plan Open Space/Conservation Element as “trails on private property” (Laguna Beach 2006). Relatively little trash (e.g., cans, bottles, golf balls) was observed during the surveys. Evidence of grazing is not present on the Preserve.

viii. Cultural Resources: An Archaeological Sensitivity Assessment (ASA) was conducted by LSA Associates, Inc. on the Preserve in 2015. The assessment included a records search, Native American coordination, field survey, and report. No archaeological resources were identified within the boundaries of the Preserve; however, if ground disturbance occurs within certain areas of the Preserve, archaeological monitoring may be necessary. This information will be kept confidential and not included in this RMP. The ASA will be utilized to help ensure that activities on the Preserve do not impact any cultural resources.

ix. Fire History: The lack of fire is a contributing factor to the high-quality habitat that exists on the site today. According to the 2016 Rohde risk assessment for the Preserve, the oldest and largest fire in the vicinity was an unnamed 1968 fire of 110 acres in South Aliso Canyon. Another 75-acre fire ignited wood roofs in residential areas above Crown Valley Parkway, southeast of the Preserve, in 1980. A recent fire in the area was an unnamed fire that burned 5 acres off Highland Drive in an unspecified year during the 1990s. In 2022, two significant fires burned within and/or near the City of Laguna Beach. The Emerald Fire burned 154 acres northwest of Laguna Beach above Emerald Bay⁶. The most recent and significant fire was the Coastal Fire, which burned a portion of the Preserve in May, 2022⁷. This 200-acre fire is thought to have been ignited from a downed power line was located near the St. Tropez and Laguna Ridge Trail, southeast of Laguna Beach and caused damage to at least twenty structures along the developed ridgeline south of the Preserve⁸. According to the California Department of Conservation California Geological Survey Memo dated May 27, 2022⁹ the Preserve burned with a mixture of low and moderate severity.

⁶ <https://www.fire.ca.gov/incidents/2022/2/10/emerald-fire/>

⁷ <https://www.fire.ca.gov/incidents/2022/5/11/coastal-fire/>

⁸ <https://wildfiretoday.com/2022/05/11/multiple-homes-burn-in-coastal-fire-at-laguna-niguel-southern-california/>

⁹ California Department of Conservation California Geological Survey Memo dated May 27, 2022. Post-Fire Reconnaissance Report 2022 Coastal Fire Incident, Orange County, California – CA-ORC-060975, from Paul Burgess, P.G. and Thomas Key, P.G., Engineering Geologists to Drew Coe, CalFire.

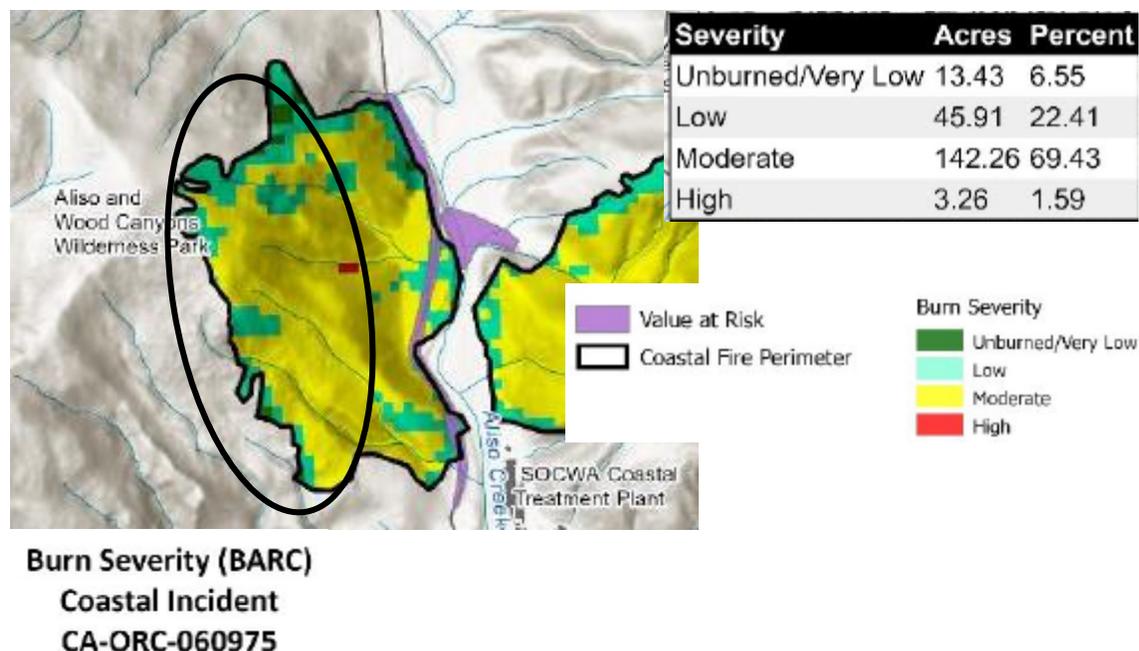


Figure 4. Map of burn severity in the 2022 Coastal Fire. California Department of Conservation California Geological Survey Memo dated May 27, 2022.

The causes of both fires are undetermined. As fire prevention and management for the Preserve falls within the jurisdiction of the City of Laguna Beach, there is no available CAL FIRE Forest Resource Assessment Program fire history data for this Preserve.

While the fire history data in the Rohde risk assessment did not specify causes of ignition, the Preserve is near enough to major roadways – especially the South Coast Highway and aforementioned Crown Valley Parkway – that the risk from a roadside ignition, the cause of a large preponderance of all wildfires, should be taken seriously (Syphard and Keeley, 2015 and Sturtevant and Cleland 2007). General patterns of ignition in the greater area reveal several additional areas of concern. Potential sources of future ignition include the Southern California Edison (SCE) transmission lines; and unauthorized use of the site, which can lead to ignition sources such as from engine activity from vehicles, smoking, and arson. Accidental ignitions occurring at nearby residences are also a concern.

x. Recreational Resources: The Pacific Horizon Preserve is intended to be open to the public for passive recreational opportunities. The 2017 RMP identifies two foot trails within the Preserve that were approved for passive recreational use based on an evaluation of biological resources as well as coordination with the Wildlife Agencies. According to the 2017 RMP, the “Preserve Manager will implement a public access program that allows for access along specific existing trails identified within the Laguna Beach General Plan. The current configuration of approved trails connects to other trails on County of Orange open space lands managed by Orange County Parks (OC Parks).”¹⁰

¹⁰ Aliso Canyon Resource Management Plan (August 2017). Executive Summary, pg. 1.

xi. Structures and Built Values at Risk: No currently occupied structures are present on the property. According to the 2016 Rohde Wildland-Urban Interface (WUI) Pre-Fire Plans commissioned by the Orange County Fire Authority (OCFA), the surrounding area supports a dense residential interface community on the edge of a large regional park, though the area has little history of large fires. Vegetation around structures is managed per the Treatment Protocols for Fuel Modification Subject to Coastal Development Permitting. Many homes are situated along ridgelines above heavy fuels and steep slopes. There are many recreational users on area trails. Figure 1 indicates the structures within a 1000-foot buffer surrounding the Preserve. Structures are outlined in red; part of a dense subdivision to the west of the Preserve is located within 100 feet of the Preserve boundary, as is a sewage plant to the Preserve's southeast.

xii. Access: The top of the Preserve is accessed via Loretta Dr, Barracuda Way, and Balboa Ave. and Del Mar Ave. For most of the length of Loretta Dr., Barracuda Way and Del Mar, access to the preserve is by necessity by foot through a private residential yard. Access is also provided by foot through the Moulton Meadows Park. The bottom of the Preserve is access by vehicle via Aliso Canyon Road and AWMA which provides access to the southeast corner of the Preserve in the bottom of Aliso Canyon.

Should Preserve visitors need to evacuate, options are either north along Balboa Ave. or south down Nyes Place.

The Preserve can also be accessed off dirt trails that extend from the City of Laguna Beach-owned Moulton Meadows Park to the northwest, dirt trails off of AWCWP to the east and dirt trails off of the City of Laguna Beach property to the southwest. As noted above, two foot trails are currently in use on the Preserve, one running through the Preserve's northern edge and the other running north-south near the property's eastern sector. Both of these trails connect to existing trails on adjacent open space properties. There are two other foot trails on the Preserve that have been called out to be decommissioned since the 2015 acquisition of the Preserve; these too connect to existing trails on adjacent properties. Both of the decommissioned trails are fenced off. While the trail in the northern section of the Preserve is beginning to revegetate, the unauthorized trail on the southeastern portion of the Preserve also been fenced off to keep recreation off the trail and to prevent travel to the area impacted by the fire.

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. Several factors combine to predict a low probability of ignition on the Preserve. An area of recurring fires is apt to burn again in the near future. However, the Preserve has not burned in decades.

Some of the fuel types are not easily ignitable – specifically mixed sage scrub and cactus – 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. Unsafe human behaviors (i.e., illegal campfires, fireworks, etc.) are the prime source of fire ignition. 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 greatest probability of ignition on the Preserve is from an external wildfire burning into the Preserve. Passive site use minimizes the risk of human-caused wildfires.

Adjacent risk of ignition comes from activities associated with adjacent residential land use including the use of vehicles, construction, and the use of mechanical mowers, barbecues, and generators. Use of a generator 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.

The dense residential development along Barracuda Way and Loretta Drive, abutting the western boundary of the Preserve, could start a fire that would burn into the Preserve with a westerly wind. Human activity associated with the golf course near the southeastern boundary of the Preserve could similarly cause fires. Fortunately, conditions most likely to cause large fires would be with Santa Ana winds which emanate from the north or northeast; this wind direction would push a fire ignited along Barracuda Way or at the golf course away from the Preserve.

With the exception of passive recreational activities on the publicly accessible Moulton Meadows Park that occurs to the northwest within the 1000-foot buffer surrounding the Preserve's and within Aliso and Woods Canyon Wilderness Park to the property's east, no human activity is near the northern and eastern boundaries of the Preserve, which limits the chance of ignition.

The risk of a fire affecting the Pacific Horizon Preserve is influenced not only by the fuels it supports, but also by the fuels present within the surrounding landscape. Adjacent fuel types are also a factor in determining the potential for spread to the Preserve. The fuel types on adjacent properties vary between low-fuel volumes and discontinuous fuels south and east of the Preserve (which would limit spread to the Preserve), to highly flammable fuel conditions and undisturbed vegetation on public lands and between residential areas to the west, east, and north, which would either propel or allow continuous spread of fire to the Preserve. Figure 5 portrays the fuels within 1000 feet outside the Preserve boundary. In

addition, flammable residential buildings and yards could propel fire into the Preserve. Fuel modification zones are in place on all existing adjacent properties with habitable structures within 100 feet. These fuel modification zones, which extend into the Preserve's western flank for the dense interface neighborhood bordering the property, limit spread to the Preserve. Unimproved parcels without fuel modification zones can constitute a wick for fire to spread to the Preserve, because of the continuity of fuels, which are often high in volume. However, the chance of a fire burning from these unimproved locations is low because of the lack of the most common cause of fires – human activity – in those areas. The level of fire hazard will vary due to season or climate. While there is risk of fire year-round, it is less 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 5, which identifies unique fuel types. Fire predictions on this Preserve indicate that most of the Preserve as well as adjoining areas to the Preserve would burn with extreme fire behavior (greater than 20-foot flame lengths). This is primarily due to the presence of mixed chaparral and chaparral-mixed sage ecotone fuel types, which are predicted to exhibit extreme fire behavior. Southern mixed chaparral (High Shrub) is the main fuel type throughout the Preserve, with smaller patches of mixed sage scrub (Grass Shrub) dominating the Preserve's southern tip and a significant patch of mixed sage scrub in the Preserve's northeast sector. As discussed below, while flame lengths are predicted to be shorter than eight feet for this latter habitat type, it would be prudent to expect both shrub-dominated vegetation types to exhibit extreme fire behavior, except where cactus is present in significant quantities. Cactus moderates fire behavior because of its high moisture content. See Figures 6a and 6b for a map of flame lengths for the Preserve based on FlamMap fire behavior modeling software.

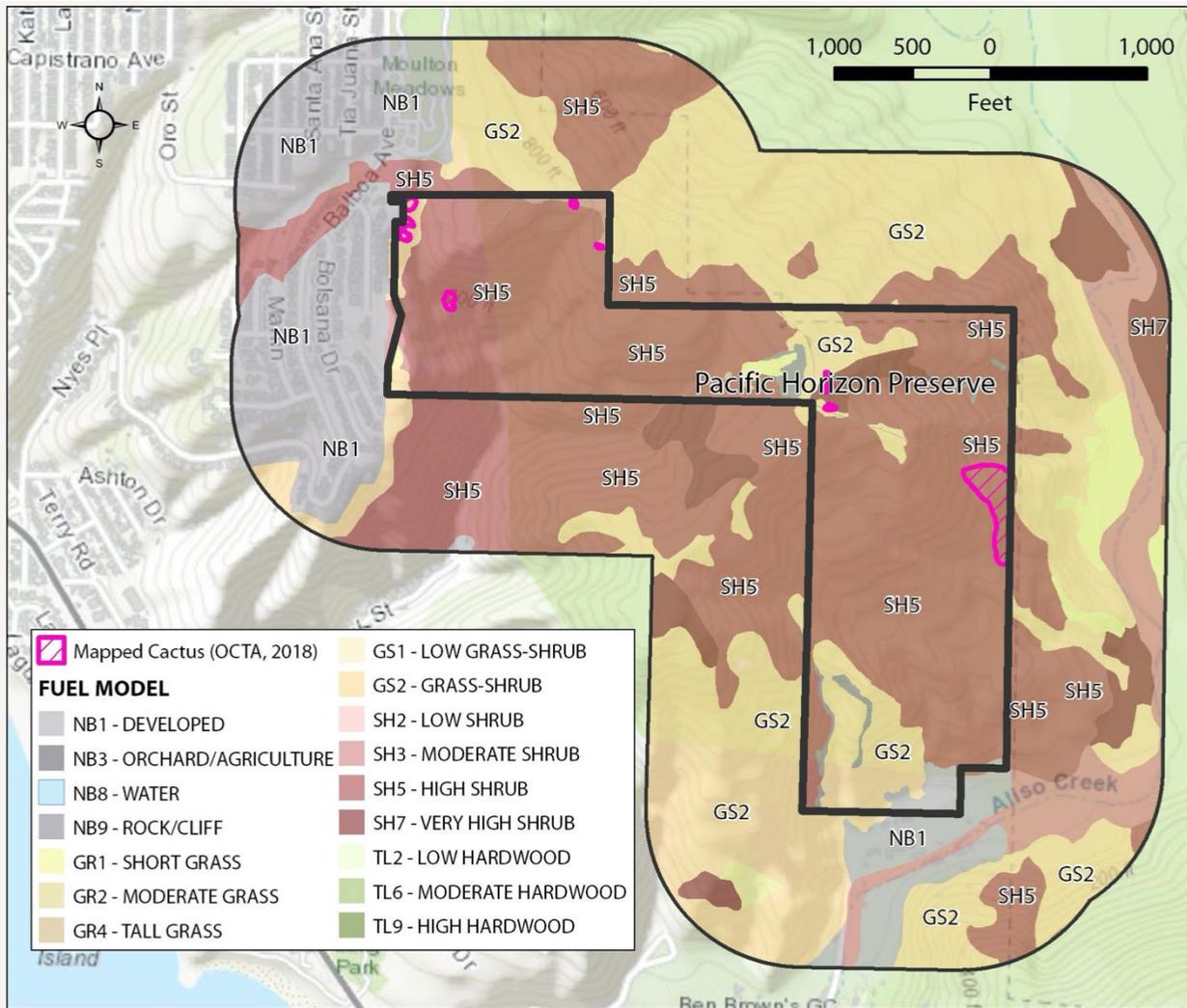


Figure 5. Pacific Horizon Preserve map showing fuel model classification based on vegetation.

Fuel Model Name and Code	Fuel Model Description	Vegetation Map Code	Acres	Percent
NB91 – Developed	Urban/Developed	DEV	2.93	2%
NB99 – Rock/Cliff	Barren	DIST/RUD/RK/BARREN	2.68	2%
GR101 – Short Grass	Short, sparse dry climate grass is short, naturally or heavy grazing, predicted rate of fire spread and flame length low	AG, CT	1.02	1%
GR104 – Tall Grass	Moderate load, dry climate grass, continuous, dry climate grass, fuelbed depth about 2 feet	PG, RG	0.16	0.1%
GS122 – Grass-Shrub	Low load, dry climate grass-shrub shrub about 1 foot high, grass load low, spread rate moderate and flame length low	CSS	18.12	12%
GS122 – Grass-Shrub with Cactus	Same as above but assigned higher fuel moistures	CSS, CSS/SCS with cactus	0.96	1%
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	CSS/D	1.62	1%
SH143 – Moderate Shrub with Cactus	Same as above but assigned higher fuel moistures	CSS/D with cactus	0.04	0.02%
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	CSS/CHAP, MCH	120.01	79%
SH145 – High Shrub with Cactus	Same as above but assigned higher fuel moistures	CSS/CHAP, MCH with cactus	2.31	2%
SH147 – Very High Shrub	Low load, humid climate shrub, woody shrubs and shrub litter, dense shrubs, little or no herbaceous fuel, depth about 2 feet, spread rate and flame high	CBS	2.69	2%
SH147 – Very High Shrub with Cactus	Same as above but assigned higher fuel moistures	CBS with cactus	0.09	0.1%
Total Acres			152.62	

Table 4. Pacific Horizon Preserve acres by fuel model and vegetation type.

In general, the fuel model assignments were based on 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, with the exception of some oak woodland which was assigned a grass fuel model (because the understory of grass carries the fire), and grass vegetation types were assigned a grass fuel model.

Areas with cactus are assigned a distinct fuel model descriptor. In those areas, the fuel volume, size class distribution and other fuel characteristics are the same as the original fuel model, but the foliar moisture is elevated. This reflects the succulent nature of cactus as it is intermingled with other vegetation types. This was an important consideration during development of the fire management plan as cactus acts as a natural fire deterrent. In other words, the heat of a fire will be absorbed by the cactus not be propelled by it.

B. Predicted Fire Behavior on the Preserve

Regionally, fire behavior is expected to be extreme. During rare critical fire weather, fires are predicted to burn with extreme behavior, high rates of spread, and long-range spotting in the Pacific Horizon area. Fires are most likely to approach the Preserve vicinity from its east and west sides. The Laguna Fire (north of the Preserve area) ran in similar fuels at a speed of 12 miles per hour (mph) under strong Santa Ana winds, immediately turning trajectory 180 degrees with the return of onshore winds. The area sees critical fire behavior less than 2 weeks/year due to coastal influence. Santa Ana winds are most likely to influence the northern portion of the Preserve vicinity, but these Santa Ana wind conditions are infrequent near the coast. Fuel loads may promote convective circular plume-dominated behavior during active fires. Onshore wind-driven fires are typically slope- and fuel-driven, reaching ridges but laying down overnight with good relative humidity recovery (Rohde, 2016).

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 Preserves. 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 Zones¹¹, 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 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.¹² 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).

Differences between the two scenarios for flame length are not very dramatic. In both wind scenarios, the highest number of acres burned by fire (approximately 77% of the total area

¹¹ <https://bof.fire.ca.gov/media/5tepuutt/full-14-a-presentation-cal-fire-vhfsz-remodeling-effort.pdf>

¹² 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.

in a northeast wind scenario and approximately 82% of the total area in an uphill wind scenario) are predicted to have flame lengths of greater than 20 feet.

In both wind scenarios, the second highest number of acres burned (approximately 12% of the total area in northeast wind conditions and approximately 11% of the total area in uphill wind conditions) are predicted to have flame lengths from 4.1-8 feet.

The other flame length categories are all 0-5% of the total acreage.

In both wind scenarios, the flame lengths of greater than 20 feet are primarily in areas of High Shrub. These High Shrub areas cover most of the Preserve.

In both wind scenarios, the flame lengths from 4.1-8 feet are primarily in the Grass Shrub areas in the center and southern tip of the Preserve.

There are very small patches of cactus scattered through the Preserve which are not predicted to burn.

Predictions for flame lengths within the 1000 feet surrounding the Preserve varies between those less than four feet to more than 20 feet in length. Large areas of Grass Shrub - with some cactus patches - are expected to burn with lower flame lengths. However, these areas alternate with smaller areas of High Shrub and very small patches of Very High Shrub. The highest flame lengths predicted in the buffer are in the High Shrub and Very High Shrub areas and can exceed 20-feet in length.

There are developed areas that abut the Preserve to the south and west where the highest flame lengths are predicted to occur nearly adjacent to the housing development that abuts the Preserve's western border, just south of Moulton Meadows Park, including homes on Barracuda Way. This area therefore faces a worrisome interface problem.

On the east side of Moulton Meadows Park within the 1000-foot buffer surrounding the Preserve is an area of Grass Shrub which is predicted to burn with 4-8-foot flames. However, the irrigated lawns and landscaping within the Park itself are not predicted to carry fire or support fire with long flame lengths, so the fire danger is lower where the Preserve abuts Moulton Meadows Park than in the residential neighborhood to the south.

Between the southern end of Barracuda Way and the northern portion of Lorretta Dr., there is a swathe of High Shrub and corresponding high flame lengths that adds to the interface fire danger for both sections of the housing development.

A small area of very high flame lengths is predicted in the Ben Brown Golf Course along Aliso Creek, adjacent to the southeastern border of the Preserve.

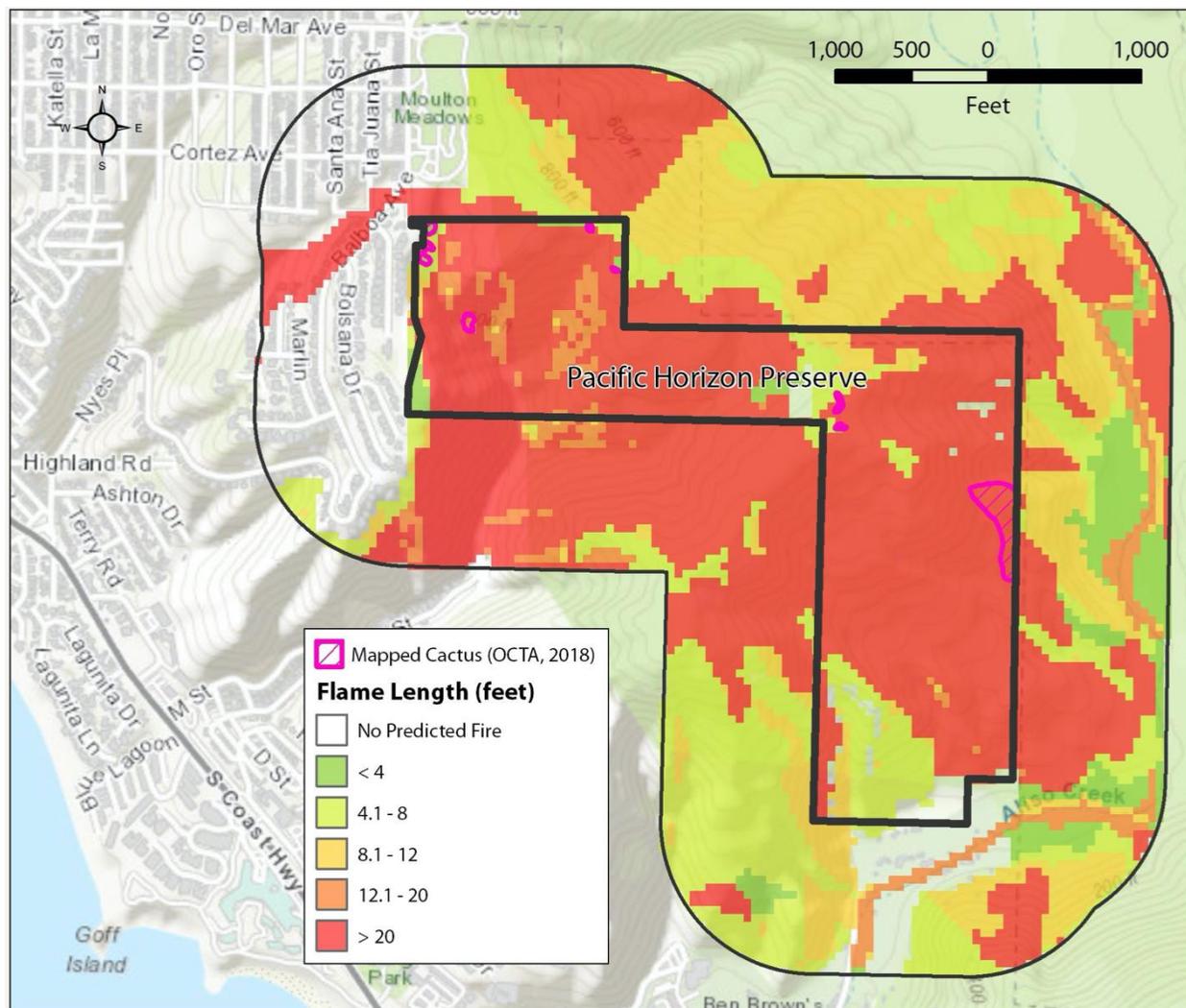


Figure 6a. Pacific Horizon Preserve map showing predicted flame length for results from the Northeast Wind scenario.

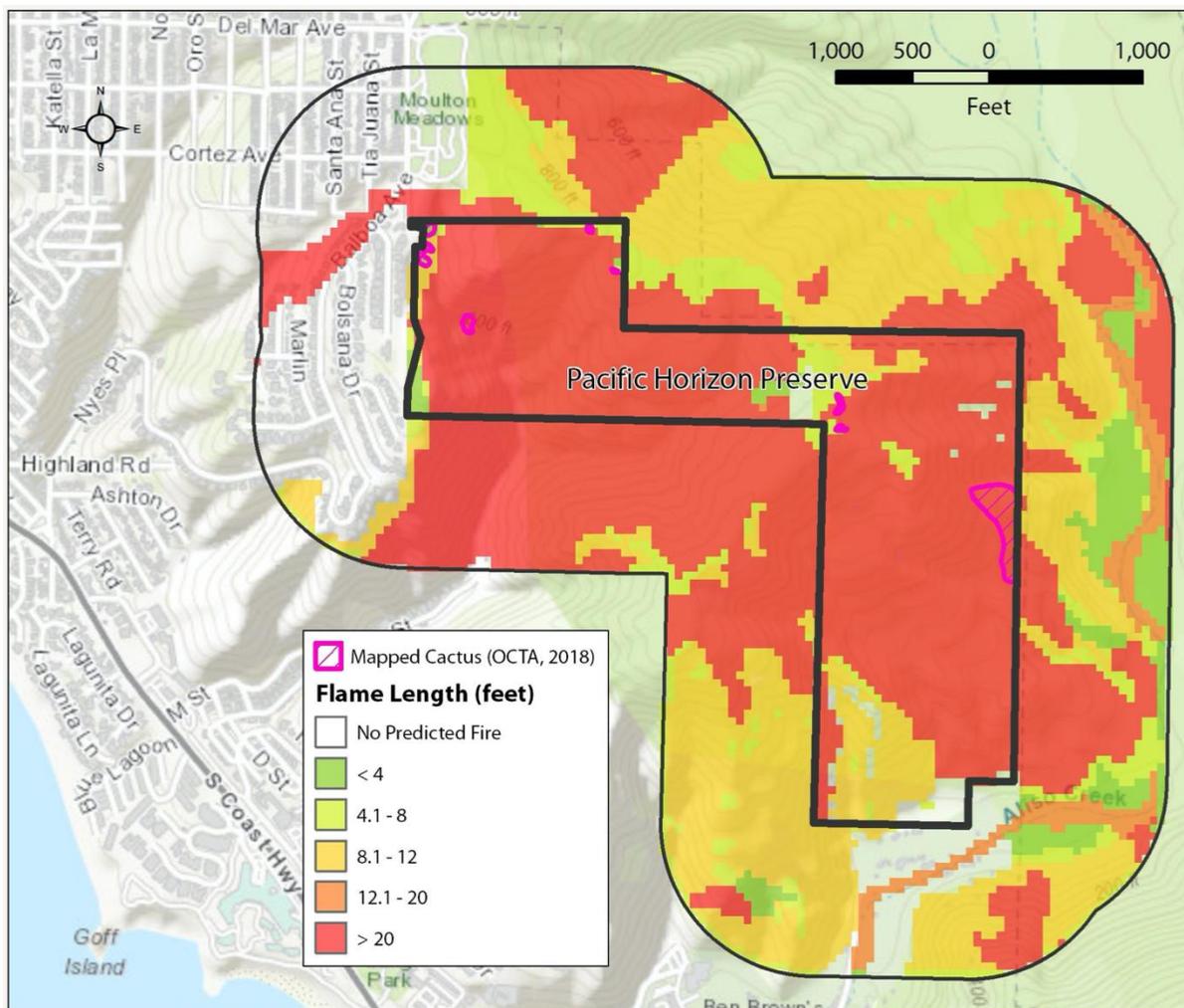


Figure 6b. Pacific Horizon Preserve map showing predicted flame length for results from the Uphill Wind scenario.

Flame Length	Acres
No Predicted Fire	5.34
Less than 4 feet	3.25
4.1-8 feet	18.14
8.1-12 feet	0.52
12.10-20 feet	7.33
Greater than 20 feet	117.33

Scenario I. Northeast Wind (see Figure 6a).

Flame Length	Acres
No Predicted Fire	5.47
Less than 4 feet	3.20
4.1-8 feet	16.32
8.1-12 feet	1.86
12.10-20 feet	0.08
Greater than 20 feet	124.97

Scenario II. Uphill Wind (see Figure 6b).

Table 5. Of the total area of the Preserve, the acreage predicted to burn with the various flame length categories. 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, 151.91 acres.¹³

¹³ As noted above, the text of the RMP denotes the acreage alternatively as 150 and 151; GIS-based tables contained in the same RMP indicate an acreage of 151.1, while other GIS-based tables provide a figure of 151.91. See 2017 Aliso Canyon RMP, Chapters 1 and 2.

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 determine. 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 of how fast the head (or leading front) of a surface fire advances. 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/ 11 feet per 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.

In both wind scenarios, much of the Preserve is predicted to burn with rates of spread over 40 feet/minute.

Large differences exist between the two wind scenarios for rate of spread regarding the areas with the highest rates of spread.

In the northeast wind scenario, approximately 65% of the total Preserve area is predicted to have a rate of spread from 40.1-80 feet/minute, and approximately 18% is predicted to have rates of spread over 80 feet/minute.

In the uphill wind scenario, approximately 44% of the total Preserve area is predicted to have a rate of spread from 40.1-80 feet/minute, while approximately 50% of the total area is predicted to have a rate of spread greater than 80 feet/minute. Hence, approximately 94% of the Preserve is predicted to have high rates of spread in uphill wind conditions.

Rates of spread in the surrounding buffer are patchier, with large areas of Grass Shrub alternating with smaller areas of High Shrub and very small patches of Very High Shrub. The highest rates of spread are predicted in the buffer in the High Shrub and Very High Shrub areas.

As with the flame length trends, some areas with very high predicted rates of spread are nearly adjacent to the housing development to the west of the Preserve, just south of Moulton Meadows Park, including in proximity to the homes on Barracuda Way. Hence, this area has a worrisome interface problem in terms of both flame length and rates of spread. The swathe of High Shrub and corresponding high rates of spread adds to this interface fire danger for both structures along Barracuda Way and Loretta Dr.

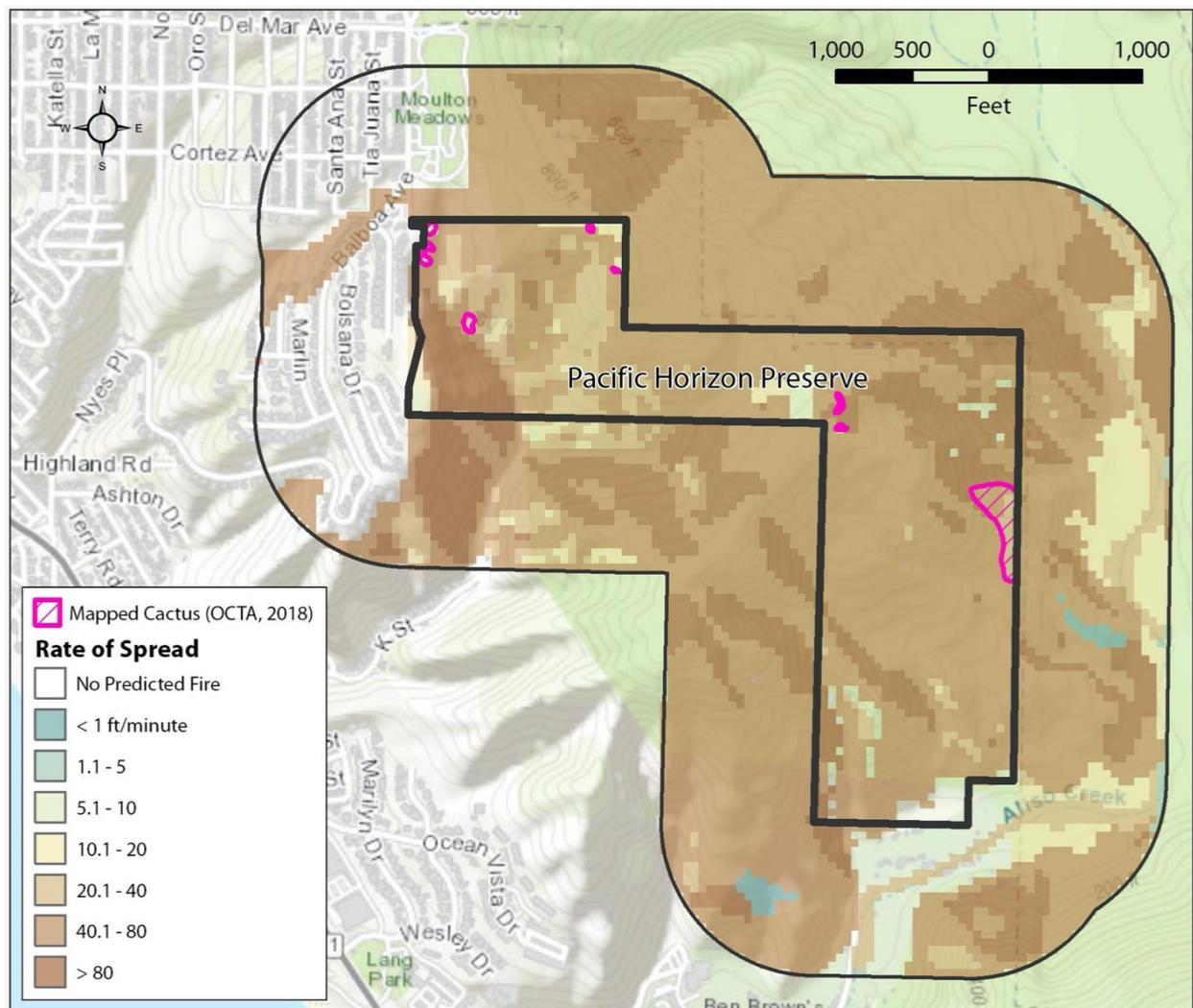


Figure 7a. Pacific Horizon Preserve map showing predicted rate of spread for results from the northeast wind scenario.

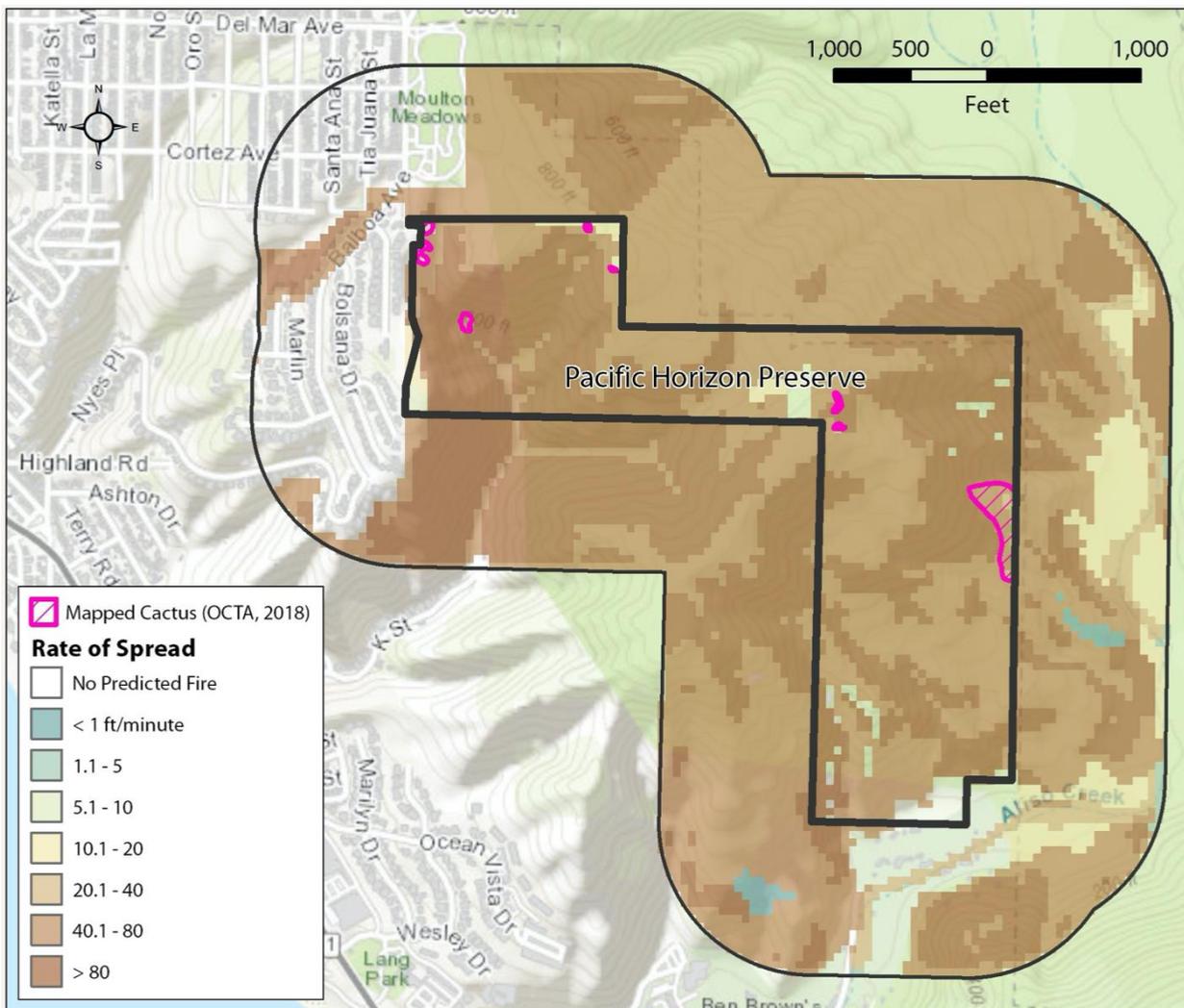


Figure 7b. Pacific Horizon Preserve map showing predicted rate of spread for results from the Uphill Wind scenario.

Rate of Spread	Acres
No Predicted Fire	5.52
Less than 1 ft/minute	0.0
1.1 – 5	0.97
5.1 – 10	0.0
10.1 – 20	3.48
20.1 – 40	16.74
40.1 – 80	98.40
Greater than 80 ft/minute	26.80

Scenario I. Northeast Wind (see Figure 7a).

Rate of Spread	Acres
No Predicted Fire	5.48
Less than 1 ft/minute	0.0
1.1 – 5	0.97
5.1 – 10	0.0
10.1 – 20	2.28
20.1 – 40	0.96
40.1 – 80	65.91
Greater than 80 ft/minute	76.31

Scenario II. Uphill Wind (see Figure 7b).

Table 6. 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 finest fire suppression forces. "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.

No crown fires were predicted. No fire is predicted in 5.05 acres of the Preserve's southeastern corner, nearly the entire western buffer zone, and a portion of the buffer abutting Aliso Creek. Surface fires are predicted to burn the Grass Shrub that covers a narrow strip along the Preserve's western border, a patch of the center of the property, and most of the Preserve's southern edge, along with much of the buffer zone to the property's north, west, and south. Torching fires are predicted to burn in 81% of the total Preserve area in both wind scenarios, almost entirely areas of High Shrub.

The same interface problem that characterizes the predicted flame length and rate of spread is reflected in the neighborhood to the west of the Preserve, which is predicted to be bordered by torching fire (especially south of the Moulton Meadows Park). Further, the swathe of High Shrub between the north and south sectors of this neighborhood is predicted to burn with torching fire.

The two wind scenarios are identical in terms of crown fire activity.

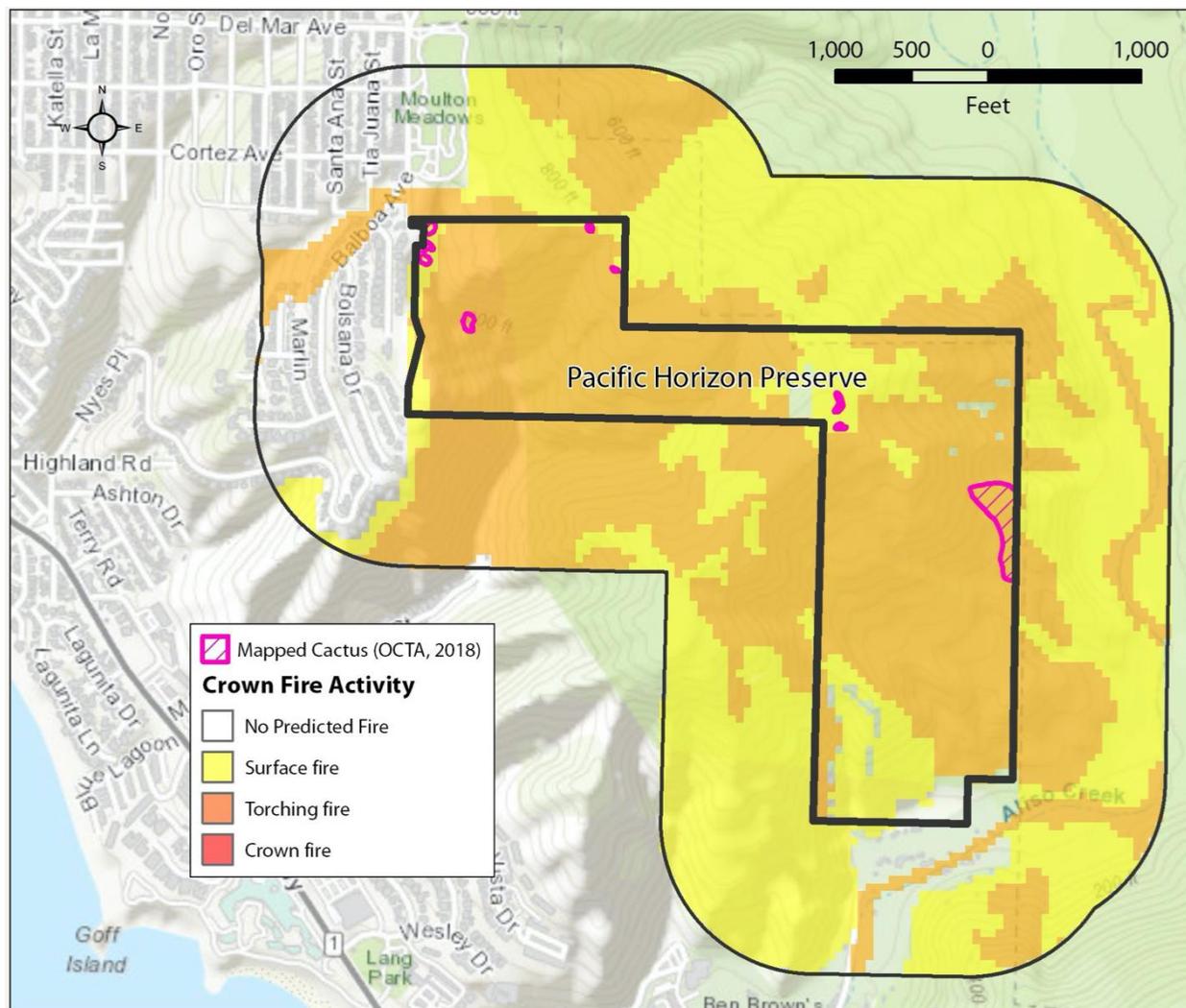


Figure 8a. Pacific Horizon Preserve map showing crown fire activity for results from the Northeast Wind scenario.

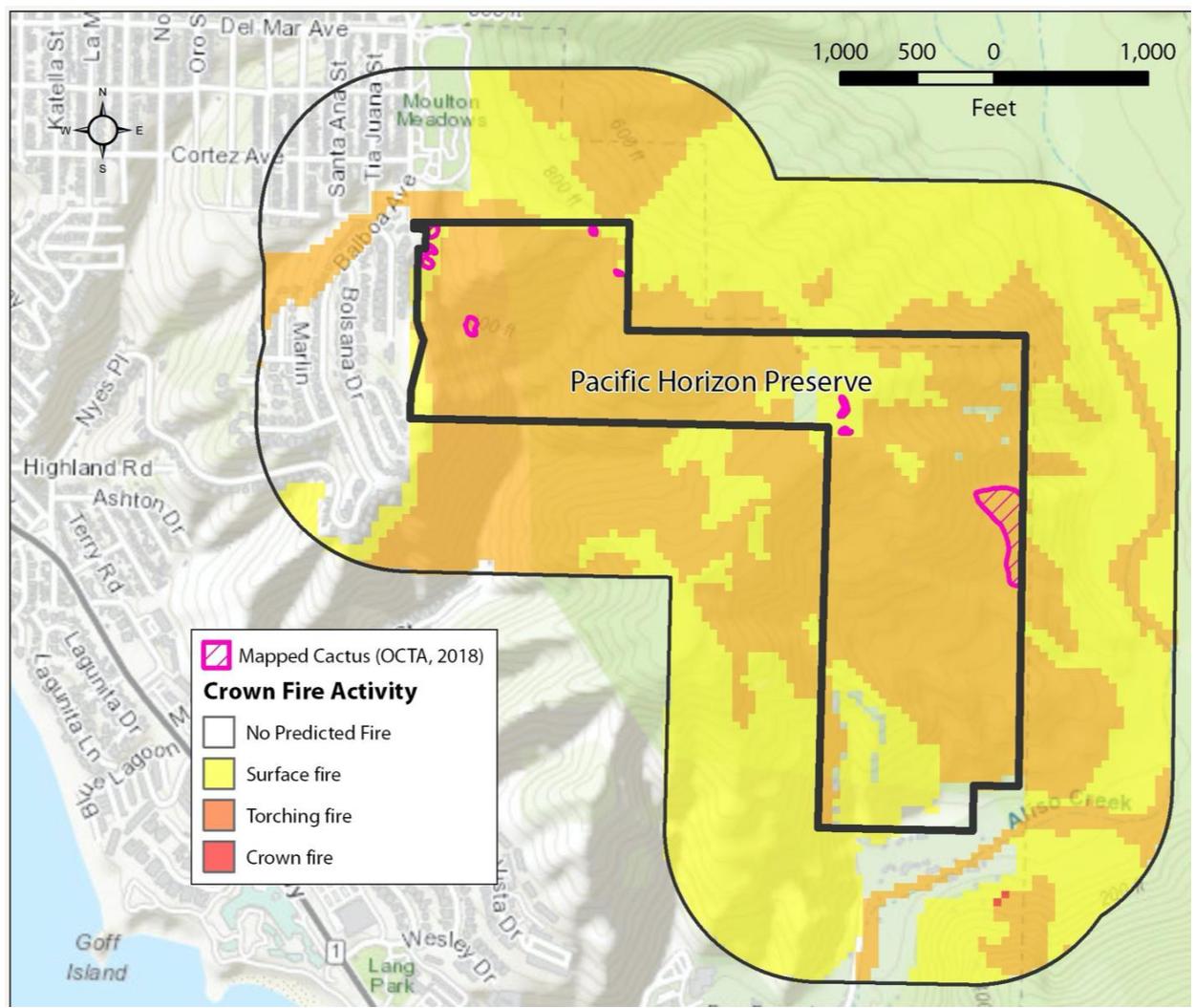


Figure 8b. Pacific Horizon Preserve map showing crown fire activity for results from the Uphill Wind scenario.

Crown Fire Activity	Acres
No Predicted Fire	5.05
Surface Fire	23.89
Torching Fire	122.97
Crown Fire	0.00

Scenario I. Northeast Wind (see Figure 8a).

Crown Fire Activity	Acres
No Predicted Fire	5.05
Surface Fire	23.89
Torching Fire	122.97
Crown Fire	0.00

Scenario II. Uphill Wind (see Figure 8b).

Table 7. 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 the 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, it is categorized as Federal Responsibility Area. The Preserve lies within a Local Responsibility Area, where the local fire department – in this case, LBFD – is financially responsible for the prevention and suppression of wildfires. The LBFD has jurisdictional responsibility for wildfire protection; OCFA will respond to protect adjacent State Responsibility Areas.

The entirety of the Preserve is mapped as Moderate to Very High Fire Hazard Severity Zone. This rating is based on a number of inputs, including the steep slopes and large areas of High Shrub fuel models that are present on the Preserve, as well as the dense spacing and minimal clearance of housing developments adjacent to the Preserve (Rohde, 2016).

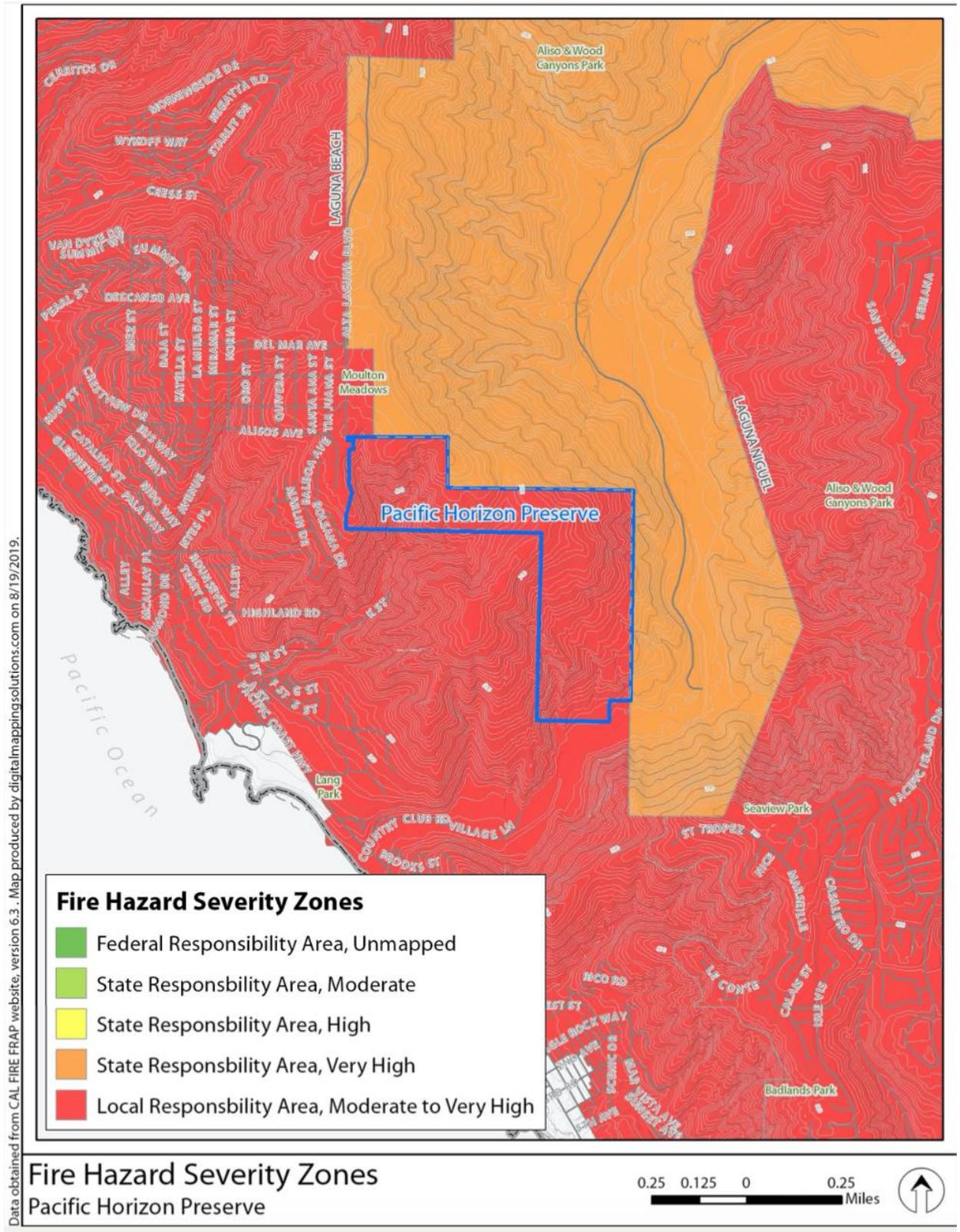


Figure 9. Fire Hazard Severity Zone of Pacific Horizon.

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 following four categories, each 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, Laguna Beach Fire Department (LBFD), and other collaborating agencies such as the 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 with OCTA's relationship with the staff of the LBFD, all support wildland fire protection of the Preserves. The Irvine Ranch Conservancy (IRC) helps regionally to train and oversee FireWatch volunteers that patrol high-risk wildlands in order to prevent ignitions.

Two locations have cameras with views of the Preserve as part of the ALERTWildfire network. ALERTWildfire is a consortium of The University of Nevada, Reno; University of California, San Diego; and the University of Oregon to help firefighters and first responders:

1. Discover, locate, and confirm fire ignitions.
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 both to the northwest of the Preserve, with one placed near the top of Signal Peak in Newport Coast and the other within Aliso and Wood Canyons Wilderness Park near the Top of the World neighborhood in Laguna Beach, south of Highway 73 and east of SR 133. Both locations have two cameras, aimed at different angles. All cameras rotate, to enable a greater area of coverage, and include views of the Preserve and its vicinity.

Camera Name	County	Region	ISP	Sponsor
SignalPeak 1	Orange	ORC	HPWREN/UCSD	CAL FIRE
SignalPeak 2	Orange	ORC	HPWREN/UCSD	CAL FIRE
Aliso Laguna 1	Orange	ORC	Geolinks	SCE
Aliso Laguna 2	Orange	ORC	Geolinks	SCE

Table 8. ALERTCalifornia cameras sites with coverage of Pacific Horizon Preserve.

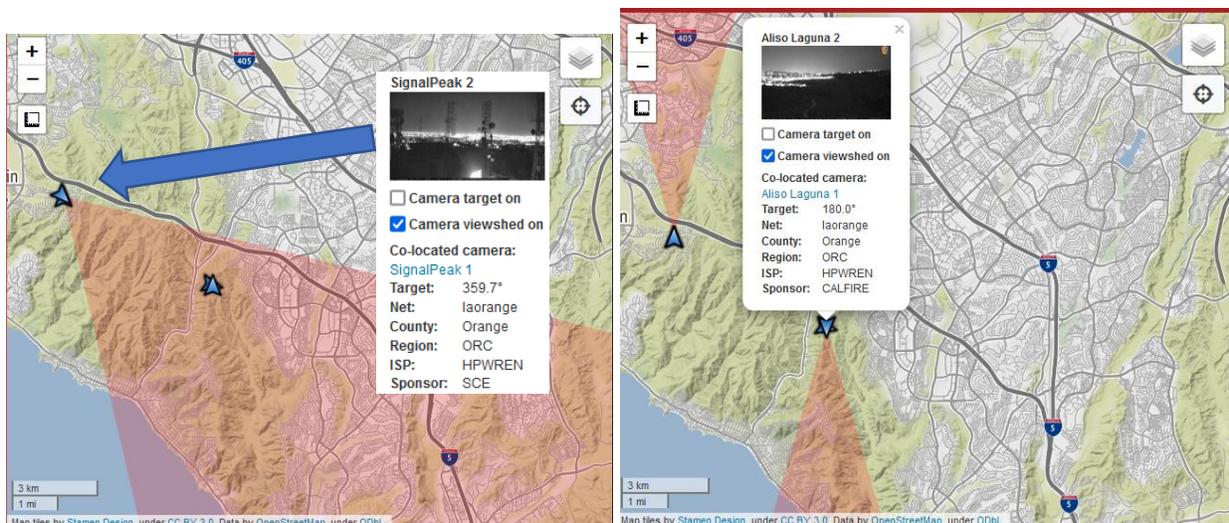


Figure 10. Locations of nearby AlertWildfire cameras. Each location hosts two cameras that rotate to ensure the viewshed is as complete as possible. All cameras rotate during operation, thus direction of arrows on this figure are examples only.

A. Pre-fire/Ignition Prevention

The 2016 M2 Conservation Plan (section 7.2.5.9) recognizes the need for pre-fire activities. Pre-fire response includes both planning and physical fire prevention activities, such as vegetation management. Responsibilities for pre-fire activities are overlapping between OCTA, the City of Laguna Beach, 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 local fire department and OCFA, prepare site-specific fire management plans as part of the preparation of RMPs for the Preserve. Include local fire department contacts and guidelines for pre-fire prevention activities, fire suppression, and post-fire restoration. [Note that OCFA does not have jurisdiction over the Pacific Horizon Preserve; hence, the local fire department (Laguna Beach Fire Department, [LBFD]) will be the sole consultant for OCTA in this matter.]
- Conduct pre-fire management, as appropriate, such as the limited removal of combustible, non-native plants. Because the Preserve is within the jurisdiction of [LBFD], [LBFD] has committed to performing pre-fire brush management, in coordination with OCTA, as described below.
- Establish fuel management zones. If necessary, exceptions to avoid impacts to sensitive species and habitats will be identified by the Preserve Managers, with concurrence sought from the local fire authority.

- Coordinate with surrounding landowners [to request that adequate setbacks or home hardening is completed to contain fuel management zones outside of the Preserve (up to 100 feet from structures) for new structures and facilities. Consistent with the City fuel management plan, if new structures or facilities are approved and the fuel management zone encroaches into the open space (OCTA Preserve), coordination with OCTA, the CCC, and Wildlife Agencies would be required and additional mitigation could be required from the homeowner or City].¹⁴
- 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 local fire department [LBFD] 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 increased volumes of dry fuel that are distributed from the ground to the tree crown. This hazard may justify pre-fire action to prevent ignitions and unnaturally high fire intensity and fire spread rates.

¹⁴ Language regarding setbacks from adjacent landowners came from the RMP; it has been revised specifically for the Pacific Horizon Fire Management Plan.

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 the Wildlife Agencies on any appropriate control actions.

OCTA conducts community outreach with wildfire prevention messages, including the impact of flying embers and the limited, but essential, need for vegetation management and 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 Orange County Ignition Prevention Working Group, a subset group of COAST. Closure of the Preserve is an effective method of preventing wildfire as human activities are closely correlated with wildfire ignition; however, closing this Preserve is not an option as there are no gates. OCTA will post signs along the trail entrances to the Preserve that will indicate that access and entry is prohibited when the National Weather Service designates a Red Flag Warning.

OCTA has the responsibility to meet with LBFD 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. OCTA has developed a map of environmentally sensitive areas [Environmentally Sensitive Lands map (Appendix D)] which informs the LBFD of rare and sensitive plants and habitat types to try to avoid and is an important component to the decision-making process during a wildfire. The M2 Conservation Plan also establishes a Strategy/Management Action that “The FMP will include maps of cactus patches and strategies to minimize direct impacts to cactus patches during fire suppression efforts, if feasible.” Cactus patches are included in the Environmentally Sensitive Lands map completed in 2019 and provided to LBFD and OCFA of areas to avoid (to the greatest extent feasible) when responding to a wildfire on the property.

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 a dozer line during response to a fire incident. The FMP includes resources and recommendations for actions during an event; however, the IC will apply tactics deemed necessary to protect life and property. For example, access within the Preserve was considered adequate for fire containment prior to the Coastal Fire. While the habitat loss was unfortunate, the actions taken during the that event likely prevented the wildfire from spreading into the neighborhood on Barracuda Way and Moulton Meadows Park. In agreement with a stated desire in the M2 Conservation Plan, this fire management plan “supports fire suppression within the Preserve as feasible to reduce the threat of cactus patches being irreparably harmed by frequent and/or intense fires (priority 1).”

ii. City of Laguna Beach Responsibilities

Responsibilities of the City of Laguna Beach for pre-fire/ignition prevention activities include conducting vegetation management as approved by OCTA, coordinating with regulatory agencies such as the Wildlife Agencies, and enforcing compliance with required vegetation management on the properties of adjacent landowners. According to OCFA Vegetation Management Guidelines, all landowners are required to maintain vegetation management zones within 100 feet of dwellings and other habitable structures.¹⁵ See Appendix A for the specific Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting.

Gail K. Sevrens, Environmental Program Manager of the California Department of Fish and Wildlife, wrote a letter November 30, 2018, to Evan Jedyak, Associate Planner of the City of Laguna Beach regarding the creation of fuel modification zone that affects the Preserve¹⁶. This letter states, “We recommend the MND [Mitigated Negative Declaration and Initial Study] be updated to identify this property as OCTA NCCP/HCP habitat Preserve. We also recommend that the City and LBFD coordinate any thinning/clearing activities with Lesley Hill of OCTA to ensure Project activities do not adversely affect the biological resources present within the Preserve... We further recommend the City and LBFD collaborate with OCTA on the development of the FMP to ensure activities associated with the current Project are consistent and compatible with the goals and management approaches identified in the FMP.”

In a subsequent letter, the California Department of Fish and Wildlife (CDFW) stated, “Fuel management activities will be performed using hand crews or goat grazing depending on site conditions (i.e., quality of habitat) and size of the FMZ. Impacts to sensitive species will be minimized by establishing protective buffers, using selective thinning where appropriate, and performing nesting bird surveys if the nesting season cannot be avoided. The Wildlife Agencies have reviewed the proposed treatment protocols and have determined that the City has implemented sufficient measures to minimize project impacts. While we encourage the City and OCTA to avoid and minimize habitat impacts within the Preserve, we understand the City’s obligation to protect public safety and, therefore, concur with the proposed fuel management activities in the Preserve... We further recommend that to guide the management efforts, OCTA and the City install field markers to delineate the maximum boundaries of the FMZ, where appropriate, as well as the OCTA Preserve Boundary.”

The area to be treated for vegetation management will be marked by the LBFD; the OCTA Representative will be informed of the location, schedule, and scope of work prior to the start of vegetation management.

As part of its pre-fire activities, OCFA commissioned a set of WUI Pre-Fire Plans for Orange County that identify risks, hazards, and infrastructure that supports fire suppression, such

¹⁵ <https://www.ocfa.org/Uploads/SafetyPrograms/OCFA%20RSG%20-%20Vegetation%20Management%20Guidelines.pdf>

¹⁶ Sevrens, Gail K. 2018. Letter to Evan Jedyak, Associate Planner City of Laguna Beach. November 30, 2018. Subject: Comments on the Notice of Intent to adopt a Mitigated Negative Declaration for the Fuel Modification Zone 10-Barracuda and Fuel Modification Zone 11 – Driftwood Fuel Modification Plan. 2 pgs.

as access and water sources. The portion of the Pre-Fire Plan that covers the Preserve appears in Figure 11. No potential choke points/entrapments were identified within the Preserve, though a number of fire hazards from heavy fuels and predicted erratic fire behavior were identified within the vicinity, including within the canyon leading to Moulton Meadows Park Canyon to the west of the Preserve and to the east across Aliso Canyon along Ridgeview Drive and lower Pacific Island Drive.

The Plans also identified the following access procedures: Use T3 engines off-pavement in Aliso-Wood Canyons Reg. Park. (A paved road serves the water treatment facility in Aliso Canyon.) The plans also mapped staging areas and temporary refuge areas, but neither are located in the Preserve. The closest staging areas are off of Pacific Coast Highway west of the Preserve at Lang Park and the CVS Parking Lot.

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). Evacuate if time permits.
- Air Safety is Level 2 (moderate risk) with 30-70' clearance.
- Hazardous Materials is Level 2 (moderate risk)
- Entrapment is Level 1 (highest risk) due to canyon topography.

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

As previously noted, any new development adjacent to the Preserve that would require vegetation management is recommended to include measures (setbacks and fire hardening) to avoid vegetation impacts to the Preserve per Section 7.2.5.9 of the Conservation Plan. If new vegetation impacts are proposed to the Preserve, off-site mitigations are anticipated to be required by the project proponent. Vegetation management is prohibited within the conservation easement proposed to be established to protect this property except as otherwise allowed under the RMP and FMP.

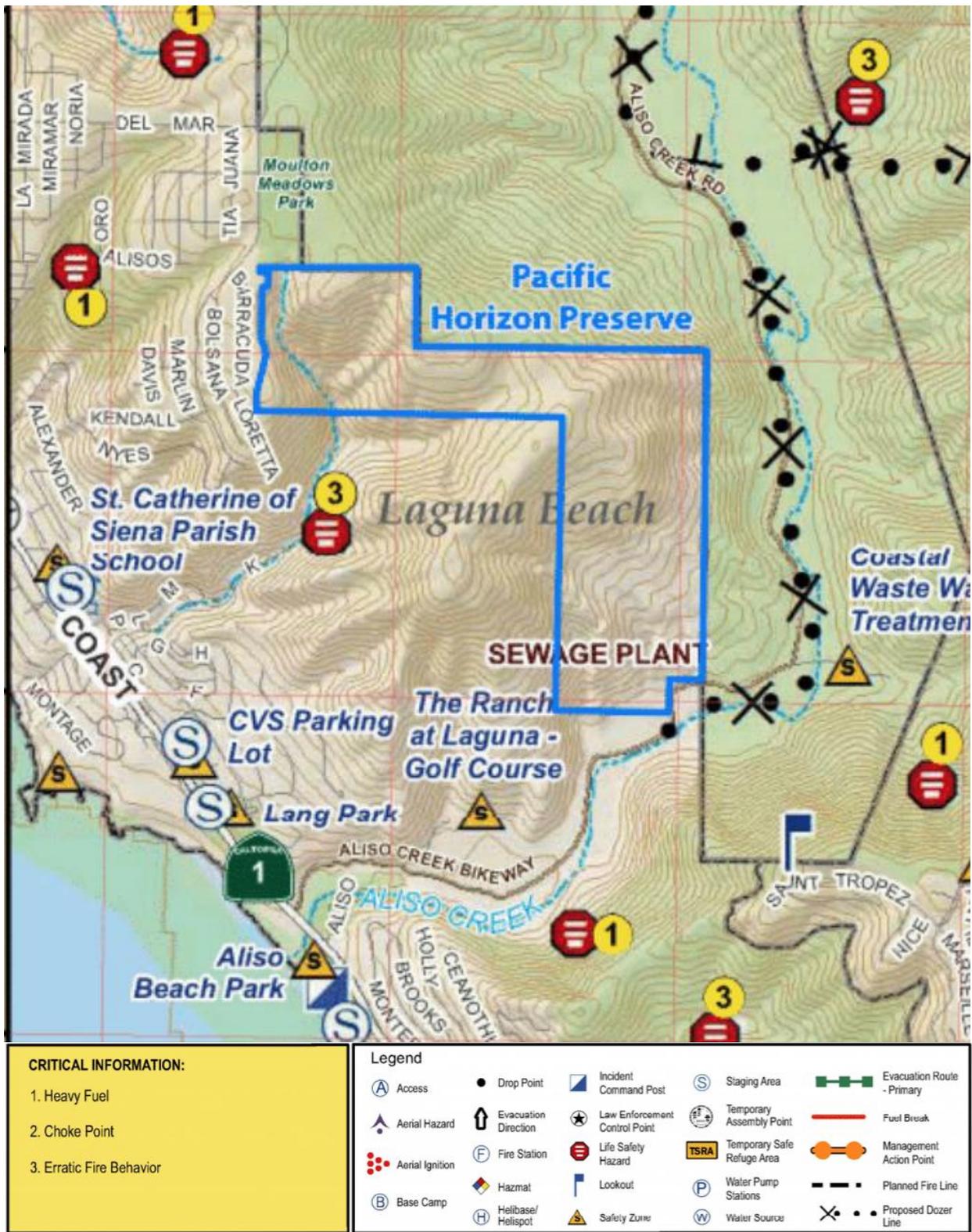


Figure 11. Brown lines indicating access roads, Safety Zones, and Life Safety Hazards in the Preserve.

B. Wildfire Response

Fire suppression is defined as all work involved in extinguishing a fire following its detection. The basic practices involve reconnaissance, hot-spotting, 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, [LBFD] will establish defenses within and nearby any adjacent homes to protect life and property. The Preserve Manager, Conservation Plan Administrator, and [LBFD] should collaborate to define the least damaging suppression strategy to Preserve resources 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.

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 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 will report to Incident Command to help inform the suppression strategy and prevent unnecessary damage to Preserve Resources.

The OCTA RA will be the individual responsible for overseeing management of the Preserve if and/or 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 LBFD and OCFA firefighters in an expedient manner. Once notified of a wildfire, the OCTA RA

will advise LBFD and OCFA, as applicable, 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 LBFD Incident Commander (IC) has complete authority for the suppression strategy pursued 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. Assist Laguna Beach Emergency Management staff, under Unified Command, in evacuation efforts.
2. Request an off-site truck-washing facility to be operated by the contracted entity. The most likely location of this facility would be the LBFD staging area.

Responsibilities and Requirements of the Resource Advisor: The RA will check in at the ICP, and report directly to the IC or Liaison. The RA will attend all incident planning and briefing meetings and inform the IC 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 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 and surrounding ownership, sensitive areas, and contents of the fire management plan. The RA must have official identification, mobile phone or radio, a copy of the fire management plan, and a RA certification.

Emergency Evacuation: OCTA staff, contractors, or any other members of the public (if during a docent led event) that may be within the Preserve during an uncontained wildfire must either be evacuated from the Preserve or brought to a "safe area." 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's Department and the LBFD. In the Pacific Horizon Preserve, fire trajectory (easterly or westerly) should be taken into consideration when determining the preferred evacuation route to vacate the Preserve, prioritizing evacuation of streets in closest proximity to and facing the fire (Rohde 2016). Generally, the Preserve should be evacuated into urban areas, concentrating on entrapment areas first. In no circumstance should members of the public be brought to the Preserve during a wildfire incident unless directed and carried out by the Orange County Sheriff's Department. The OCFA commissioned a WUI Pre-attack Plan that includes an evacuation plan for this area; this section of the Pre-attack Plan appears as Appendix E.

ii. City of Laguna Beach Fire Department Responsibilities

The Laguna Beach Emergency Manager will notify OCTA of a wildfire.

The LBFD is responsible for providing fire protection for the Pacific Horizon Preserve. The nearest fire station is LBFD Station #4, on 2nd Ave. The City is responsible for four front line fire engines, two reserve fire engines, a Type III wildland engine, an Office of Emergency Service (OES) engine, and various command and support vehicles.

Nearest Fire Station	Service Area	Fire Station Address	Route	Distance	Estimated Time
STATION #4	LAGUNA BEACH	31646 2 nd Ave, Laguna Beach, CA 92651	Via CA-1	1.4 miles	< 5 minutes
STATION #2	LAGUNA BEACH	285 Agate St, Laguna Beach, CA 92651	Via CA-1	1.9 miles	5 – 10 minutes
STATION #1	LAGUNA BEACH	501 Forest Ave, Laguna Beach, CA 92651	Via CA-1	3.2 miles	10 – 15 miles
STATION #3	LAGUNA BEACH	2900 Alta Laguna Blvd, Laguna Beach, CA 92651	Via Temple Hills Dr	4.7 miles	10 – 15 miles
STATION #5	LAGUNA NIGUEL	23600 Pacific Island Dr., Laguna Niguel 92677	Via Crown Valley Pkwy	6.1 miles	10 – 15 miles
STATION #49	BEAR BRAND	31461 St. of Golden Lantern, Laguna Niguel 92677	Via CA-1	6.5 miles	> 15 minutes

Table 9. Location of nearby fire stations and response times to the Preserve.

In the event of a fire, LBFD will commence suppression activities consistent with the primary goal of saving lives. Mapping indicating all Environmentally Sensitive Lands on the Preserve, as in Appendix D, was created with input from the OCTA RA and was developed to be used as a tool to aid in sensitive resource avoidance and minimization. The LBFD will notify OCTA of a wildfire. The LBFD staff will liaison between the landowner and the IC as needed. The LBFD staff will also be responsible for coordination with neighboring landowners: the City of Laguna Beach, Orange County Parks, and private landowners.

If a fire starts outside the City, response personnel from that jurisdiction would respond to the fire and the incident would be managed under Unified Command if it crosses the jurisdictional boundaries of fire agencies. Unified Command is an application of ICS when there is more than one agency with incident jurisdiction. Agencies work together at the ICP to establish a common set of objectives and strategies, and a single IAP. For a fire within and adjoining the Preserve, the most likely scenario would be for both LBFD and OCFA to respond and establish Unified Command. OCTA's RA would fulfill the same role and report to the same position within the ICS, regardless of where the fire started.

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 within the Preserve. Several hydrants in nearby residential tracts provide good volumes and pressure of water flow. However, there is no water available for fire response in the canyons within and adjacent to the Preserve. The system of valves (inter-tie) between water districts at the Moulton Niguel Water District Isla Vista facility are manually operated but can share supply between districts.

EMERGENCY RESOURCE NEEDS - FIRST SIX HOURS (In addition to Initial Attack Resource)				
Fire ORC Dispatch: (714)573-6522		Law Enforcement OCSD (714)288-6963		
Ordering Point:		Ordering Point:		
Engines: The number range reflects the number of "minimum" to "preferred" resources.		Law Enforcement:		
Type 1	Type 3	100 officers, OCSD to evacuation, traffic control, and security. CHP to assist with traffic. OC Parks & OCSD to evacuate Aliso-Wood Canyons Regional Park. IC-Lt., Capt. Traffic Control on: Crown Valley Pkwy., Pacific Island Dr., Sea Island Dr., Highland Dr. Clubhouse Dr., Highlands Ave., Alicia Pkwy.		
Strike Teams: 6-10	Strike Teams: 4-5			Water Tenders: 4-5
Crews	Dozers			Overhead: 4-5
Single: 8-12 STs:	Single: 2-4 STs:	Div. Sup.: 5-6		
Aircraft:		Logistics		
Type 1 Helicopter (Large): 1 Type 3 Helicopter (Light): 1 Type 2 Helicopter (Med.): 3 Air Tankers: 4		Open City & Co. EOC to support aggressive fire or significant evacuation need. Consider responder fuel, water, & food needs. File F-MAG application with CAL-OES. Notify public works to assist in traffic, Red Cross & Animal Services to assist in evacuation. Consult with SCE & SDG&E regarding electrical issues. Water Districts: Molton Niguel: (949)831-2500, South Coast: (949)274-2975.		
WUI Engine Deployment - High Risk		Other		
1 engine/2-4 perimeter structures, 1 engine/isolated structures 2 engines/ multi-family structures				
WUI Engine Deployment - Moderate Risk				
1 engine/2-4 perimeter structures, 1 engine/isolated structure, 2 engines/multi-family structure		Liaison with OC Parks for Aliso-Wood Canyons Park lands- OC Parks Dispatch: (562)795-5410. Dozer restrictions: use on ridge lines or to expand existing or legacy TT's, restrict use in canyon bottoms & near rock outcroppings/shelves. Retardant avoidance area in Aliso Creek.		
WUI Engine Deployment - Low Risk				
1 strike team/2 blocks of perimeter homes				

Figure 12. Expected emergency resource needs identified in the Wildland Urban Interface Pre-Fire Plan (20) for a wildfire in/near Pacific Horizon Preserve. OCTA has requested OCTA contacts be included in those plans in which a Preserve is located.

C. Wildfire Suppression Repair

Wildfire suppression remediation, repair, or rehabilitation refers to activities focused on the repair and rehabilitation of any damage to resources directly caused by firefighting activities. It does not include post-fire recovery efforts needed to mitigate fire-related impacts to resources (see Wildfire Recovery). For the purposes of this FMP, repair activities refer to the actions taken by LBFD or OCFA immediately after firefighting activities to repair impacts from equipment, fire lines, and other firefighting efforts. Repair activities are focused on reducing the overall effects that may occur downslope and are described in a Fire Suppression Repair Plan (also known as Incident Repair Plan, or IRP) that is developed for the property. As a landowner, OCTA will be actively involved in the development of the IRP and oversight of its implementation so that the effects of suppression are identified and mitigated. Combined, OCTA and LBFD or OCFA will form an Incident Rehabilitation (or Repair, or Remediation) Team to develop and implement the IRP.

i. Orange County Transportation Authority Responsibilities

The RMP for the Pacific Horizon Preserve lays out specific actions for post-fire response:

“If a fire occurs on the Preserve, the Preserve Manager will inventory the condition of natural communities following the fire, and will coordinate with the Monitoring Biologist, Wildlife Agencies, and Regulatory Agencies as necessary, to determine if habitat restoration is warranted...

The Preserve Manager will inventory the condition of natural communities following a fire on the Preserve, and will coordinate with the Monitoring Biologist, and Wildlife Agencies as necessary, to determine if habitat restoration is warranted. The NCCP/HCP Administrator and Preserve Manager will work with the Wildlife Agencies and LBFD, as necessary, to determine if fire severity and frequency meet the requirements of a Changed Circumstance as defined in the NCCP/HCP and utilize funding as appropriate to implement post-fire restoration. Options for funding this restoration include (1) using funds allocated for adaptive management, (2) reallocating funds from existing management priorities, as appropriate, (3) pursuing outside funding sources, or (4) seeking authorization to use Changed Circumstance funding.”¹⁷

According to the Pacific Horizon RMP, “[p]ost-fire management activities may include but are not limited to the following.

- Conduct emergency post-fire erosion control, where necessary. [This is separate from and in addition to work performed by LBFD under the IRP and would include areas that are not re-contoured.]
- Repair/restore damaged fences, roads, or other official Preserve structures to pre-fire conditions.

¹⁷ Aliso Canyon Resource Management Plan (August 2017), Section 3, pg. 6, 26-27.

- Monitor post-fire recovery closely. Implement control measures to remediate any resulting erosion, sedimentation, and invasion by nonnative plant species.
- Coordinate with LBFD to recontour any dozer lines created within the Preserve. Restoration [of] dozer lines by LBFD 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 LBFD and the Preserve Manager. [These activities are specified and agreed to in the IRP.]
- Plan all post-fire actions (e.g., habitat restoration, invasive species removal, erosion control, or trail stabilization) in consultation with the Wildlife Agencies prior to project initiation and permitted if necessary, by State and Federal regulation programs. The Preserve Manager will use current information on best approaches and strategies for post-fire restoration, including erosion control, seeding, and success criteria.”

Following a wildfire on the Preserve, a representative of the OCTA will attend all Incident Rehabilitation Team meetings. The representative will perform a reconnaissance of OCTA lands affected by the burn or suppression activities and convey damage and mitigation recommendations to the LBFD so that it can be included in the IRP. This representative will coordinate all rehabilitation measures on OCTA lands called for in the IRP. The OCTA representative will review/approve all proposals not specifically identified in the IRP. The OCTA representative will also interact with public watershed protection agencies and the Wildlife Agencies.

Wildfires that burn OCTA lands will be documented and reported in the NCCP/HCP Annual Reports or under separate cover as appropriate. Maps created by fire protection agencies after a large wildfire could have inaccuracies and should be field checked to determine actual OCTA lands affected. It is recommended OCTA conduct its own mapping of the area burned during or immediately following the incident and provide the data CAL FIRE and the Wildlife Agencies. Wildfire perimeters and major unburned areas within the overall fire perimeter should be located with a Global Positioning System (GPS) and transferred to a Geographic Information System layer. For significant damages caused by the suppression activities, costs to OCTA will be reimbursed by OCTA filing a compensation claim.

ii. City of Laguna Beach Fire Department Responsibilities

The responsibility for wildfire suppression repair is linked to the lead agency in the wildfire incident. If OCFA is the Lead Agency, it would be responsible for wildfire suppression repair. Because the entirety of the Preserve is within the Local Responsibility Area of Laguna Beach, LBFD would be immediately engaged in fire suppression and response. The assessment of need for watershed or fire rehabilitation will be a part of that response, and the city of Laguna Beach will determine on a case-by-case basis, to act on the identified needs. This assessment will be based on risk and cost and will be considered jointly by the cooperating agencies. In practice, OCFA may conduct the wildfire suppression repair 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 will include:

- Preparation of an IRP.
- Recontouring areas of the Preserve where 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., fences and 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.

Repair activities will focus on minimizing erosion and minimizing the introduction of alien species. The 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 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 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. Erosion control on burned areas on portions of the site will take place if considered necessary by OCTA with guidance from the regulatory agencies where all viable seed and rootstock have been consumed or killed. LBFD and OCFA do not perform plantings.

All existing roads and trails that 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 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 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 LBFD are necessary. OCTA would be responsible for such activities as vegetation seedings and plantings (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 collecting seed from within the Preserve is not possible, coordination and approval of alternative seed sources with 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 chance of being vulnerable to disturbance.

The RMP for the Pacific Horizon (then Aliso Canyon) Preserve lays out specific actions for post-fire response:

“If a fire occurs on the Preserve, the Preserve Manager will inventory the condition of natural communities following the fire, and will coordinate with the Monitoring Biologist, Wildlife Agencies, and Regulatory Agencies as necessary, to determine if habitat restoration is warranted...

The Preserve Manager will inventory the condition of natural communities following a fire on the Preserve, and will coordinate with the Monitoring Biologist, and Wildlife Agencies as necessary, to determine if habitat restoration is warranted. The NCCP/HCP Administrator and Preserve Manager will work with the Wildlife Agencies and LBFD, as necessary, to determine if fire severity and frequency meet the requirements of a Changed Circumstance as defined in the NCCP/HCP and utilize funding as appropriate to implement post-fire restoration. Options for funding this restoration include (1) using funds allocated for adaptive management, (2) reallocating funds from existing management priorities, as appropriate, (3) pursuing outside funding sources, or (4) seeking authorization to use Changed Circumstance funding. Post-fire management activities may include but are not limited to the following.

- Conduct emergency post-fire erosion control, where necessary. [This is separate from and in addition to work performed by LBFD under the IRP and would include areas that are not re-contoured.]
- Repair/restore damaged fences, roads, or other official Preserve structures to pre-fire conditions.
- Monitor post-fire recovery closely. Implement control measures to remediate any resulting erosion, sedimentation, and invasion by nonnative plant species.
- Coordinate with LBFD to recontour any dozer lines created within the Preserve. Restoration [of] dozer lines by LBFD 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 LBFD and the Preserve Manager. [These activities are specified and agreed to in the IRP.]

- Plan all post-fire actions (e.g., habitat restoration, invasive species removal, erosion control, or trail stabilization) in consultation with the Wildlife Agencies prior to project initiation and permitted if necessary, by State and Federal regulation programs. The Preserve Manager will use current information on best approaches and strategies for post-fire restoration, including erosion control, seeding, and success criteria.”¹⁸

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.”

¹⁸ Aliso Canyon Resource Management Plan (August 2017), Section 3, pg. 6, 26-27.

REFERENCES

- Ager, Alan A., Nicole M. Vaillant and Mark A. Finney. 2011. Integrating fire behavior models and geospatial analysis for wildland fire risk assessment and fuel management planning. *Journal of Combustion*. Volume 2011, Article ID 572452. Hindawi Publishing Corporation. 19 pp doi:10.1155/2011/572452
- Andrews, Patricia L. 2018. The Rothermel surface fire spread model and associated developments: A comprehensive explanation. Gen. Tech. Rep. RMRS-GTR-371. Fort Collins, CO. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 121 pp.
- BonTerra Psomas. 2015 (October). Baseline biological surveys technical report for the Aliso Canyon property Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation in Orange County, California. Prepared for OCTA. 76 pp.
- California Department of Forestry and Fire Protection. 2019. Fire perimeters. <https://frap.fire.ca.gov/frap-projects/fire-perimeters/>. Last accessed November 24, 2019.
- California Office of Safety and Health. 2018. Title 8, General Industry Safety Orders, Section 3410. At <https://www.dir.ca.gov/title8/3410.html>. Last accessed Nov 22, 2019.
- City of Laguna Beach. 2018. Fuel Modification Zone 10-Barracuda and Fuel Modification Zone 11 – Driftwood Fuel Modification Mitigated Negative Declaration and Initial Study.
- Finney, Mark A. 1997. FARSITE Fire Area Simulator users guide and technical documentation 1997. Systems for Environmental Management. Missoula MT.
- ICF International. 2016. M2 Natural Community Conservation Plan/Habitat Conservation Plan, Final– November 2016. Prepared for the Orange County Transportation Authority, Orange, CA.
- Irvine Ranch Conservancy. 2008. Wildland Fire Ignition Reduction Strategy. A Strategy with Recommended Actions to Reduce Wildland Fire Ignitions. Irvine Ranch Conservancy, Irvine, CA.
- Laguna Beach Historical Society (LBHS). 2015. Chronology of Laguna Beach. Laguna Beach, CA: LBHS. <http://www.lagunabeachhistory.org/chronology/>.
- National Weather Service, San Diego, CA Weather Forecast Office. Monthly summarized data, 1928-2022, Laguna Beach, CA. <https://www.weather.gov/wrh/climate?wfo=sgx>
- Natural Communities Coalition. 2014 Stakeholders Implementation Guide to the Long-term Fire Management Plan for the Nature Reserve of Orange County (NROC). Prepared by Wildland Res Mgt., Reno, NV.

Orange County Fire Authority. 2017. Community Wildfire Protection Plan covering Orange County, California. Adopted May 2017. Prepared by Wildland Res Mgt, Reno, NV. 99 pages.

Orange County Fire Authority. 2019 Strategic Unit Fire Plan. Orange County Fire Authority, Irvine, CA.

Orange, County of. 1997. *Silverado-Modjeska Specific Plan* (as amended). Santa Ana, CA: County of Orange Environmental Management Agency.

Orange County Transportation Authority. 2017. Aliso Canyon Preserve Resource Management Plan. Orange County Transportation Authority, with support from ICF, San Diego, CA. 294 pp.

Orange County Transportation Authority (OCTA). 2012a (February). Draft Environmental Mitigation Program Chronicles. Orange, CA: Orange County Transportation Authority.

Rohde and Associates. 2016. Pacific Island wildland urban interface fire plan. Prepared for Orange County Fire Authority, Irvine, CA. 6/6/16.

Schlotterbeck, Claire and Melanie Schlotterbeck. 2015. [Understanding Fire Regimes in the Santa Ana Mountains and Laguna Coast](https://www.fhbp.org/resources/studies-reports/fire-water-quality-study/), at: <https://www.fhbp.org/resources/studies-reports/fire-water-quality-study/>

Schlotterbeck, Claire and Melanie Schlotterbeck. 2020. [Fire Regimes in the Santa Ana Mountains and Laguna Coast](https://www.fhbp.org/resources/studies-reports/updated-fire-study/) (1914-2019). Published by Hills For Everyone, at: <https://www.fhbp.org/resources/studies-reports/updated-fire-study/>

Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

Sevrens, Gail K. 201. Letter to Evan Jedyak, Associate Planner City of Laguna Beach. November 30, 2018. Subject: Comments on the Notice of Intent to adopt a Mitigated Negative Declaration for the Fuel Modification Zone 10-Barracuda and Fuel Modification Zone 11 – Driftwood Fuel Modification Plan. 2 pgs.

Sturtevant Brian R., and David T. Cleland. 2007. Human and biophysical factors influencing modern fire disturbance in northern Wisconsin. *International Journal of Wildland Fire* 16, 398–413. doi:10.1071/WF06023

Sugihara, Neil, Jan Van Wagendonk, Kevin Shaffer, Joann Fite-Kaufman, and Andi Thode. 2006. *Fire in California's Ecosystems*, University of California Press. Berkeley and Los Angeles, California.

Syphard, Alexandra D. and Jon E. Keeley. 2015. Location, timing and extent of wildfire vary by cause of ignition. *International Journal of Wildland Fire* 14, 213–222. doi:10.1071/WF14024

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.

US Forest Service. 2018. FlamMap <https://www.fs.fed.us/rmrs/tools/flammap> and <https://www.firelab.org/project/flammap> last accessed November 2019.

APPENDICES

- A. Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting
- B. Fire Suppression Repair Standards and Example of Plan
- C. Glossary of Terms
- D. Environmentally Sensitive Lands Maps
- E. Wildland Urban Interface Pre-attack Plan



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

The intent of this protocol is to define City procedures for achieving compliance with the California Coastal Act, California Environmental Quality Act (CEQA), regulation of the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and other agencies regarding fuel modification in zones requiring a Coastal Development Permit.

Fuel Modification Zones (FMZ's) are managed by the City of Laguna Beach under two different approaches;

- a. Public Nuisance Abatement sites – Those legacy sites which have a history of long-term grazing disturbance. These sites and their associated management by goat grazing predate the adoption of the Coastal Act and has been judged by the State Attorney General as exempt from the act as a pre-existing condition. This generally refers to sites grazed by goats in FMZ's 1-10.
- b. Coastal Development Permit sites- Those sites subject to the Coastal Act for which a Coastal Development Permit must be obtained for fuel modification. This treatment protocol guides fuel modification for these sites, which includes all zones currently maintained under Coastal Development Permits (FMZ's 10-15, 23, 24, and 27), and all program expansion sites planned for future development.

Reduction of Fire Behavior Potential

The objective of any fuel modification treatment shall be to achieve at least an average 75% reduction in potential wildfire fire line intensity (energy release), as measured by flame length and rate of spread. In general, a 50% reduction of fuel loading and continuity, accomplished by the parameters of this protocol will achieve such a reduction. (*Fuel Modification Impacts to Potential Fire Behavior- A Case Study for the City of Laguna Beach, Rohde, 2017*, and *Catastrophic Wildfire Assessment- City of Laguna Beach, Franklin, 2013*). Fuels reduction shall be managed to accomplish reduction in fuels continuity and disrupt potential wildfire trajectory and intensity.

Treatment Area Determination:

Fuel Modification treatments will generally be limited to those areas that are within 100 feet of developed properties or structures. Treatments outside of these areas will be limited to removal of targeted invasives, general non-natives weeds control, or tree thinning and dead branch removal. Fuel modification outside of the 100-foot zone shall be conducted with intent to minimize impacts to adjacent intact habitats, serve as partial on-site mitigation for fuel modification impacts when required, or for prevention of fire branding over the fuel break. Exceptions to the 100-foot clearance may include when topographic conditions may



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

accentuate wildfire behavior such as in steep gullies which may “chimney” or accentuate fire effects towards development. Other cases may include where islands of native vegetation are retained as buffers for sensitive species within the fuel modification zone and allow fuel continuity to exist that would allow wildfire to transition readily through the zone. In these or similar conditions, the fuel modification width may be extended to 150-feet when required to mitigate expected fire behavior on structures above the site. Disruption of fuel continuity will be accomplished to limit fire movement within or through the Fuel Modification Zone and reduce crown fire spread.

The primary methods for vegetation management shall consist of grazing or hand crew modification. Other methods including mechanical mastication, prescribed burning, mass herbicide use, crushing, chaining, or other means of mechanical conversion have been generally eliminated from consideration for environmental or geological risk, topographic limitations for heavy equipment use, concern for contamination of water courses, lack of ability to manage fire or smoke impacts from prescribed fire, or social/political concerns.

Geotechnical Findings:

Proposed FMZ’s shall be evaluated by a qualified geologist for geologic stability and flood/debris movement potential. Treatment within areas determined to be geologically unstable in the geotechnical report may be modified, treated, or eliminated. Unstable sites may include historic landslide or debris flow areas, unstable soil or rock structure, or similar sites.

Archeological/Paleontological Findings:

Proposed FMZ’s shall be evaluated for archeological and paleontological resources in accordance with CEQA requirements. Such evaluation requires solicitation of tribal interests, survey of data sources for known resources, and site survey. Areas determined to have a presence of identified archaeological and/or paleontological resources may require fuels treatment to be modified or eliminated and shall require consultation with a certified archeologist/paleontologist.

Sensitive Species Protection:

For all Coastal Development Permit FMZ’s, a qualified biologist shall inspect proposed fuel modification sites for the presence of sensitive species prior to the initiation of work. If the presence of sensitive species is identified, a biologically trained environmental monitor shall be present at all times while work is conducted in the immediate vicinity of identified habitat to ensure no accidental takings occur, and sensitive species are protected. Crews conducting



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

fuel modification work shall receive instruction and training in sensitive species management and avoidance prior to initiation of work.

Sensitive species include those identified in the California Endangered Species Act (CESA), the Native Plant Protection Act (NPPA), the California Environmental Quality Act (CEQA), the Natural Community Conservation Planning Act (NCCPA), California Penal Code Section 384a, or by Federal designation in the Endangered Species Act (F-ESA). Sensitive species shall not be disturbed by fuel modification activities.

Sensitive plant species of principal concern in Laguna Beach include:

1. Big-leaved Crownbeard (*Verbesina dissita*)
2. Intermediate Mariposa Lilly (*Calochortus weedii* var. *intermedius*)
3. Many-Stemmed Dudleya (*Dudleya multicaulis*)
4. Fish's Milkwort (*Polygala cornuta* var. *fishae*)
5. Cliff Spurge (*Euphorbia misera*)
6. Catalina Mariposa Lily (*Calochortus catalinae*)
7. Coulter's Matillija Poppy (*Romneya coulteri*)
8. Western Dichondra (*Dichondra occidentalis*)
9. Laguna Beach Life-forever (*Dudleya stolonifera*)
10. Many-stemmed Dudleya (*Dudleya multicaulus*)

Whenever listed sensitive plant species are identified, they will be protected by establishing a flagged, 15-foot buffer around all specimens of the sensitive species, inside of which no material shall be initially removed. Such presence and limits shall be effectively communicated to project contractors. Based upon the species identified, its ecology and phenology, hand removal of non-native vegetation within the 15 foot buffer may be initiated at the direction of the biological monitor, if it is determined to be ecologically beneficial for the identified species. For Big-Leaved Crownbeard (*Verbesina dissita*), the potential shading/nurse plant benefit of non-native shrubs would be considered before removing non- native shrubs with such a determination to be made by the biological monitor.

Nesting Birds

To avoid impacts to nesting and migratory birds, including the Coastal California Gnatcatcher (*Poliioptila californica*), removal of vegetation should occur outside of nesting season (January 1 to August 31 in upland habitats) as much as is practicable. If work is conducted during nesting season, a qualified biologist will conduct a Nesting Bird Survey in the work area within 48 hours of the commencement of work. If any are found, a buffer zone will be flagged around the



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

nesting site(s) in compliance with the biologist's recommendations before work commences. Contractor personnel will be directed to check all vegetation for nests before cutting and to cease work in the area immediately if one is found, until a qualified biologist can assess it. If work ceases for more than two days, another nesting bird survey will be required before work can re-commence.

Grazing Treatment Protocols:

Goats will be used to implement grazed fuel modification treatment in areas of Low to Moderate Habitat Value as defined in the *Laguna Beach Biological Resources Inventory*, (Marsh et. al 1983, see Appendix). To determine habitat value for this purpose, Laguna Beach City GIS maps based on the above-referenced document will be initially referenced and modified as necessary based on site visits by a qualified biologist to reflect current conditions. Grazing sites will generally be dominated by herbaceous and woody herbaceous plant species.

- a. No more than 75 goats will be permitted per acre.
- b. Goats shall remain in secure enclosures at all times.
- c. Sensitive plant species shall be protected from trampling or consumption by establishing the secure enclosures a minimum distance of at least 15 feet between sensitive plants and the limits of grazing.
- d. Grazing animals shall be moved periodically to ensure enough vegetative cover remains to promote erosion control, inhibit dust, and preserve view aesthetics.
- e. Goat grazing shall be preferred for removal of nonnatives, or native herbaceous species.
- f. Up to 80% of the native and 100% of the non-native species in this cover type may be removed in such areas. An average minimum of 4 inches height of intact grass shall be retained onsite as an erosion control measure
- g. Goat grazing shall be limited to sites which are of low to moderate habitat value
- h. Goat grazed fuel breaks should generally be limited to 100-foot width. Pinned areas may be extended to a maximum 150 feet when physical obstructions such as rock outcrops, cliffs, water courses etc. prevent reasonable establishment of pens at 100-foot width.
- i. Goats shall be used for brush reduction only and shall be immediately removed when the brush clearance has been accomplished.
- j. A targeted invasive control plan will be implemented in all future goat-grazed areas to prevent invasive species from propagating and impacting adjacent intact habitat.
- k. Where practicable and environmentally appropriate, goat grazing may be used as the maintenance method for areas which required initial clearance by hand crews.



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

Hand Crew Treatment Protocols:

Hand crews will be used to implement fuel modification in areas of High or Very High Habitat Value as defined in the *Laguna Beach Biological Resources Inventory*, (Marsh et. al 1983, see Appendix). To determine habitat value for this purpose, Laguna Beach City GIS maps based on the above-referenced document will be initially referenced and modified as necessary based on site visits by a qualified biologist to reflect current conditions. In general, hand treated sites will be dominated by woody herbaceous or shrub species.

The initial phase of vegetation removal shall include the following steps:

- a. Fuel Modification will be conducted by hand crews with chainsaws, brush-cutters, and other hand tools.
- b. Hand crew fuel modification shall be the preferred method for fuel modification in high or very high value habitat
- c. Fuel Modification shall generally be limited to a width of 100 feet.
- d. Crews will cut down all non-native vegetation (including unmaintained ornamental vegetation) and dead/dying native vegetation and carefully remove dead branches from trees and large shrubs. As noted above, an exception may be made where non-native shrubs are providing shading/nurse plant benefits for Big-Leaved Crownbeard, as determined by the environmental monitor.
- e. Special care will be exercised to distinguish dormant native vegetation from dead/dying native vegetation.
- f. Tree-form shrubs (e.g. Laurel Sumac (*Malosma laurina*), Toyon (*Heteromeles arbutifolia*), Lemonade Berry (*Rhus integrifolia*)) that are over 6 feet tall will be carefully pruned of their lower branches to increase the Crown Base Height to 50% of the plant height. For example, a 10-foot-tall plant would have its lower branches removed to a height of 5 feet. Branches will be pruned to within 1 inch or less of the branch crown. Southern Maritime Chaparral shrub species shall be left fully intact except as noted below, and not pruned unless all other hierarchy opportunities have been exhausted. Pruning methods shall be determined by environmental monitors based upon needs of specific species to maximize probability of survival.
- g. For large tree species within FMZ's, non-native trees (*Pinus*, *Eucalyptus*, *Washingtonia*, et. al.) shall be considered for removal on a case-by-case basis, taking into consideration their potential ignitability, potential to spread fire from or across the FMZ, and property/tree ownership.
- h. Native large trees (*Quercus*, *Platanus*, et. al.) shall be pruned of dead components, and lower small branches removed to a height of 8 feet or one half their height, whichever is less, so as to disrupt "fuel ladder" potential. Dead and down tree components on the



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

ground below large trees shall be removed. No more than three trees may be retained in a single grouping or cluster of trees. A minimum distance of 20 feet shall be maintained between mature tree canopies.

- i. Remaining shrub clusters shall not exceed 400 square feet, except in the presence of sensitive species. Spacing between shrub clusters shall generally be at least 6 feet width.

Other Treatment Methods

Prescribed fire use shall be limited to pile burning only when air quality and fire behavior limitations may be met. Broadcast use of fire will not generally be utilized due to the presence of heavy, old age class fuels with a high dead-to-live ratio, lending to difficulty of control, air quality concerns, and risks to developed properties of escape.

Fuels clearance by mechanical heavy equipment and related methods such as chaining will generally not be used for landscape-scale treatments within the City due to terrain and slope restrictions on heavy equipment, concerns for geologic slope stability, and the broad presence of high value habitat and sensitive species. Where these concerns may be eliminated, heavy equipment use may be considered. Mowing is currently authorized for FMZ's 26 and 26 (Irvine Cove and Emerald Bay) and is performed by the Home Owners Association on those sites

Fuels Removal

Where there is still over 50% vegetative cover after removal of non-natives and invasive plants, removal of healthy live vegetation in accordance with the hierarchical list below may occur, beginning with the first species listed, then in descending order through the list until 50% vegetative cover has been attained. The environmental monitor shall provide guidance as necessary in addition to this hierarchy to ensure plant diversity is maintained onsite.

Plant Hierarchy

1. Coastal Goldenbush (*Isocoma Menziesii*)
2. Coyote Brush (*Baccharis pilularis*)
3. California Buckwheat (*Eriogonum fasciculatum*)
4. Black Sage (*Salvia mellifera*)
5. California Sagebrush (*Artemisia californica*)
6. Monkeyflower (*Mimulus aurantiacus*)
7. Giant Wildrye (*Leymus condensatus*)



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

8. Laurel Sumac (*Malosma laurina*),
9. Toyon (*Heteromeles arbutifolia*),
10. Lemonade Berry (*Rhus integrifolia*)

Stumps will be cut to within 4" or less of the ground. Thinning of healthy, live vegetation will be done in a dispersed manner to avoid creating large new openings. All healthy specimens of Southern Maritime Chaparral species including Bush Rue (*Cneoridium dumosum*), Spiny Redberry (*Rhamnus crocea*) and Bigpod Lilac (*Ceanothus megacarpus*) will be retained.

Treatment of Water Courses

Pampas Grass and other invasive plant removal and herbicide treatment will be the primary vegetation management within a 25-foot buffer on either side of any "blue-line" ephemeral drainages or stream courses (as listed by USGCS map or City Website) that cross the treatment areas. For long drainages which may form a corridor through which fire may be ushered into residences at the head of drainages, additional site-specific steps may be implemented to establish breaks in fuel continuity within these corridors on a site-specific basis consistent with best environmental practice.

Herbicide Use

Herbicides may be used for spot treatment of invasive species when identified as appropriate by the site biologist. Herbicides shall be specific to the intended use and be used in such a manner as to not pose excessive risk to nearby sensitive species or water courses. Herbicides shall not be used on a landscape scale to defoliate large expanses of fuels.

Erosion Control

The preponderance of roots of perennial plants will be left in place to minimize erosion. Mulch and other erosion control measures (such as straw wattles and/or jute netting) will be installed as necessary for additional protection without being obtrusive, as recommended in site geotechnical reports. Haul paths will be minimized and rehabilitated with mulch or other methods as deemed appropriate by the project biologist. Areas of relatively low slope (i.e., below 33% or 1:3 grade) will be mulched to an adequate depth to minimize weed propagation and ongoing maintenance needs.



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

Disposal of Cut Materials

All dead and cut material will be disposed of properly. All non-native material will be removed from the site, placed in a truck or dumpster, and hauled to a green waste recycler. City contractors will generally be conditioned within their contracts to pay all dump fees related to disposal. Native material will be chipped and used as mulch on-site in areas of moderate slope to reduce erosion and weed propagation. Native material unable to be reused on site will be hauled to a green waste recycler, though efforts will be made to reuse as much native material on site as possible.

Native vegetation under 3 inches in diameter, live or dead, may be processed with hand tools on site and spread in place as mulch as an alternative to hauling and chipping, if it is cut into pieces not exceeding 12 inches, lays flat on the ground, does not cover remaining native plant species and total mulch depth does not exceed 12 inches. All coarse non-native material (e.g., woody debris, Pampas Grass leaves), live or dead, must be removed from the site, including any material dumped in the Project Area by residents or others. Fine material treated with herbicide (e.g., non-native grasses and annual weeds) may be left on site.

Periodic Maintenance

Fuel modification zones are subject to multiple treatments each year to maintain prescribed conditions. The number of annual treatments shall be determined by annual growth, seasonal conditions, and related factors and may be conducted as often as necessary to maintain fire prevention benefits.

Compliance with Policy

Fuel Modification Zones as managed by this protocol are compliant with City of Laguna Beach land use policy found within the General Plan Land Use Element and Open Space Conservation Element, Local Coastal Plan, and fire and building code, except where FMZ development is specifically exempted. City Fuel Modification Zones subject to nuisance abatement declaration are exempt from these processes. FMZ's managed by either nuisance abatement or Coastal Act permitting are authorized under the authority of the City's General Plan Safety Element. Development of all new Fuel Modification Zones shall be submitted for review under the California Environmental Quality Act and California Coastal Act, as required. Specifically, this protocol ensures compliance with the following City General Plan requirements:



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

- a. Local Coastal Plan 25.41.007-008
- b. Land Use Element 5.2, 7.3-4, 7.6, 9.8, 10.6
- c. Open Space Conservation Element 4I, 7A, 7G, 7K, 8A, 8C 8N, 8G, 8H, 10C, 10E, 8E

Additional Mitigations

Additional site mitigations may be applied when recommended or required by environmental permitting agencies for application to a specific FMZ.

Trash and Litter Found On-site

Litter or rubbish found within Project Areas will be removed and hauled to a landfill.

Site Monitoring and Documentation

An annual monitoring report shall be prepared by the City detailing the following:

1. Dates and locations of vegetation treatment or modification
2. Treatment methods utilized by site
3. Number of acres managed
4. Photos of treatment sites, pre- and post-treatment
5. Description of any violations or failure to meet conditions of the Coastal Development Permit

HABITAT CLASSIFICATION

The following definitions are utilized in the classification of habitat types within the City of Laguna Beach: (Excerpt from: *Laguna Beach Biological Resources Inventory, Marsh et. al 1983 pp. 35-36*)

Biological Value Mapping is based on the parameters of habitat integrity and extent, faunal use, and presence of endangered, rare, or locally unique biota. From these, a ranking system was developed of low, medium, high, and very high value habitat. These habitats are classified as follows:

LOW VALUE HABITAT:

Disturbed, impacted sites, often dominated by ruderals, annual plants, and escaped horticulturals. Such areas are usually highly fragmented by, or are contiguous to urban



Treatment Protocols for Fuel Modification Zones Subject to Coastal Development Permitting

development. These sites are biologically simplified and are of low faunal carrying capacity. Low value habitats do not possess biological constraints to urban development, but may, if developed, be areas where spillover impact adversely affects contiguous higher value settings

MODERATE VALUE HABITAT:

These sites may contain either native vegetation of a specific community type, or ornamental species in a setting providing horizontal and vertical structural diversity. The sites are usually, however, limited in area extent, being contiguous to urban development. Thus, their faunal carrying capacity, and often, the native floral species diversity, is lower than “high value” habitats described below.

HIGH VALUE HABITAT:

These are extensive areas dominated by indigenous plant communities which possess good species diversity. They are often, but not always, linked to extensive open space areas, within or outside of the city, by wild fauna transversable open space corridors. Their faunal carrying capacity is good to excellent, many areas are utilized as bedding and foraging sites by mule deer or possess large resident populations of avifauna or native small animals.

VERY-HIGH VALUE HABITAT:

These include the habitats of endangered, rare, or locally unique native plant species (including disjunct and outpost populations). Also included are areas of southern oak Woodland and natural (not irrigation augmented) springs and seeps. Among the very-high value habitats inventoried are areas of significant rock outcrop exposures, because of the assemblages of sensitive plant species which often occupy such setting

6/3/20

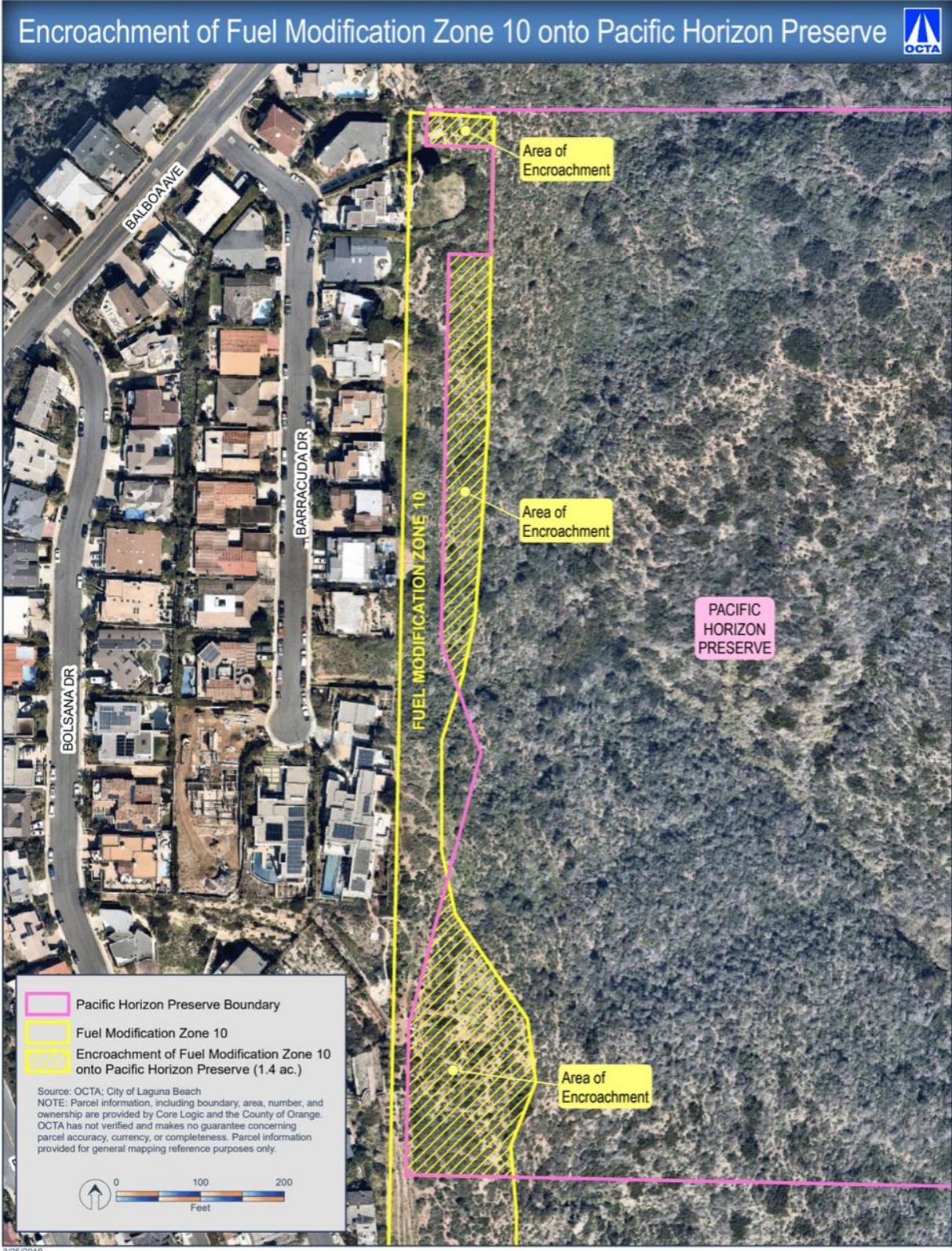


Figure 1. Location of Fuel Modification Zone 10

APPENDIX B: 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.

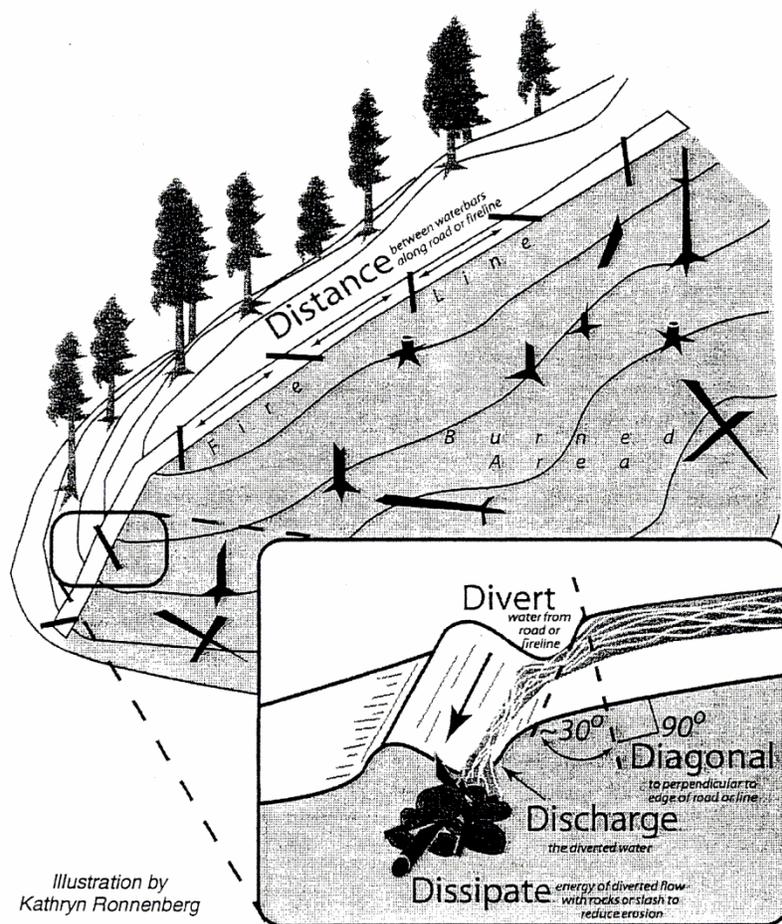
Spacing will be modified to take advantage of natural features that will reduce the water's erosive energy.

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
- 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):

Slope%	0-10	11-25	26-50	>50
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 C: 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 – 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 $\frac{1}{4}$ 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.

Red Flag Warning - A Red Flag Warning means warm temperatures, very low humidities, and stronger winds are expected to combine to produce an increased risk of fire danger.

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.

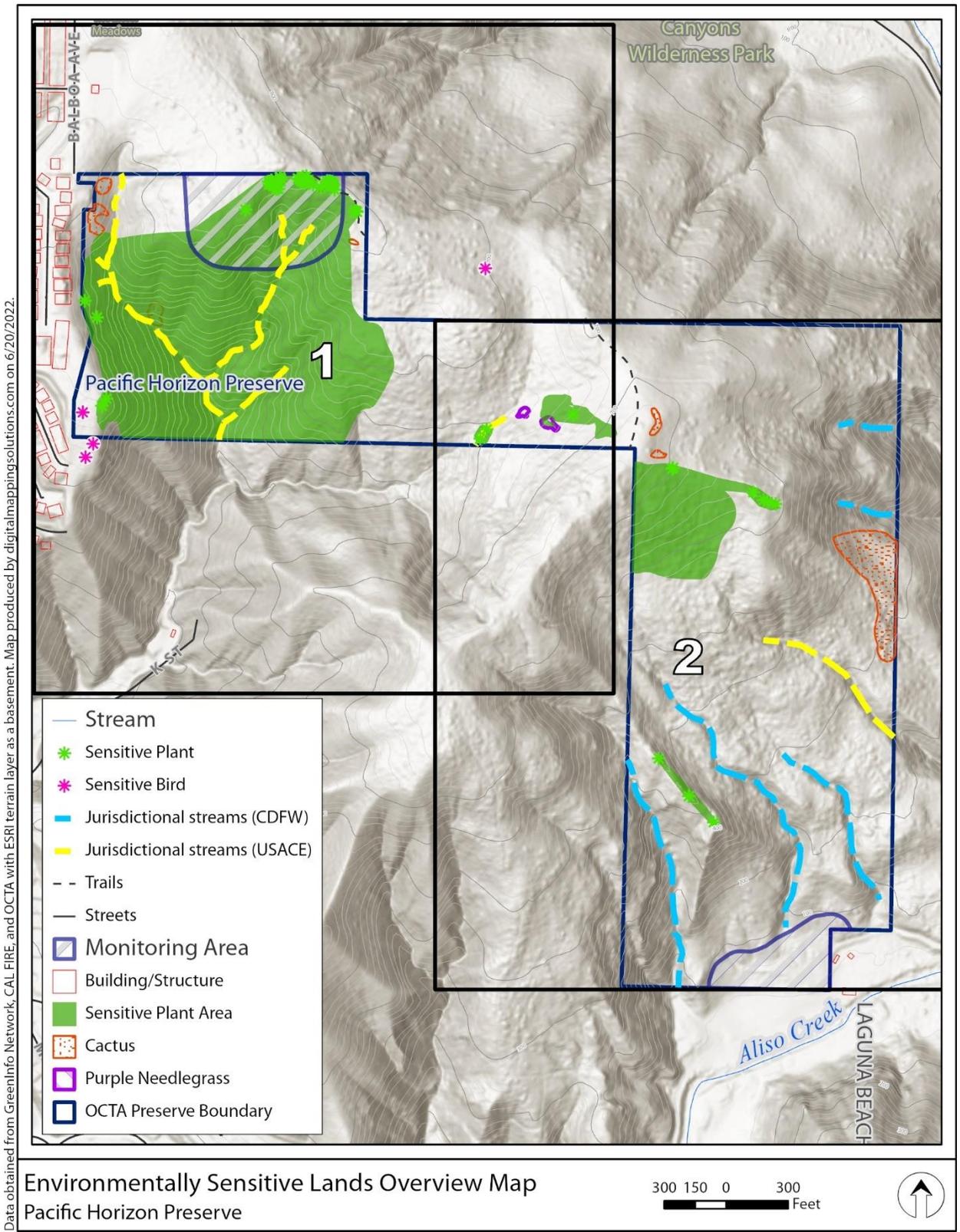
Torching – The burning of the foliage of a single tree or a small group of trees, from the bottom up.

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.

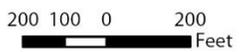
Vegetation Treatment – Activities that modify the vegetation, often to reduce the fire hazard. Manual labor, machinery, prescribed fire, and herbicide use are all used as vegetation treatments. Vegetation treatment may achieve several types of goals, such as the installation of defensible space, shade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

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 firelines on steep slopes to prevent erosion.)

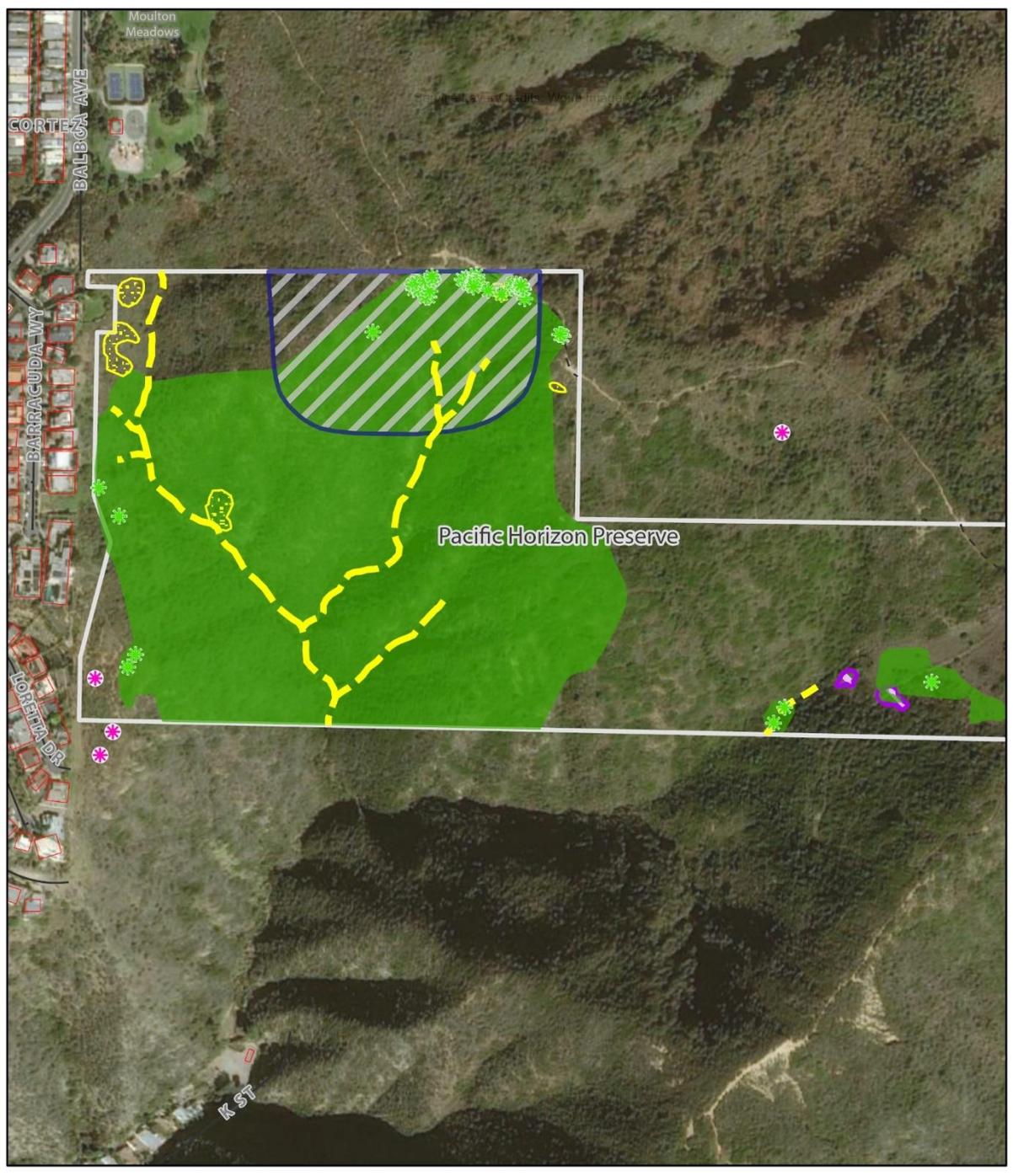
APPENDIX D: ENVIRONMENTALLY SENSITIVE LANDS MAPS PACIFIC HORIZON PRESERVE



Environmentally Sensitive Lands Detailed Map Page 1 of 2
 Pacific Horizon Preserve

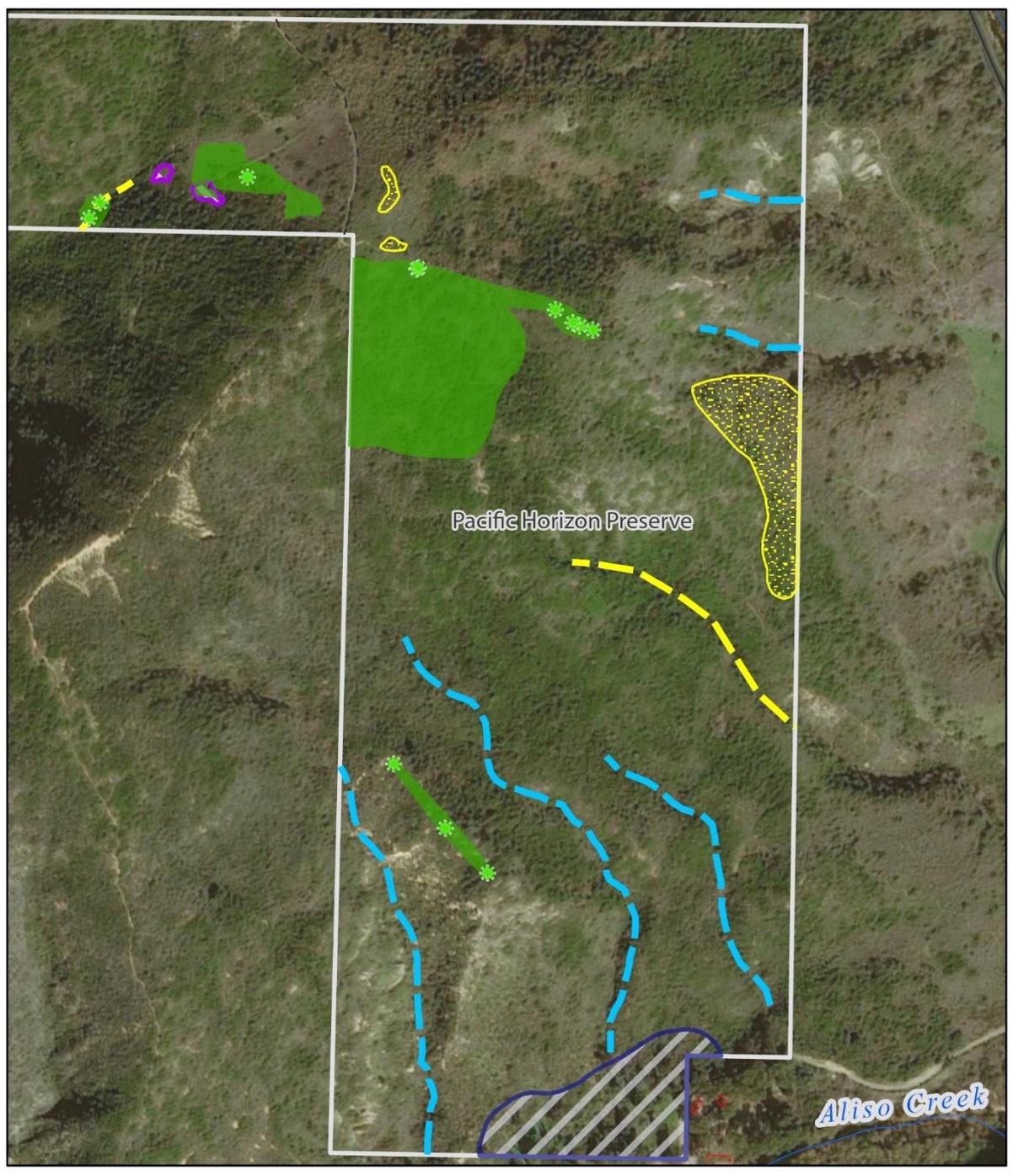


Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 6/20/2022.



- | | | | | |
|-----------------|--------------------------------|----------------------|--------------------|--------------------|
| Sensitive Bird | Jurisdictional streams (USACE) | Cactus | Purple Needlegrass | Streets |
| Sensitive Plant | Monitoring Area | Sensitive Plant Area | Trails | Building/Structure |

Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 6/20/2022.



- Stream
- Sensitive Plant
- Jurisdictional streams (CDFW)
- Jurisdictional streams (USACE)
- Monitoring Area
- Cactus
- Sensitive Plant Area
- Purple Needlegrass
- - Trails
- Streets

APPENDIX E: WILDLAND URBAN INTERFACE PRE-ATTACK PLAN¹⁹

¹⁹ *Rohde and Associates, 2015. Wildland Urban Interface Pre-attack Plan. Prepared for the Orange County Fire Authority*

	WUI Name: PACIFIC ISLAND			6547D																																																																																																				
	Location: Laguna Niguel W/O Crown Valley Pkwy.			Insp'd Date: 6/6/16																																																																																																				
	Topo: San Juan Capistrano, CA and Dana Point, CA			By: Rohde & Assoc.																																																																																																				
Risk Assessment	Tactical Plan	Tactical Map	Area Map	Aerial Map	Additional Info																																																																																																			
RISK ASSESSMENT MATRIX																																																																																																								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3" style="background-color: #FFD700;">PACIFIC ISLAND</th> </tr> <tr> <th colspan="3" style="background-color: #FFD700;">RISK ASSESSMENT MATRIX</th> </tr> <tr> <th style="background-color: #FFD700;">SAFETY</th> <th style="background-color: #FFD700;">STATIC</th> <th style="background-color: #FFD700;">ATTACK</th> </tr> <tr> <td style="background-color: #FFD700;">FF Safety 2</td> <td style="background-color: #FFD700;">Fuels 1</td> <td style="background-color: #FFD700;">Access 2</td> </tr> <tr> <td style="background-color: #FFD700;">Civ. Safety 2</td> <td style="background-color: #FFD700;">Topography 1</td> <td style="background-color: #FFD700;">Water 2</td> </tr> <tr> <td style="background-color: #FFD700;">Air Safety 2</td> <td style="background-color: #FFD700;">Clearance 1</td> <td style="background-color: #FFD700;">Comms 2</td> </tr> <tr> <td style="background-color: #FFD700;">Hazmat 2</td> <td style="background-color: #FFD700;">Construct 2</td> <td style="background-color: #FFD700;">Tac Air 1</td> </tr> <tr> <td style="background-color: #FFD700;">Entrapment Risks- 1</td> <td style="background-color: #FFD700;">Density 1</td> <td></td> </tr> </table>			PACIFIC ISLAND			RISK ASSESSMENT MATRIX			SAFETY	STATIC	ATTACK	FF Safety 2	Fuels 1	Access 2	Civ. Safety 2	Topography 1	Water 2	Air Safety 2	Clearance 1	Comms 2	Hazmat 2	Construct 2	Tac Air 1	Entrapment Risks- 1	Density 1		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">SAFETY</th> <td>FF Safety</td> <td>FF Safe</td> <td>No Safety Zones</td> <td>Marginal Safety Zones</td> <td>Adequate Safety Zones</td> </tr> <tr> <td>Civilian Safety</td> <td>Civ Safe</td> <td>Mandatory Evacuation</td> <td>Evacuate if Time Permits</td> <td>Shelter in Place</td> </tr> <tr> <th rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">STATIC</th> <td>Air Safety</td> <td>Clear</td> <td>Restrictions, Sleep Cyna</td> <td>30' to 70'</td> <td>More than 70'</td> </tr> <tr> <td>HazMat</td> <td>HazMat</td> <td>Bulk LPG, Chemicals</td> <td>Hazards in Barn</td> <td>None</td> </tr> <tr> <th rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">ATTACK</th> <td>Fuels</td> <td>Fuels</td> <td>Heavy or Dead Trees, Brush</td> <td>Moderate</td> <td>Light</td> </tr> <tr> <td>Topography</td> <td>Topog</td> <td>Steep</td> <td>Medium Slope</td> <td>Flat</td> </tr> <tr> <td>Clearance</td> <td>Clear</td> <td>30' or Less</td> <td>30' to 70'</td> <td>More than 70'</td> <td></td> </tr> <tr> <td>Construction</td> <td>Const</td> <td>Abundant Combustible</td> <td>Some Combustible</td> <td>Non-Combustible</td> <td></td> </tr> <tr> <td>Structural Spacing</td> <td>Density</td> <td>Dense Spacing</td> <td>Subdivision Tracts</td> <td>Rural, dispersed</td> <td></td> </tr> <tr> <td>Access</td> <td>Access</td> <td>Narrow, Dirt Rds No turnarounds</td> <td>1 Ln, paved, 1-way in/out</td> <td>3-Lane Ribs Good Ingress/Egress</td> <td></td> </tr> <tr> <td>Water</td> <td>Water</td> <td>No Water Source</td> <td>Ponds, pools, low flow hydts</td> <td>Good Hydrants</td> <td></td> </tr> <tr> <td>Communications</td> <td>Comm</td> <td>Poor Radio, Call Coverage</td> <td>Some Weak Spots</td> <td>Good Coverage</td> <td></td> </tr> <tr> <td>Tac Air Support</td> <td>Tac Air</td> <td>20+ Min Re-load, No LZs</td> <td>10-15 Min Re-load, No LZs</td> <td>5 Min re-load, LZs</td> <td></td> </tr> </table>			SAFETY	FF Safety	FF Safe	No Safety Zones	Marginal Safety Zones	Adequate Safety Zones	Civilian Safety	Civ Safe	Mandatory Evacuation	Evacuate if Time Permits	Shelter in Place	STATIC	Air Safety	Clear	Restrictions, Sleep Cyna	30' to 70'	More than 70'	HazMat	HazMat	Bulk LPG, Chemicals	Hazards in Barn	None	ATTACK	Fuels	Fuels	Heavy or Dead Trees, Brush	Moderate	Light	Topography	Topog	Steep	Medium Slope	Flat	Clearance	Clear	30' or Less	30' to 70'	More than 70'		Construction	Const	Abundant Combustible	Some Combustible	Non-Combustible		Structural Spacing	Density	Dense Spacing	Subdivision Tracts	Rural, dispersed		Access	Access	Narrow, Dirt Rds No turnarounds	1 Ln, paved, 1-way in/out	3-Lane Ribs Good Ingress/Egress		Water	Water	No Water Source	Ponds, pools, low flow hydts	Good Hydrants		Communications	Comm	Poor Radio, Call Coverage	Some Weak Spots	Good Coverage		Tac Air Support	Tac Air	20+ Min Re-load, No LZs	10-15 Min Re-load, No LZs	5 Min re-load, LZs	
PACIFIC ISLAND																																																																																																								
RISK ASSESSMENT MATRIX																																																																																																								
SAFETY	STATIC	ATTACK																																																																																																						
FF Safety 2	Fuels 1	Access 2																																																																																																						
Civ. Safety 2	Topography 1	Water 2																																																																																																						
Air Safety 2	Clearance 1	Comms 2																																																																																																						
Hazmat 2	Construct 2	Tac Air 1																																																																																																						
Entrapment Risks- 1	Density 1																																																																																																							
SAFETY	FF Safety	FF Safe	No Safety Zones	Marginal Safety Zones	Adequate Safety Zones																																																																																																			
	Civilian Safety	Civ Safe	Mandatory Evacuation	Evacuate if Time Permits	Shelter in Place																																																																																																			
STATIC	Air Safety	Clear	Restrictions, Sleep Cyna	30' to 70'	More than 70'																																																																																																			
	HazMat	HazMat	Bulk LPG, Chemicals	Hazards in Barn	None																																																																																																			
ATTACK	Fuels	Fuels	Heavy or Dead Trees, Brush	Moderate	Light																																																																																																			
	Topography	Topog	Steep	Medium Slope	Flat																																																																																																			
Clearance	Clear	30' or Less	30' to 70'	More than 70'																																																																																																				
Construction	Const	Abundant Combustible	Some Combustible	Non-Combustible																																																																																																				
Structural Spacing	Density	Dense Spacing	Subdivision Tracts	Rural, dispersed																																																																																																				
Access	Access	Narrow, Dirt Rds No turnarounds	1 Ln, paved, 1-way in/out	3-Lane Ribs Good Ingress/Egress																																																																																																				
Water	Water	No Water Source	Ponds, pools, low flow hydts	Good Hydrants																																																																																																				
Communications	Comm	Poor Radio, Call Coverage	Some Weak Spots	Good Coverage																																																																																																				
Tac Air Support	Tac Air	20+ Min Re-load, No LZs	10-15 Min Re-load, No LZs	5 Min re-load, LZs																																																																																																				
CRITICAL INFORMATION																																																																																																								
<p>Response Safety Dense interface community on edge of large regional park. Heavy chaparral fuels with little large fire history, with 100+ defensible space around most structures although some areas have limited-no clearance (Ridgeview Dr.). Many homes are situated along ridgelines above heavy fuels & steep slopes. Many recreational users on trails. Good radio & cell communications except deep in canyons.</p>																																																																																																								
<p>Aviation Hazards Small to mid-sized powerlines along some ridgelines above Laguna Beach. Dip sites at Sulphur Creek Reservoir-Laguna Niguel Regional Park or golf course ponds E/O Crown Valley.</p>			<p>Potential Choke Points/Entrapments Ridgeview Dr., San Simeon/Vista Montemar/upper Clubhouse Dr., Sierra Vista, Coronado Pointe, W. Port Royal, W. Christians, Vista Napol, Anamonte/Sonrisa, St. Tropez/Marseille & all streets SW, Sea Shadows Wy., Isla Vista & all streets west, Sea Island Dr., Azores/Crete Rd., Highlands Rd., All streets E/O Flying Cloud Dr., Crystal Sands Dr., Palencia Ln., Cavalier, & lower Pacific Island Dr.</p>																																																																																																					
BRIEFING INFORMATION			UNIFIED COMMAND																																																																																																					
Fuels	Heavy chaparral & sage, grass-oak woodlands in canyon bottoms. Combustible ornamental veg. around homes on canyon rims in most of plan area. Large structure loss in 1993 Laguna Fire to north- similar conditions exist along Pacific Isl. Dr.		<p>Potential Incident Command Post Location</p> <p>Initial: 1. Crown Valley Park, 29751 Crown Valley Pkwy. 2. Salt Creek Beach, 33333 PCH</p> <p>Major Fire: 1. Laguna Niguel Regional Park, 28241 La Paz Rd., 2. Doheny State Beach, 25300 Dana Pt. Harbor Dr.,</p>	<p>Unified Command Participants</p> <p>OCFA, OCSD, Cal-Fire, LAB FD/PD</p>																																																																																																				
Last Year(s) Burned	1968:110 ac.-S. Aliso Cyn., 75 ac. fire with ignition of wood roofs above Crown Valley Pkwy-1980, 5 acres off Highland Dr-1990's- no other large fire hx.																																																																																																							
Expected Fire Behavior	During rare critical fire weather, fires burn with extreme behavior, high rates of spread, long range spotting, & may approach area from east/west sides. The Laguna Fire (north of area) ran in similar fuels 12 MPH under strong Santa Ana, immediately turning trajectory 180 degrees with the return of onshore winds. The area sees critical fire behavior less than 2 weeks/year due to coastal influence. Santa Ana's influence the north portion but are infrequent nearer the coast. Fuel loads may promote plume-dominated behavior during active fires. Onshore wind driven fires are typically slope/fuel driven, reaching ridges but laying down overnight with good RH recovery.																																																																																																							
Topography	Aliso & Wood Canyons Regional Park borders the west side of the plan area and is a part of the San Joaquin Hills. Elevations range from sea level in South Laguna to 936 ft. at the summit of Niguel Hill (at the top of Pacific Island Dr.). The ridge line on the east side of Aliso Canyon north of Niguel Hill sits between 7-800 ft. elev. The wastewater facility in Aliso Cyn. sits at 100 ft.		<p>Staging Areas</p> <p>1. Crown Valley Park, 29751 Crown Valley Pkwy. 2. Salt Creek Beach, 33333 PCH 3. Laguna Niguel Regional Park, 28241 La Paz Rd., 4. Soka University, 1 University Cr., Aliso Viejo 5. Doheny State Beach, 25300 Dana Pt. Harbor Dr., 6. La Paz Sports Park, 28051 La Paz Rd., Laguna Niguel</p>																																																																																																					
Access	All areas are T1 engine accessible via Pacific Island Dr., Highlands Ave. or Niguel Rd. (enter off Crown Valley or Alicia Pkwy.) Many streets have community gates requiring Knox keys. Use T3 engines off-pavement in Aliso-Wood Canyons Reg. Park. (A paved road serves the water treatment facility in Aliso Cyn.)																																																																																																							
Special Hazards	<p>* South OC Wastewater Authority treatment plant- S. Aliso Cyn. 7-4 weekday staffing only, (949)234-5415/5499</p> <p>* Many recreational trail users within canyons.</p> <p>* Exposed water pump stations require structural defense- see tactical map.</p>																																																																																																							
Safety Zones/Temporary Safe Refuge Areas	Type	Location	Limits of Use																																																																																																					
	SZ	Retreat east into urban areas or stay around homes with good defensible space.	Entire plan area																																																																																																					
	TRA	Laguna Sur Community Club, 6 Antibes	Talavera Dr. area																																																																																																					
	TRA	Community Pools, 22900 Via Miramar & 31346 Flying Cloud	Pacific Island Dr. area																																																																																																					
	SZ	Moulton Elementary, 29851 Highlands Ave.	Highlands Av. area																																																																																																					
	SZ	Niguel Woods Park, 29883 White Otter Ln.	Niguel Rd. area																																																																																																					
Water Supply	Good fire flow & water supply from tract hydrants. No water in canyons. Defend key pump stations or potentially loose uphill hydrants (see map)- Starview Ln x- PID- near water tank, & 2 stations- PID 1/2 mi. & 3/4 mi. W/O Crown Valley Pkwy. Pump stations have backup generators. Inter-tie between water districts at MNWD Isla Vista facility manually opened but can share supply between districts.																																																																																																							
LARGE FIRE DEVELOPMENT FACTORS																																																																																																								
Weather																																																																																																								
Temperature		>85 degrees F.																																																																																																						
Relative Humidity		<10%																																																																																																						
Wind Speed		Avg: 15-25 MPH Gusts: 20-35 MPH																																																																																																						
Fuel Moisture		Seasonally dry or long term drought																																																																																																						
Fire Behavior																																																																																																								
Rate of Spread		3,300- 10,230 ft./hr.																																																																																																						
Spotting		> 3/4 mile																																																																																																						
Flame Length		Avg: 8-11 ft. Peak: 20-40 ft.																																																																																																						
* Peak flame lengths occur when fire growth is in alignment with heavy fuel, slope and wind.																																																																																																								
WUI ARRANGEMENT																																																																																																								
Interface: x		Intermix: x		Urban: x																																																																																																				
Suburban: x		Rural: x		Other: x																																																																																																				

	WUI Name: PACIFIC ISLAND			6547D	
	Location: Laguna Niguel W/O Crown Valley Pkwy.			Insp'd Date: 6/6/16	
	Topo: San Juan Capistrano, CA and Dana Point, CA			By: Rohde & Assoc.	
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 into ornamental vegetation around homes.			Alternate Plan (Offensive) Deploy to prep-and-defend homes along perimeter streets and evacuate homes at the head of the fire and along active flanks only. Watch for spotting ahead and into ornamental vegetation around homes. Conduct simultaneous perimeter control and structure defense to prevent fire from extending into multiple neighborhoods. Deploy 2-3 type 1 engines plus 2 handcrews to SOCWA treatment plant to prep-and-defend. Reinforce this operation with aircraft. Use caution if fire extends south into area of San Simeon/Vista Montemar/Ridgeview Dr. (W/O Highlands Ave.), some tracts here have little-no defensible space. Heavy fuels will produce heavy spotting ahead.		
Contingency Plan (Defensive - Responder Safety) Firefighters and law enforcement seek temporary refuge around homes with good defensible space or in safety zones. Gather civilians trapped in plan area with you. Select potential safe refuge sites in advance of movement. Escort civilians from area only when safe to maneuver. Select "prep. and defend homes in for stands against fire. Use anchor-and-hold tactics along urban fringe if multiple structures become involved to hold fire to perimeter/canyon facing streets. Use fire-front following on spur ridge streets with heavy fire exposure and/or no defensible space. Expect new spot fires occurring at long range. Consider if safe to deploy to SOCWA plant.			Emergency Plan (Defensive) Prioritize evac. over fire control. Evacuate populations to surrounding urban areas or protect in SZ's/TRA's if unable to move. 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 & firefighter safety only when roads are assured safe for maneuver. Fire-front-follow in highly exposed or entrapment risk areas. Be vigilant for long-range spotting. Be vigilant for development of fire whirls or other extreme fire behavior that may compromise safety. Do not attempt access to SOCWA water plan. Anchor-and-hold for large blocks on fire.		
Perimeter Control Plan: Hold fire to Aliso Canyon, or to slopes away from homes. Construct proposed dozer line near the Aliso Creek water plant access road & (see map-3.8 miles, 2 dozers, 4-6 crews, 6 hours needed) to keep fire north of plan area. Seek OC Parks resource protection guidance. Cut of fire flanking ridges to protect structures. Construction of headline in heavy fuels will be slow & require extra saw work (100 ft/hr. construction rates). During extreme fire- may suffer structure loss along Pacific Island Dr. similar to Laguna Fire "Skyline" area in 1993- in such conditions protect evacuees in safety zones & hold escape routes open as long as possible.					
EVACUATION PLAN					
Primary Evacuation Plan Activate Alert OC. Consider fire trajectory (from east or west) & evac. streets facing fire first. Evacuate into urban areas & concentrate on entrapment areas first (see potential entrapment areas on page 1). Evac. in large tract groups prioritized by fire threat: a.) Hillside streets N/O Highlands Ave., b.) Streets between Highland Ave. & Flying Cloud, c.) Streets S/O Flying Cloud & W/O Crown Valley Pkwy. Be prepared to close Pacific Island Dr. (south end) when compromised by fire movement.					
Evacuation Trigger Point Consider evac. of entire hilltop area of Pacific Island Dr. for a major Santa Ana wind driven fire in Aliso Canyon (S/O Woods Canyon). For significant onshore wind driven fires, evacuate canyon perimeter areas up to 1/2 mile ahead of fire. For lesser fires, conduct evacuation at the head of the fire or along active flanks only.					
Temp. Evacuation Assembly Points (Human & Animal) 1. Dana Hills High School, 33333 Golden Lantern, Dana Point 2. Aliso Niguel High School, 28000 Wolverine Way, Aliso Viejo 3. Mission Viejo High School, 25025 Chrisanta, Mission Viejo Large Animals: County Fair Grounds: 88 Fair Dr., Costa Mesa					
POPULATION & STRUCTURES AT-RISK			STRUCTURAL TRIAGE		
Population	11,737		Threatened/Non-Defensible	10%	
Planning Unit Acreage	2,227 ac.			Structures without defensible space.	
Structures	5,365 homes		Threatened/Defensible	80%	
			Non-Threatened W/ Defensible Space	70%	
EMERGENCY RESOURCE NEEDS - FIRST SIX HOURS (In addition to Initial Attack Resource)					
Fire ORC Dispatch: (714)573-6522			Law Enforcement OCSD (714)288-6963		
Ordering Point:			Ordering Point:		
Engines: The number range reflects the number of "minimum" to "preferred" resources.			Law Enforcement:		
Type 1	Type 3	Water	100 officers, OCSD to evacuation, traffic control, and security. CHP to assist with traffic. OC Parks & OCSD to evacuate Aliso-Wood Canyons Regional Park. IC-Lt., Capt. Traffic Control on: Crown Valley Pkwy., Pacific Island Dr., Sea Island Dr., Highland Dr., Clubhouse Dr., Highlands Ave., Alicia Pkwy.		
Strike Teams: 6-10	Strike Teams: 4-5	Tenders: 4-5			
Crews	Dozers	Overhead: 4-5			
Single: 8-12 STs:	Single: 2-4 STs:	Div. Sup.: 5-6			
Aircraft:			Logistics		
Type 1 Helicopter (Large): 1 Type 3 Helicopter (Light): 1 Type 2 Helicopter (Med.): 3 Air Tankers: 4			Open City & Co. EOC to support aggressive fire or significant evacuation need. Consider responder fuel, water, & food needs. File F-MAG application with CAL-OES. Notify public works to assist in traffic, Red Cross & Animal Services to assist in evacuation. Consult with SCE & SDG&E regarding electrical issues. Water Districts: Molton Niguel: (949)631-2500, South Coast: (949)274-2975.		
WUI Engine Deployment - High Risk			Other		
1 engine/2-4 perimeter structures, 1 engine/isolated structures 2 engines/ multi-family structures			Liaison with OC Parks for Aliso-Wood Canyons Park lands- OC Parks Dispatch: (562)795-5410. Dozer restrictions: use on ridge lines or to expand existing or legacy TT's, restrict use in canyon bottoms & near rock outcroppings/shelves. Retardant avoidance area in Aliso Creek.		
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 homes					