SILVERADO CHAPARRAL PRESERVE
DRAFT FIRE MANAGEMENT PLAN

Prepared for

The Orange County Transportation Authority

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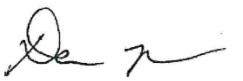

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- Table of Contents -

Acronym List

ASA - Archaeological Sensitivity Assessment
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
GPS - Global Positioning System
IAP - Incident Action Plans
ICP - Incident Command Post
ICS - Incident Command System
IRC - Irvine Ranch Conservancy
M2 – Renewed Measure M
NCCP/HCP - Natural Community Conservation Plan/Habitat Conservation Plan
OC Go – Rebranded Measure M2
OC Parks – Orange County Parks
OCFA - Orange County Fire Authority
OCTA - Orange County Transportation Authority
PCA - Priority Conservation Areas
PRC - Public Resources Code
RA - Resource Advisor
SCE - Southern California Edison
SEMS - State Emergency Management System
SMSP - Silverado-Modjeska Specific Plan
USACE - U.S. Army Corps of Engineers
USFS - U.S. Forest Service
USFWS - United States Fish and Wildlife Service

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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 204-acre OCTA Silverado Chaparral Preserve (formerly known as MacPherson 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 Orange County Fire Authority (OCFA).

Silverado Chaparral 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 coastal sage scrub, chaparral, coast live oak woodland, riparian forest, and grassland. Its location supports local and regional biological connectivity between lands owned by Orange County Parks, Cleveland National Forest, and other conserved open space. No structures are close enough to the boundary of the Preserve to warrant any modifications to the vegetation for structure protection.

The terrain of the Silverado Chaparral Preserve is hilly. A fire road, Black Star Helo Pad Road, runs along the main ridgeline from northeast to southwest. Temperatures in interior valleys

of Southern California, such as in the Preserve, often exceed 40 degrees Celsius[1] (104 degrees Fahrenheit). Santa Ana winds are common in the fall. The Preserve has not burned in several decades, although several large fires have spread nearby. Fuel types known as mature shrub and grass-shrub fuel types dominate the Preserve and surrounding wildlands.

Fire behavior modeling predicts that once a fire is ignited, fire will generally spread quite fast throughout the Preserve. A 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. Similarly, most of the vegetation on the Preserve is expected to torch during a wildfire, which would produce and distribute embers ahead of the wildfire. There is no significant difference in burning characteristics between a fire of the same windspeed that burns with northeast wind or an uphill wind. However, these strong northeasterly winds, commonly called 'Santa Ana winds,' often blow faster than winds from the west.

Pre-fire vegetation treatments proposed to be implemented as part of this FMP are limited to conducting "regular maintenance of weeds along existing fire roads and maintain[ing] existing roads in a condition that will provide safe access for firefighters." Because no structures are within a distance that would require fuel modification or creation and maintenance of defensible space, no other vegetation treatment is recommended.

Responsibilities of both OCTA and OCFA during a wildfire are detailed in this plan. The draft FMP recommended that a Resource Advisor (RA) position be established to communicate the location of sensitive resources that, if possible, should be avoided to the Wildland Resource Planner (WRP) during and following fire agency response to an active fire incident. The OCTA staff has already completed the required training (National Park Service Wildland Fire Resource Advisor training) to be certified as a Resource Advisor and is ready to provide this service during an incident. Post-fire actions are guided by a CAL FIRE Fire Suppression Repair Plan (see Section V-C and Appendix A) to ensure suppression repair actions are effective. Fire prevention is supported by OCFA patrols, camera placement as part of the ALERTCalifornia Consortium, and monitoring by 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 and/or the OCFA. In addition, the development of a fire management plan is specified as an Adaptive Management Objective with a Strategy/Management Action in the Conservation Plan and must also be approved by the Wildlife Agencies.

The purpose and scope of this fire management plan for Silverado Chaparral 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, 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 Silverado Chaparral Preserve in 2013, subsequent to the 2006 passage of Measure M2, which provided revenue for the Environmental Mitigation Program (EMP) intended in part to offset the impacts from the freeway projects that were also funded by the measure. This Preserve is one of seven Preserves that were identified as Priority Conservation Areas and selected for purchase because of their high environmental value.

This Preserve contains a diversity of high-quality habitat types, including coastal sage scrub, chaparral, coast live oak woodland, riparian forest, and grassland and the species within them. It is bounded on the west by lands owned by OC Parks and is near the Cleveland National Forest[2] and other conserved open space lands placed under conservation easements or protected as part of the Orange County Central and Coastal Subregions Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) Reserve to the south, east, and north.

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 its 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 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 OCFA. 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. Additionally, Southern California Edison (SCE) has an access easement for the utility lines that run just outside the western property boundary of the Silverado Chaparral Preserve.

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

The easement allows for vehicular travel and for fire hazard reduction activities such as vegetation removal, within the easement only. This property is located within the Cleveland National Forest administrative boundary and is additionally within a State Responsibility Area.[3] The Silverado Chaparral Preserve also falls within the jurisdictional boundaries of the Silverado-Modjeska Specific Plan (SMSP) (County of Orange 1977), and the Silverado-Modjeska Recreation and Park District.

Documents considered as complementing the fire management plan for Silverado Chaparral Preserve include: the fire management plan for the Nature Reserve of Orange County and its Strategic Implementation Guide, OCFA Strategic Unit Fire Plan, Orange County Ignition Reduction Strategy, the Community Wildfire Protection Plan for Orange County, and the OCTA Silverado Chaparral RMP (titled MacPherson 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; 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.

[3] State Responsibility Areas (SRA) are areas of the state where the State of California is financially responsible for the prevention and suppression of wildfires. The Orange County Fire Authority provides these services under contract by CAL FIRE. https://bof.fire.ca.gov/projects-and-programs/state-responsibility-area-viewer/

III. EXISTING CONDITIONS

A. Land Ownership

The 204-acre[4] Silverado Chaparral Preserve is located in a patchwork of largely publicly owned lands in eastern Orange County, in the cismontane foothills of the Santa Ana mountains, southeast of Irvine Lake. Specifically, the property occurs between Baker and Hall Canyons to the north, Ladd Canyon to the east, Silverado Canyon to the south, and Santiago Canyon to the west. It is accessed by Black Star Helo Pad Road, which runs along the ridgeline, and by Hall Canyon Road. Both are dirt roads located in the northwestern portion of the site.

The western edge of the Preserve is immediately adjacent to OC Parks open space managed by the Irvine Ranch Conservancy; Cleveland National Forest land holdings are generally to the north and east. Surrounding land uses include low density rural residential development along Silverado Canyon Road south of the property, and the Black Star RV Park located within 1000 feet of the Preserve's northern border at the end of Baker Canyon Road.

[4] While the MacPherson RMP consistently notes the acreage as 204, the size of the Preserve reflected in GIS mapping is 207. See 2017 MacPherson RMP, Chapters 1 and 2.

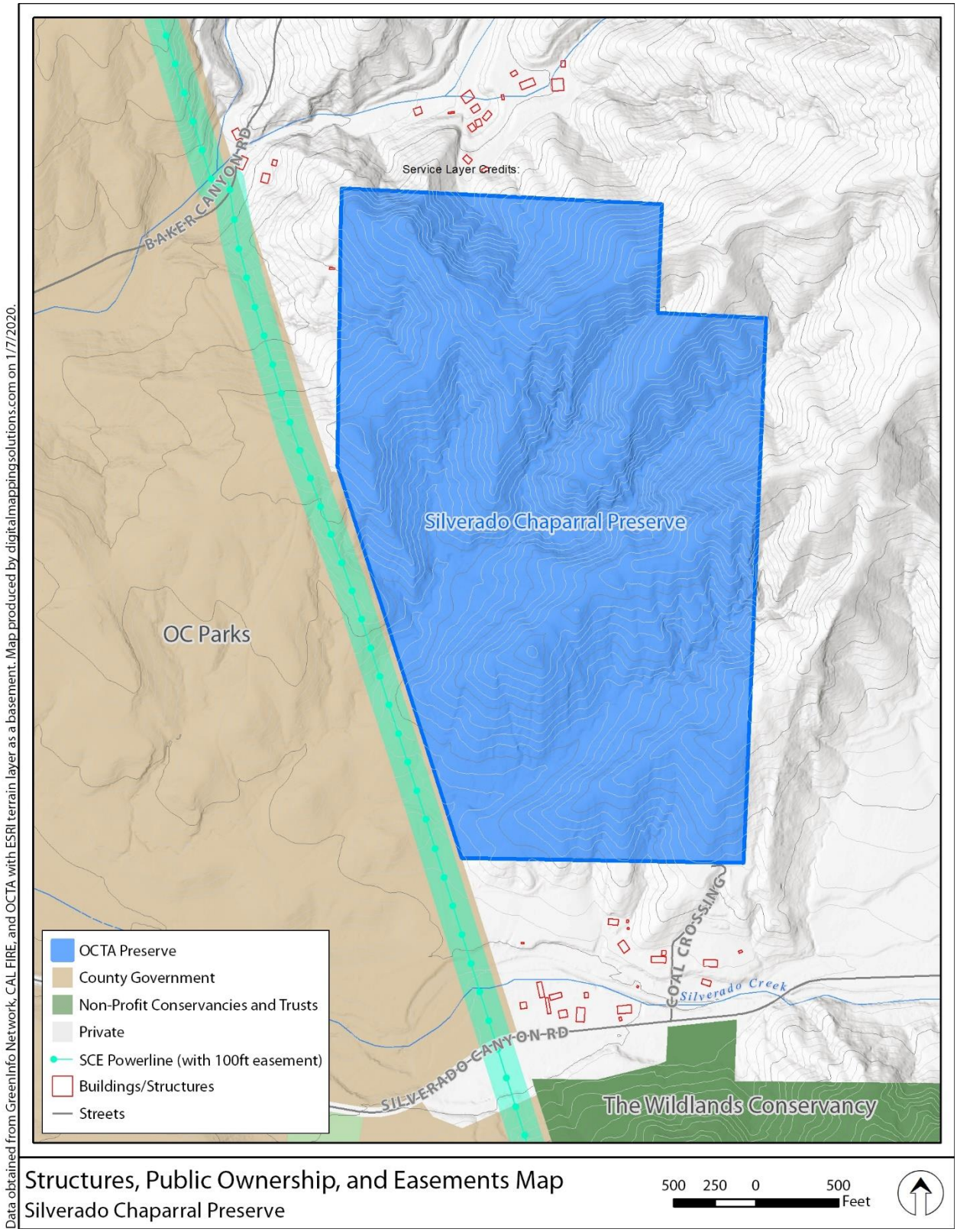


Figure 1. Land ownership, structures, and easements adjacent to Silverado Chaparral

B. Natural Resources/Physical Environment

i. Topography and Elevation: The Preserve is located on the southwestern flank of the Santa Ana Mountains and spans a series of ridges and ravines that run roughly east-west. Biological surveys were conducted on the Preserve in the spring/summer of 2014 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 arid and sloping, vegetated with a mosaic of shrubland and grassland. Riparian and oak woodlands also occur on the Preserve (see Figure 3). As described in the RMP, mixed chaparral represents the main habitat type (~124 acres). Open southern mixed chaparral occurs in steep, eroding slopes and has lower shrub cover. Mixed sage scrub (~32 acres) is the next most dominant type; grassland, California sagebrush scrub, poison oak scrub, and live oak riparian forest are also found on the Preserve.

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

The topography on the Preserve is hilly, with the main ridgelines oriented in a northeast to southwest direction. Most of the Preserve faces west (spanning northwest to southwest), whereas only 29 percent of the land in the Preserve has a north-facing aspect of any sort. A few unnamed drainages flow to the southwest within the Preserve. Elevations range from approximately 1,135 to 1,678 feet above mean sea level. Slope steepness ranges from 2 to 75 percent. However, much of the landscape has a slope steepness between 50 and 75 percent.

Silverado Chaparral Preserve	**Acres**	**Percent**
East	8.03	4%
North	10.50	5%
Northeast	4.13	2%
Northwest	44.36	22%
South	41.67	20%
Southeast	29.84	15%
Southwest	34.72	17%
West	30.19	15%
Total Acres	203.45	

Table 1. Summary of aspect of Silverado Chaparral Preserve

Silverado Chaparral Preserve	Acres	Percent
Level (0-0.5)	none	none
Nearly level (0.5 - 2)	0.06	0.03%
Very gentle slope (2 - 5)	0.34	0.2%
Gentle slope (5 - 9)	1.89	0.9%
Moderate slope (9 - 15)	6.20	3%
Strong slope (15 - 30)	47.12	23%
Very strong slope (30 - 45)	76.45	38%
Extreme slope (45 - 70)	63.93	31%
Steep slope (70 - 100)	7.35	4%
Very steep slope (> 100)	0.11	0.1%
Total Acres	203.45	

Table 2. Summary of slope steepness of Silverado Chaparral Preserve

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

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

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

However, winds from the west are also likely to cause a significant risk of wildfire, especially if followed by a Santa Ana wind event. Another scenario is a fire driven by a westerly wind that follows a Santa Ana event or episode. Because the northeast wind is normally associated with low humidity and high temperatures, it dries the fuels. At the end of this Santa Ana wind condition, fog can move quickly shoreward, pushed by a brisk, high-speed westerly wind. Under these conditions, the fuels would still be dry from the previous weather conditions and burn at a high rate.

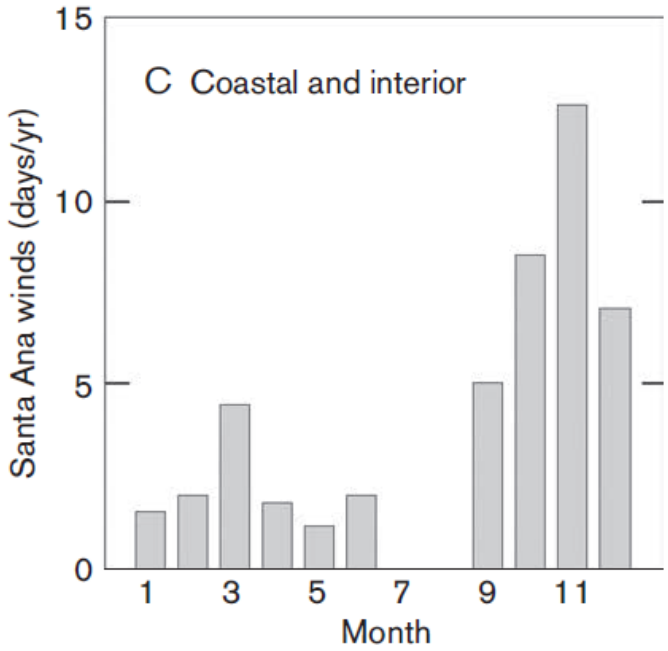


Figure 2. Average number days per month in which Santa Ana winds occur.[5]

The Preserve's location in proximity to the coast influences its weather conditions. It has the warm, dry summers and cool, moist winters characteristic of the coastal area. There are 75 days annually when the high temperature is over 90 degrees F; August is the hottest month, with 25 days per month exceeding 90 degrees F.[6] The area averages about 12 inches of precipitation a year, primarily in the fall and winter. Most of the measurable rainfall generally occurs during the winter months (mid-October to mid-April). According to the Resource Management plan for the Preserve, "Rainfall patterns are subject to extreme variations from year to year and longer-term wet and dry cycles." Moreover, "[i]in Southern California, precipitation is characterized by brief, intense storms generally between November and March. It is not unusual for most of the annual precipitation to fall during a few storms over a close span of time."[7] Santa Ana winds are more frequent in the late fall, after months of high temperatures and lack of rain. Thus, while fires can occur year-round, the time of highest fire danger comprises the dry months from May to October.

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

[5] From *Fire in California's Ecosystems*, 2006, Sughiara, Van Wagtendonk, Shaffer Kaufman and Thode.
[6] https://www.accuweather.com/en/us/silverado/92679/august-weather/2154981?year=2022
[7] Bonterra Consulting. Baseline Biological Surveys Technical Report for the MacPherson Property. Appendix B pg. 6, MacPherson Preserve Resource Management Plan. 2017. OCTA, with support from ICF.

iii. Hydrology: The Preserve is located within the Santiago Hydrologic Subarea of the 1,680-square-mile Santa Ana Watershed. Multiple state and federal jurisdictional drainage features are present in the canyon bottoms. The two main drainages on the property are mapped by the National Wetlands Inventory as freshwater forested/shrub wetland, with the various tributaries mapped as riverine. These drainages flow into Santiago Creek, which is a tributary to the Santa Ana River.

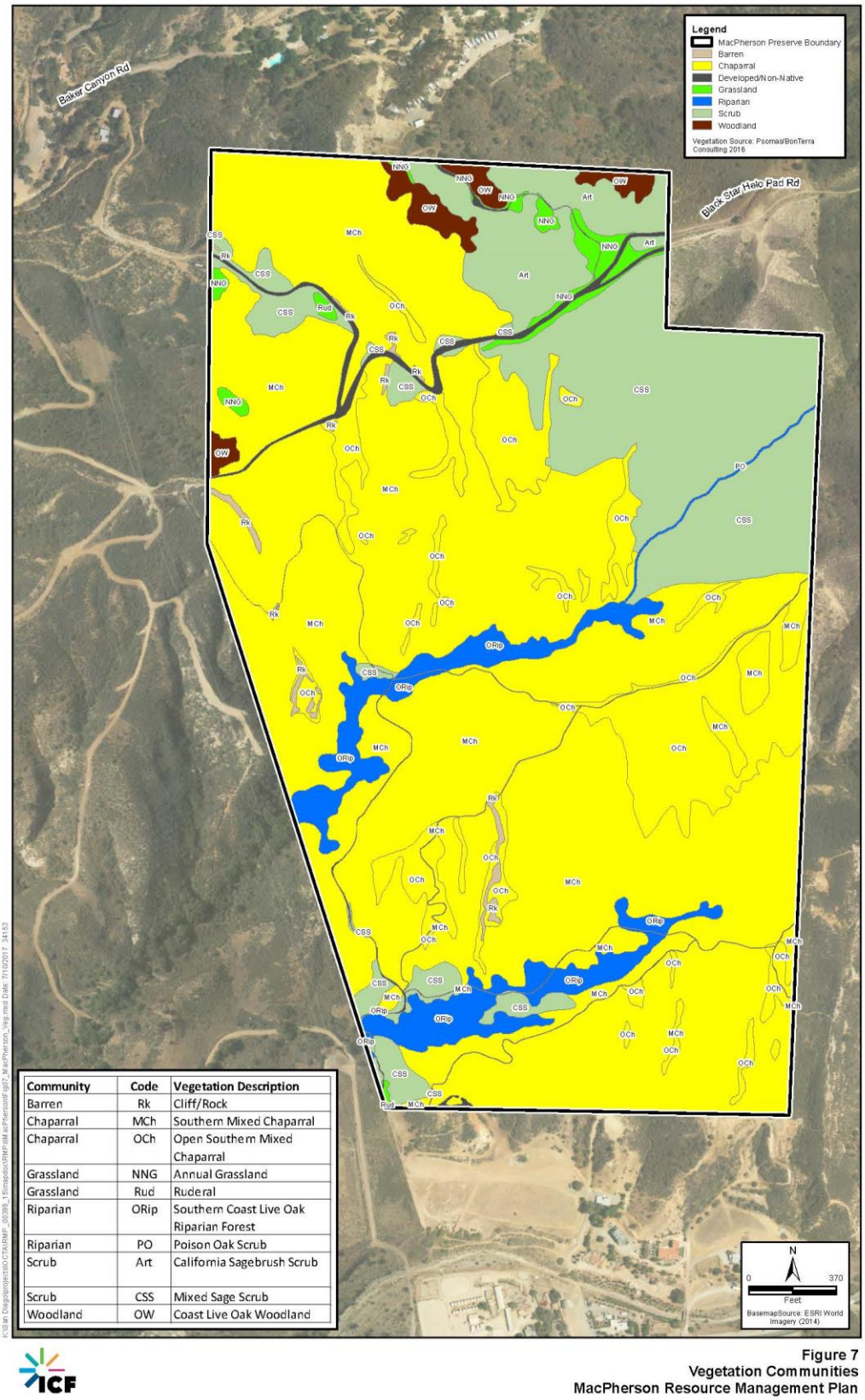
iv. Soils: Soil types mapped on the Preserve consist of Anaheim clay loam (30 to 50 percent slopes), Cieneba sandy loam (30 to 75 percent slopes, eroded), Myford sandy loam (2 to 9 percent slopes), and Soper loam (30 to 50 percent slopes).

v. Vegetation Types, Protected Species: Three special-status plant species were documented on the Preserve in 2015. Intermediate mariposa lily (*Calochortus weedii var. intermedius*) and chaparral nolina (*Nolina cismontana*) are both California Rare Plant Rank 1B.2; paniculate tarplant (*Deinandra paniculate*) is California Rare Plant Rank 4 (watch list).

Eleven vegetation types and other habitat types occur on the Preserve, including scrub, riparian, chaparral, woodland, grassland, cliff and rock habitat, and disturbed areas (e.g., dirt roads such as the Black Star Helo Pad Road).

Vegetation Types and Other Areas	**Acreage**
Southern mixed chaparral	123.91
Open southern mixed chaparral	20.78
California sagebrush scrub	8.23
Mixed sage scrub	32.12
Annual grassland	2.27
Ruderal	0.23
Southern coast live oak riparian forest	9.48
Poison oak scrub	0.29
Coast live oak woodland	2.80
Cliff/rock	0.96
Disturbed	2.56

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



Community	Code	Vegetation Description
Barren	Rk	Cliff/Rock
Chaparral	MCh	Southern Mixed Chaparral
Chaparral	OCh	Open Southern Mixed Chaparral
Grassland	NNG	Annual Grassland
Grassland	Rud	Ruderal
Riparian	ORip	Southern Coast Live Oak Riparian Forest
Riparian	PO	Poison Oak Scrub
Scrub	Art	California Sagebrush Scrub
Scrub	CSS	Mixed Sage Scrub
Woodland	OW	Coast Live Oak Woodland

Figure 3. Vegetation Communities (from the MacPherson Resource Management Plan).

vi. Wildlife Types, Protected Species: Focused surveys for coastal California gnatcatcher (*Polioptila californica californica*) were performed on site by BonTerra Consulting in 2015. Special-status wildlife species documented at the Preserve in 2015 include Blainville's [coast] horned lizard (*Phrynosoma blainvillii*) and orangethroat whiptail (*Aspidoscelis* [*Cnemidophorus*] *hyperythra*).

The Preserve provides habitat for a wide variety of wildlife species that are characteristic of scrub habitats, riparian, chaparral, woodland, grassland, cliff and rock habitat, and wetlands. The coastal sage scrub habitat within the Preserve is high quality and appears undisturbed and is in large enough patches to support pairs of coastal California gnatcatchers, though none were observed during baseline surveys. The Preserve is near the edge of the elevation range of coastal California gnatcatcher, but the 2017 RMP notes that it could serve as a habitat refugia from fire and/or a steppingstone for regional connectivity.

vii. Historical Influences: According to the U.S. Forest Service (USFS), the area was inhabited by the Kumeyaay, Luiseño, Cahuilla, and Cupeño Native Americans, who would burn the brushlands along the coast and in the mountains (USFS 2018). Juan Rodriguez Cabrillo arrived in 1542, but the land did not undergo significant change until the late 18th century and the advent of a ranching culture coincided with the establishment of the California missions by Junipero Serra. The Silverado-Modjeska Canyon area was named "Canyon de la Madera" (or "Canyon of Timber") in 1769 during a Spanish expedition led by Gaspar de Portolá (California Land Conservation Fund 2011). The Spanish had received land grants in the canyons for logging timber as well as for cattle and horse grazing.

In 1877, silver was found in Silverado Canyon and coal was found near the canyon's entrance the following year. By 1883, both the coal mine and silver mines were closed. In the early 1900s, the sulphur springs in the canyon attracted residents, and mining resumed at the Blue Light Mine. A review of historic aerial photographs of the property shows that, in general, vegetation communities have not significantly altered since 1946. However, suburban development has continued to expand slightly in the general region. Low density development along Silverado Canyon Road is present in aerial photographs as early as 1946, though development along Baker Canyon Road has occurred since 1952.

Prior to acquisition by OCTA, this Preserve was privately owned and contained a network of dirt roads and trails which were used by the previous property owner. There is no evidence of buildings or otherwise significant structures on the Preserve.

Local mountain bikers have been utilizing and/or cutting unauthorized trails through the habitat on the Silverado Chaparral Preserve. Portions of the roads, just west of the Preserve's western boundary, are used by SCE to maintain electrical transmission lines. OCFA also utilizes the roads to access the land for assessing fire danger levels through fuel moisture sampling. Enforcement of OCTA regulations are performed through OCTA patrols and through the use of motion sensor cameras. The cameras are moved on a periodic basis.

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.

ix. Fire History: The lack of fire is a contributing factor to the high-quality habitat that exists on the site today. An1889 fire in Silverado Canyon burned approximately 350,000 acres, and presumably included the Preserve.[8] An unnamed fire in 1914 was mapped as burning into the northwestern portion of the Preserve. The 1948 Green Fire is the most recent fire in the Preserve and burned the entirety of the Preserve.

However, several wildfires in the surrounding area have impacted the adjacent and nearby habitat and community. For example, the most recent fire, the 2007 Santiago Fire, extended to the southern border of the Preserve. Generally, fire frequency is higher to the west and south of the Preserve.

While not large, at less than 2 acres, the 2018 Live Oak fire shows the potential for roadside ignitions in the Preserve vicinity, as it was located just east of Live Oak Canyon Road. The very small 2017 Rose Fire (0.2 acres) was also a roadside ignition. These fires, though small, are reflective of a wider trend, as a large preponderance of all wildfires begin with roadside ignitions (Syphard and Keeley, 2015 and Sturtevant and Cleland 2007). The report, Fire Regimes in the Santa Ana Mountains, and Laguna Coast (1914-2019) (Schlotterbeck 2020), indicates that between 1914 – 2019 35 fires (fifty percent of known ignitions or sixteen percent of all fires in that geography) were caused by roadside-types of ignitions in the Santa Ana Mountains.[9] This report found nearly all areas with the highest wildfire frequency were along freeway and roadway corridors.

While the cause of all the major recorded fires is "Unknown/Unidentified" or "Miscellaneous" (Table 4), general patterns of ignition in the region reveal several areas of concern. Potential sources of future ignition include the SCE transmission lines and unauthorized use of the site, which can lead to ignition sources such as engine activity from vehicles, smoking, and arson. Accidental ignitions occurring at nearby residences and commercial/agricultural facilities are also of concern.

FIRE NAME	YEAR	ACRES	CAUSE
(no name)	1914	18,755	Unknown/Unidentified
(no name)	1931	7,760	Unknown/Unidentified
GREEN RIVER	1948	53,080	Unknown/Unidentified
PASEO GRANDE	1967	51,077	Unknown/Unidentified
GRUNDY #3	1975	1,506	Unknown/Unidentified
BAKER	1997	6,320	Unknown/Unidentified
BLACKSTAR	2004	35	Arson
SANTIAGO	2007	28,430	Miscellaneous

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

[8] From *Fire in California's Ecosystems*, 2006, Sughiara, Van Wagtendonk, Shaffer Kaufman and Thode.
[9] These figures were arrived by combining automobile and road flares causes.

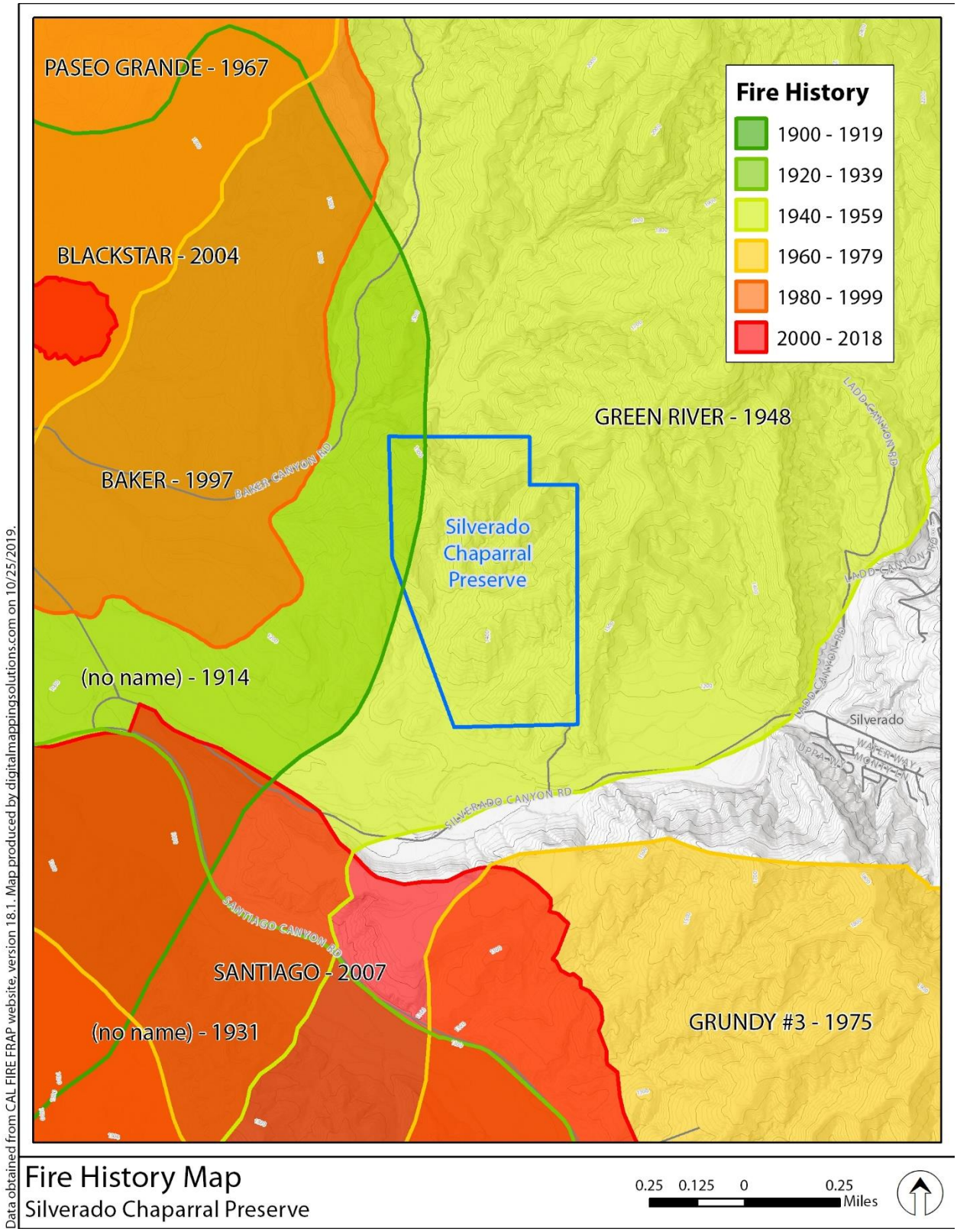


Figure 4. Fire history in the Silverado Chaparral Preserve region.

x. Aesthetic Resources: The Silverado Chaparral Preserve straddles a ridgetop, where it provides a scenic backdrop with the small unincorporated community of Silverado and the community of Hall Canyon (along Baker Canyon Road)—both to the east. The preservation of this property ensures visual continuity with the surrounding protected and/or undeveloped lands.

xi. Recreational Resources: The Preserve is not open to the public as a recreational resource. Even though the 204-acre Preserve is closed to hikers and mountain bikers, multiple unauthorized trails cross the property. It is also believed that unauthorized target practice occurs on the property. Evidence of grazing is not present.

The Preserve is in Silverado Canyon between three rural roads, which were not designed for the higher volumes of traffic that could occur if open public access is allowed. The Preserve does not currently include the necessary space for adequate staging areas (parking/restroom facilities) to facilitate open public access. Access to this Preserve is considered managed access – and occurs at OCTA's discretion.

xii. Structures and Built Values at Risk: According to the 2017 RMP, no structures are present on the property. No habitable structures are located within a distance that would necessitate vegetative fuel modification on the Preserve. Structures within 100 feet of a Preserve would require action because it represents a value at risk from wildfire that may spread from the Preserve. Within the 1000-foot buffer surrounding the Preserve, an RV park with several structures lies to the north, and a residential property with propane tanks stored lies to the south and west. SCE transmission lines are located just outside the Preserve's western boundary. Figure 1 indicates the structures within the 1000-foot buffer around the Preserve. Structures are outlined in red; however, none of the habitable structures are located within 100 feet of the Preserve boundary.

xiii. Access: Main access is via Black Star Helo Pad Road, which bisects the northern portion of the Preserve. This is an unpaved utility road utilized by SCE to service utility lines that run along, but outside, the western property boundary of the Silverado Chaparral Preserve. Black Star Helo Pad Road extends west of the Preserve to Black Star Canyon Road and is utilized as part of the OC Parks land and managed access programs. This road also extends east off the Preserve onto private property.

There are two smaller unpaved private access roads that enter Silverado Chaparral Preserve from the northern portion of the Preserve off Baker Canyon Road. One of these roads is designated to be decommissioned. Hall Canyon Road and an unnamed road both traverse south onto the Preserve. Hall Canyon Road begins on OC Parks land, and the unnamed dirt road originates on private property. In addition, a series of dirt trails traverse the Preserve and travel predominantly from east to west.

The lack of access other than Black Star Helo Pad Road hinders fire response to contain a fire both on the Preserve and to US Forest Service lands to the east. The Black Star Helo is the sole access to USFS lands to the east, so this access is important for containment of a fire to Federal lands. An intervening parcel is privately held, and fire suppression is

required there as well. Fire suppression actions are not anticipated mid-slope; thus actions will be focused on the ridgeline dirt road. Importantly, fire vehicle access off of Black Star Helo Pad Road provides opportunities to contain a fire coming into the Preserve from the north.

To provide better conditions under which fire response is safer, vegetation treatments along the road are recommended to maintain the roadbed and reduce roadside vegetation that might burn with such intensity that could preclude passage.

V. ANALYSIS OF HAZARDS, RISK

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

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

Adjacent risk of ignition comes from activities associated with residential land use including the use of vehicles, construction, use of mechanical mowers, barbecues, and generators, as well as a green waste/mulching operation and the presence of powerlines. The 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. Because the Preserve is upslope of residential and commercial properties to the south and north, fire could quickly spread from those areas of greatest ignition risk to the Preserve.

The risk of a fire affecting the Silverado Chaparral Preserve is influenced not only by the fuels it supports, but also by the fuels present on the surrounding landscape. Adjacent fuel types are also a factor in determining the potential for fire to spread to the Preserve, especially because the Preserve is 204 acres within a larger matrix of wildland fuels. The fuel types on adjacent properties vary between low-fuel volumes and discontinuous fuels south of the Preserve (which would limit spread to the Preserve), to highly flammable fuel conditions north of the Preserve, and undisturbed vegetation on public lands to the east and west, which would either propel or allow continuous spread of fire to the Preserve. Figure 5 below portrays the fuels within 1000 feet outside the Preserve boundary. The level of hazard will vary due to season or climate. While there is risk of fire year-round, 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 in Figure 5, which identifies unique fuel types. Fire predictions on this Preserve indicate that over half of the Preserve as well as adjoining areas to the Preserve would burn with extreme fire behavior (greater than 20-feet flame lengths). This is due to the large expanse of chaparral – the Preserve's namesake. Sagebrush is the main fuel type where chaparral is not dominant, particularly in the northeast portion of the Preserve and adjacent landscape. While flame lengths are predicted to be shorter than 8 feet for this vegetation type, it would be prudent to expect both shrub-dominated vegetation types to exhibit extreme fire behavior. See Figures 6a and 6b for a map of predicted flame lengths on the Preserve based on FlamMap fire behavior modeling software.

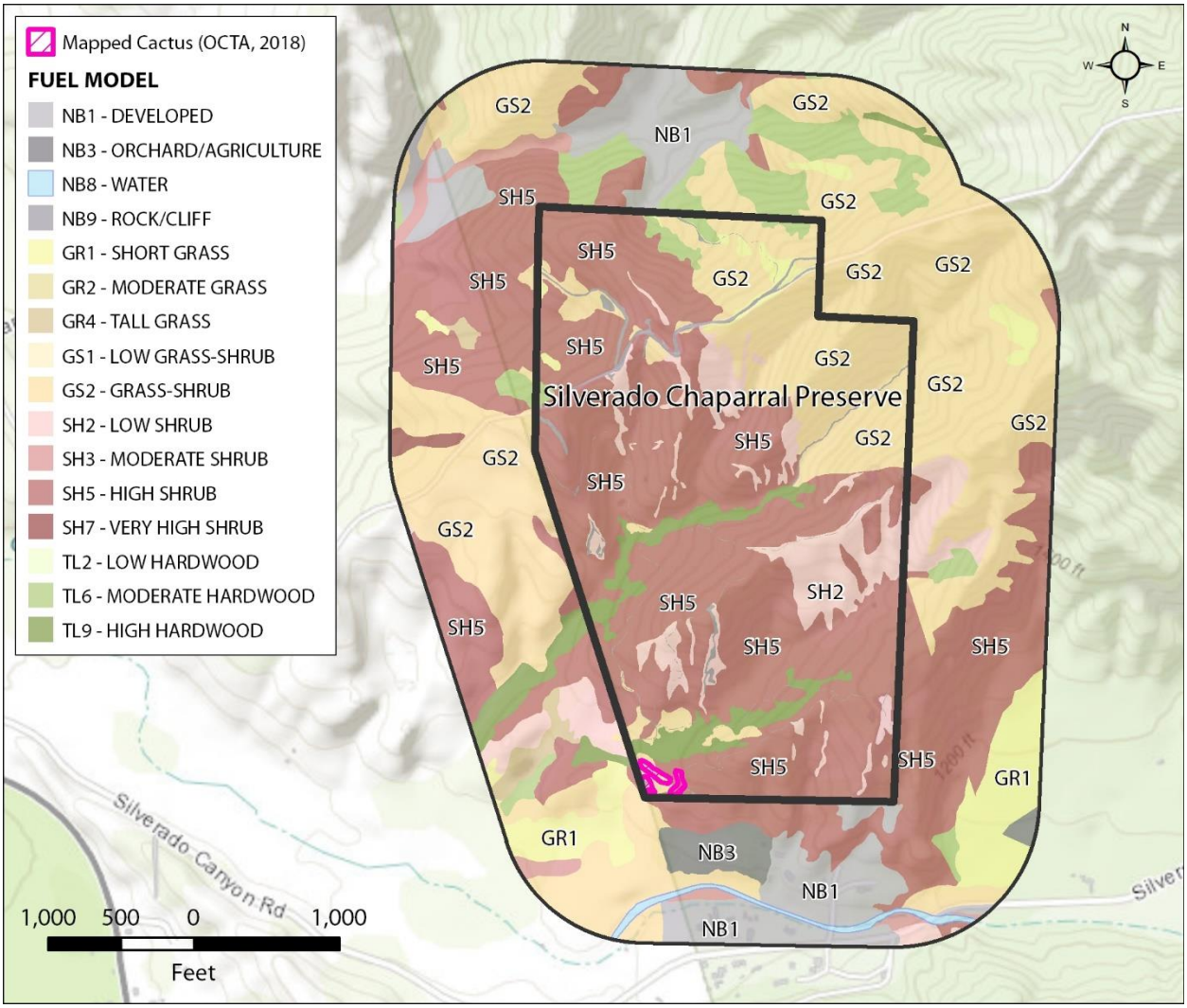


Figure 5. Silverado Chaparral Preserve map showing fuel model classification based on vegetation.

Fuel Model Name and Code	Fuel Model Description	Vegetation Map Code	Acres	Percent
NB99 – Rock/ Cliff	Barren	DIST/RUD/RK/BARREN	4	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	2	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	40	20%
GS122 – Grass-Shrub with Cactus	Same as above, but assigned higher fuel moistures	CSS with cactus	0.3	0.2%
SH142 – Low Shrub	Low load, humid climate shrub, woody shrubs and shrub litter, fuelbed depth 2-3 feet, spread rate and flame low	OCH	21	10%
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	MCH	124	61%
SH145 – High Shrub with Cactus	Same as above, but assigned higher fuel moistures	MCH with cactus	0.2	0.1%
TL186 – Moderate Hardwood	Moderate load broadleaf litter, spread rate and flame moderate	CLO/W	3	1%
TL189 – High Hardwood	Very high load broadleaf litter, may be heavy needle drape, spread rate and flame moderate	ORIP	9	5%
Total Acres			**204**	

Table 5. Silverado Chaparral Preserve acres by fuel model and vegetation type.

In general, the fuel model assignments were based on the mapped vegetation types and associated expected surface vegetation (that would presumably carry a fire). All shrub vegetation types were assigned a shrub fuel model, tree vegetation types were assigned a tree fuel model, except for some oak woodland which was assigned a grass fuel model (because 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 grass and shrub. 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 and not be propelled by it.

B. Predicted Fire Behavior on the Preserve

Regionally, fire behavior is expected to be extreme. In critical weather, fires are expected to burn with extreme behavior, high rates of spread, and long-range spotting. In the Silverado area, Santa Ana wind-driven fires have moved from Interstate 15 to the area in 8 hours. Some areas are wind sheltered deep in the drainage, or subject to erratic winds/roll vortices off ridgelines. There is no recent history of fire running the entire canyon under Santa Ana winds, but this scenario is more likely during return of westerly winds following Santa Anas if a fire is burning at the western mouth of the canyon when the winds start to blow from the west. There is a high chance of and potential for plume dominated/fuel driven fire behavior when heavy fuels are burning (Rhode, 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 Zones,[10] 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.[11] Indirect attack is a method of suppression in which the control line is located some considerable distance away from the fire's active edge.

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

The differences between the two scenarios for flame length are not very dramatic. In both wind scenarios, the highest number of acres burned (approximately 57% of the total area in scenario I and approximately 66% of the total area in scenario II) are predicted to have flame lengths of greater than 20 feet. In both wind scenarios, the second highest number of acres burned (approximately 32% of the total area in scenario I and approximately 27% of the total area in scenario II) are predicted to have flame lengths from 4.1-8 feet.

In both wind scenarios, flame lengths of greater than 20 feet are predicted in areas of High Shrub (Fuel Model 145). These areas exist on the slopes located on most of the west and southwest of the Preserve area as well as areas in the 1000-foot buffer surrounding the Preserve to the northwest, south and southeast.

[10] https://bof.fire.ca.gov/media/5tepuutt/full-14-a-presentation-cal-fire-vhfsz-remodeling-effort.pdf
[11] Andrews, Partricia 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 both wind scenarios, the flame lengths from 4.1-8 feet are primarily in the Low Shrub (Fuel Model 142) and Grass-Shrub (Fuel Model 122) areas. These areas are mostly in the northeast of the Preserve and to the northeast of the Preserve in the buffer. Smaller areas are also to the west of the Preserve in the buffer.

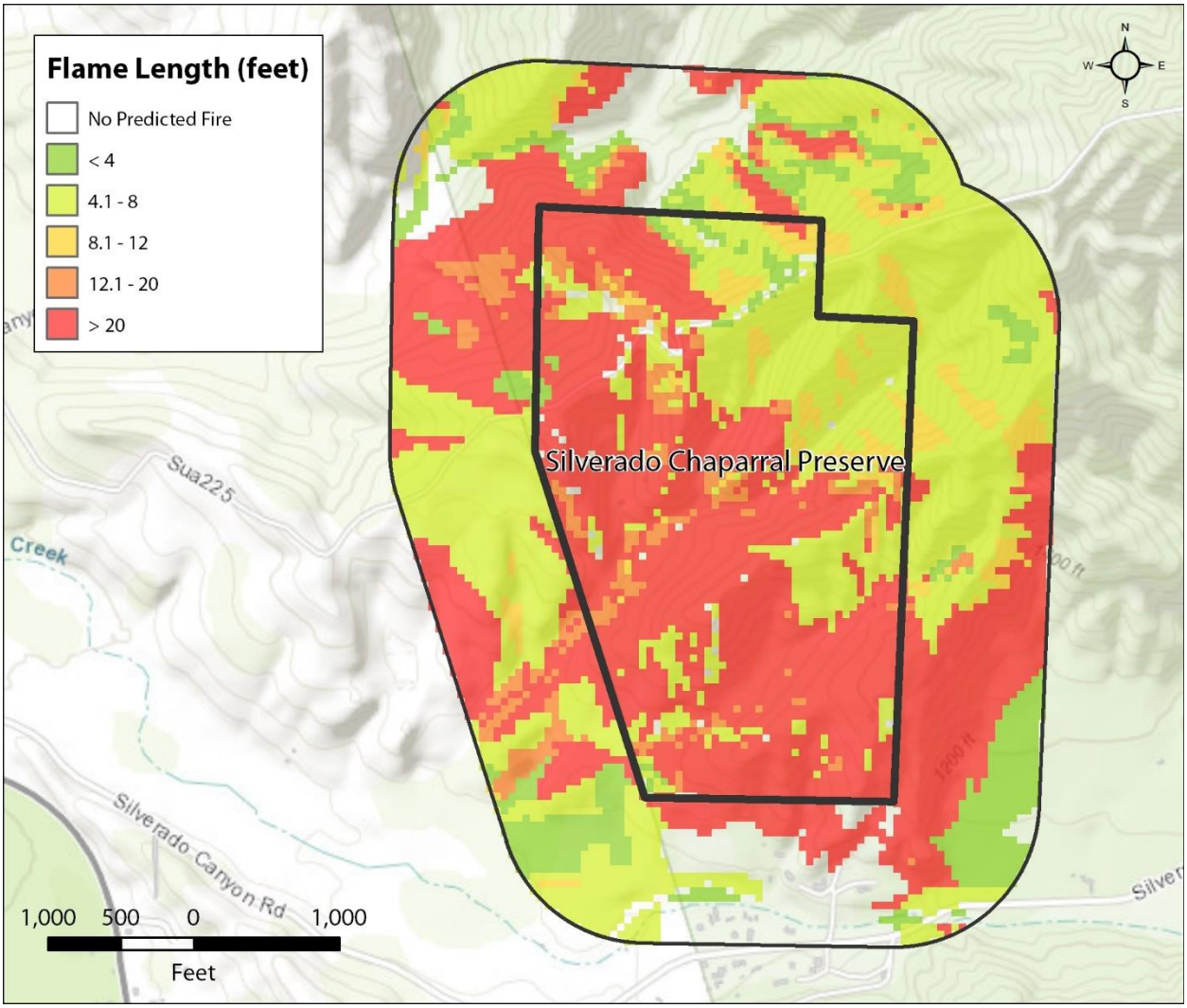


Figure 6a. Silverado Chaparral Preserve map showing predicted flame length for results from the northeast wind scenario.

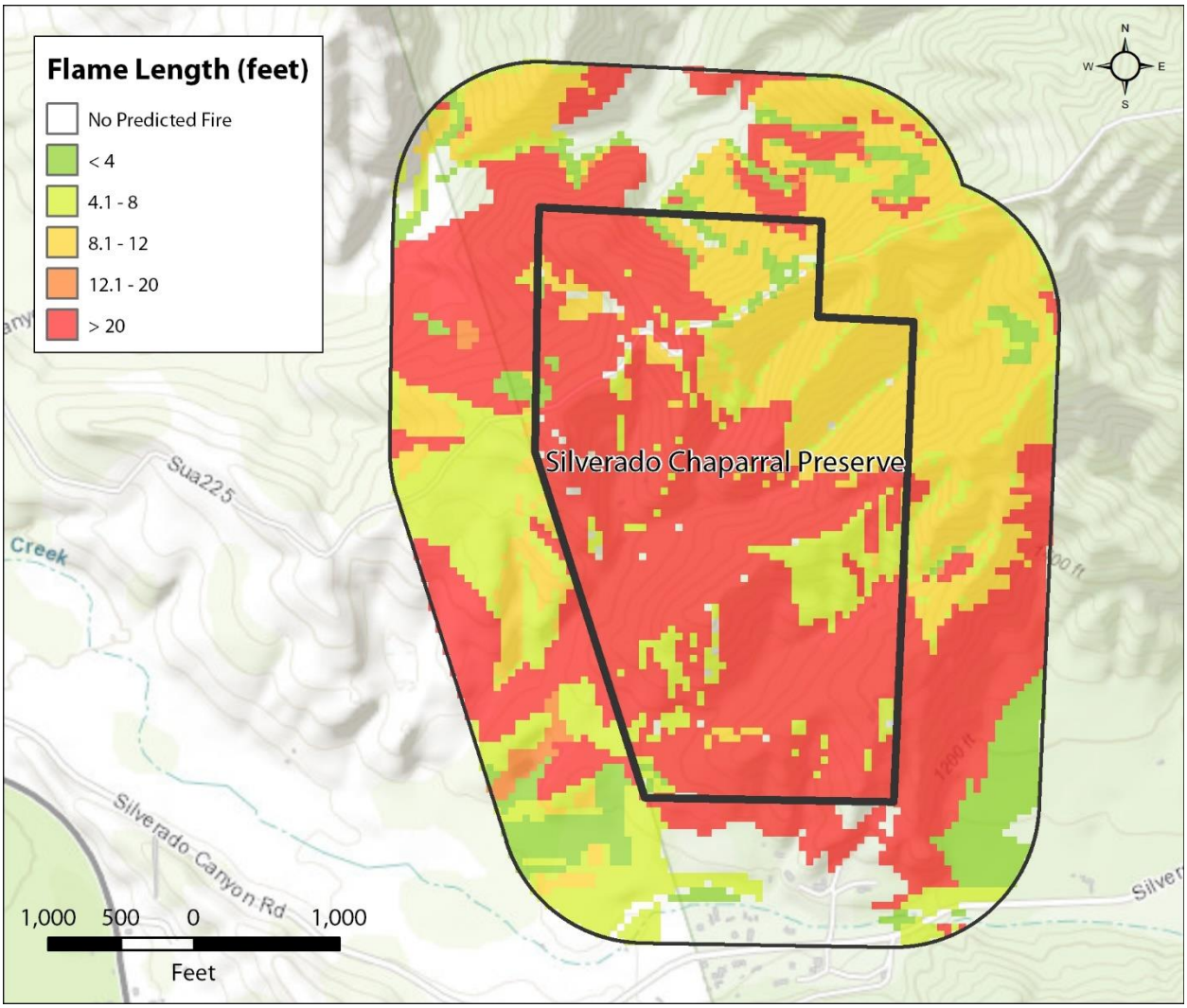


Figure 6b. Silverado Chaparral Preserve map showing predicted flame length for results from the uphill wind scenario.

Scenario I Northeast Wind (see Figure 6a)

Flame Length	Acres
No Predicted Fire	3.97
Less than 4 feet	4.04
4.1-8 feet	64.48
8.1-12 feet	2.64
12.10-20 feet	13.98
Greater than 20 feet	117.50

Scenario II Uphill Wind (see Figure 6b)

Flame Length	Acres
No Predicted Fire	3.99
Less than 4 feet	4.04
4.1-8 feet	55.91
8.1-12 feet	5.12
12.10-20 feet	0.21
Greater than 20 feet	134.36

Table 6. 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, 207 acres.[12]

[12] As noted above, while the text and tables of the MacPherson RMP list a total Preserve acreage of 204, other GIS analysis suggests an acreage of 207. See Chapters 1 and 2 of the 2017 MacPherson RMP.

ii. Rate of Spread: Rate of spread, or the rate at which a fire moves across a specific fuel bed, is a much more complicated parameter to 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, or 11 feet/minute) might be easily contained whereas fast-moving fire (a fire moving faster than one mile per hour, or 88 feet/minute) challenges containment and has the potential to move into high value sensitive areas before containment can occur. While a fast rate of spread does not necessarily result in a problematic fire, a fast-moving fire coupled with high flame lengths cannot be suppressed with a hand-crew.

Rate of spread in this Preserve is impacted by wind, with the uphill wind causing a much higher rate of spread in both the Preserve and the buffer. Over 80% of the Preserve is predicted to have high rates (greater than a mile per hour) of spread in an uphill wind.

Large differences exist between the two wind scenarios in regard to the areas with the highest rates of spread. In the northeast wind scenario, approximately 64% of the total area is predicted to have a rate of spread from 40.1-80 feet/minute. In the uphill wind scenario, approximately 42% of the total area is predicted to have a rate of spread from 40.1-80 feet/minute, while approximately 43% of the total area is predicted to have a rate of spread greater than 80 feet/minute. Combined, more than 80% of the Preserve is predicted to have high rates of spread in an uphill wind.

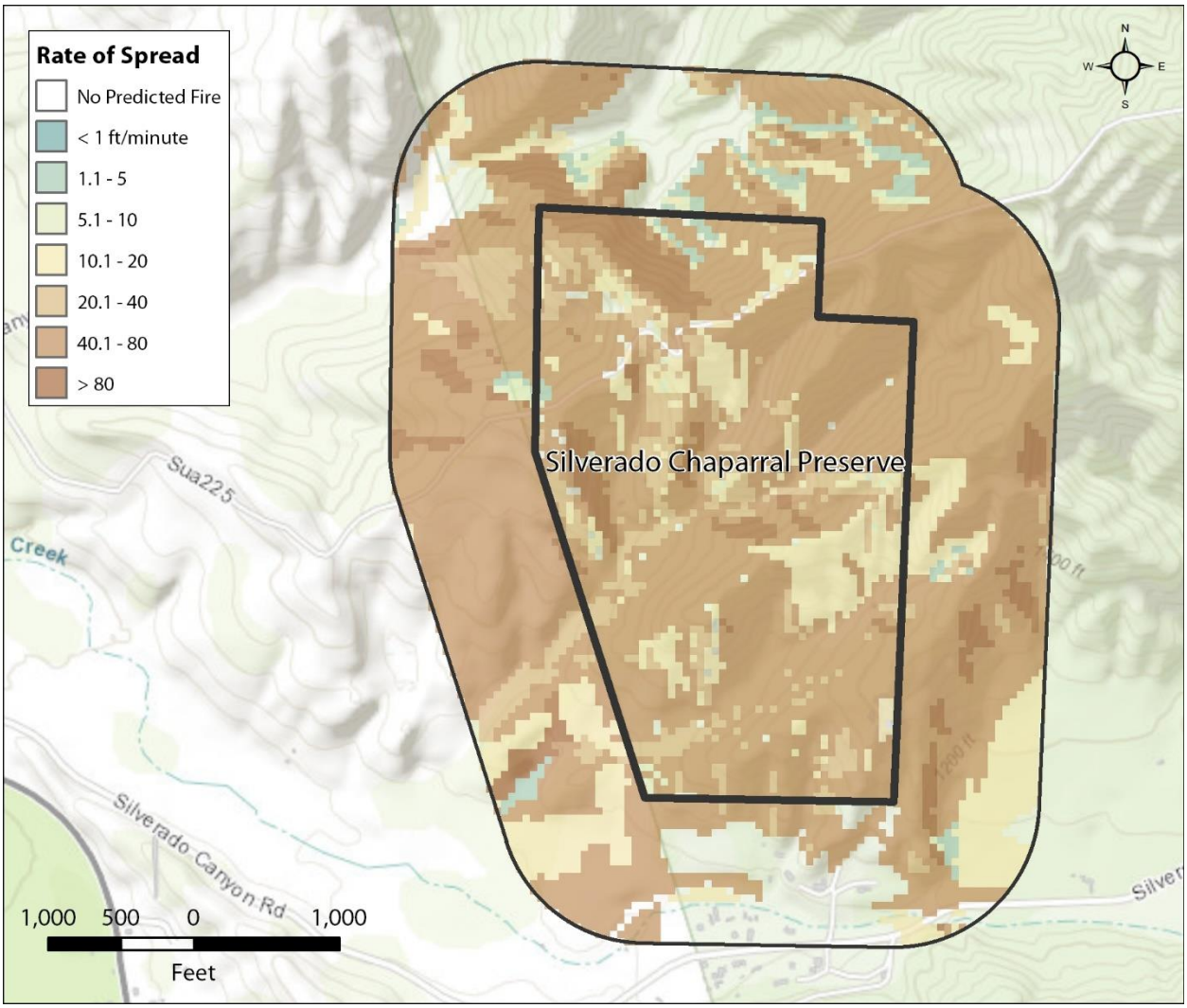


Figure 7a. Silverado Chaparral Preserve map showing predicted rate of spread for results from the northeast wind scenario.

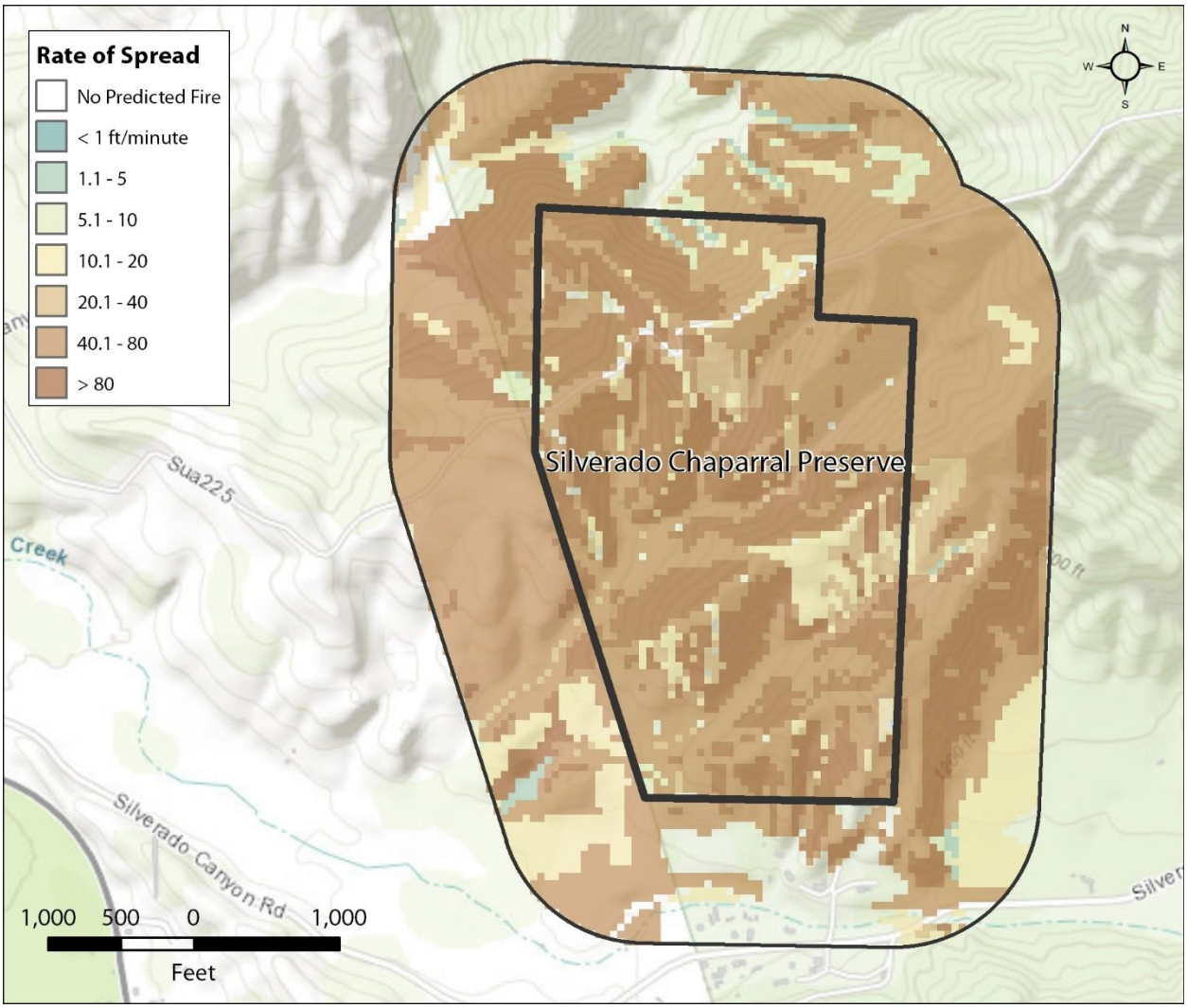


Figure 7b. Silverado Chaparral Preserve map showing predicted rate of spread for results from the uphill wind scenario.

Scenario I Northeast Wind (see Figure 7a)

Rate of Spread	**Acres**
No Predicted Fire	4.03
1.1-5 feet (ft)/minute	1.94
5.1-10 ft/minute	0.92
10.1-20 ft/minute	26.05
20.1-40 ft/minute	26.53
40.1-80 ft/minute	130.26
Greater than 80 ft/minute	13.89

Scenario II Uphill Wind (see Figure 7b)

Rate of Spread	**Acres**
No Predicted Fire	4.03
1.1-5 ft/minute	1.80
5.1-10 ft/minute	0.04
10.1-20 ft/minute	17.74
20.1-40 ft/minute	6.51
40.1-80 ft/minute	86.45
Greater than 80 ft/minute	87.06

Table 7. 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 shrubs and 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.

Surface fire is predicted throughout the Preserve. This includes the areas of Grass-Shrub (Fuel Model 122) fuel model where it occurs in the northeast corner of the Preserve, to the northeast of the Preserve in the buffer, and in a pocket to the west of the Preserve boundary in the buffer, as well as in the Short Grass (Fuel Model 101) fuel model to the southwest of the Preserve in the buffer.

Other fuel models throughout the Preserve can be expected to have torching. Torching fire is predicted in 67% of the total area of the Preserve in both wind scenarios. Within the Preserve, the most extreme potential fire behavior is in a large swath extending from the northwest of the Preserve in the buffer all the way through the center of the Preserve to the south and east of the Preserve in the buffer. The swath is primarily in High Shrub (Fuel Model 145) areas both within and around the Preserve, where mass torching is predicted. Very little active crown fire is predicted.

Differences between the two wind scenarios for crown fire activity are not very dramatic. Active crown fire is only predicted for less than 1% of the total area even in the uphill wind scenario, primarily because of the small amount of tree fuel model types within the Preserve. Torching fire is predicted within 67% of the total area of the Preserve in both wind scenarios.

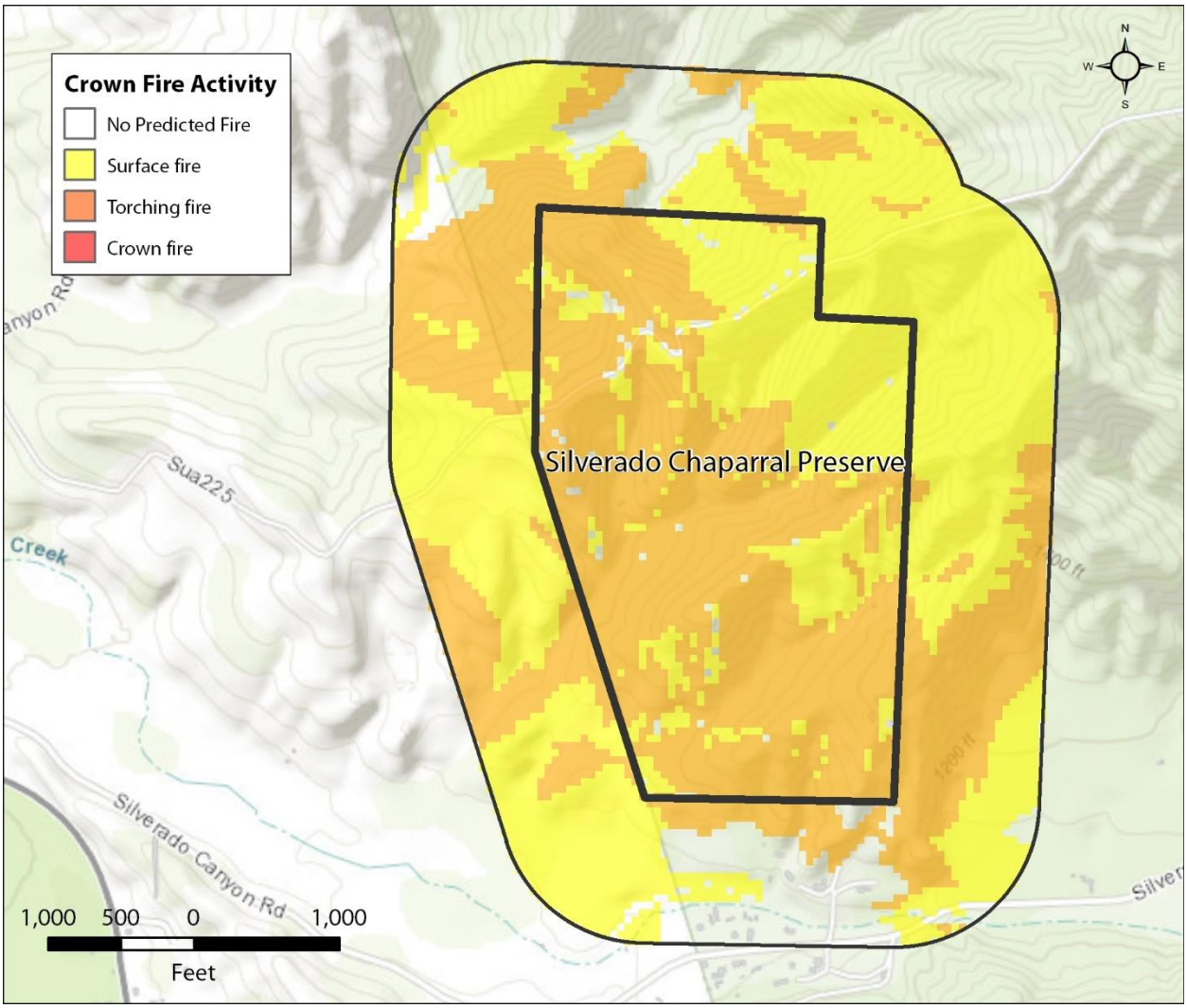


Figure 8a. Silverado Chaparral Preserve map showing crown fire activity for results from the northeast wind scenario.

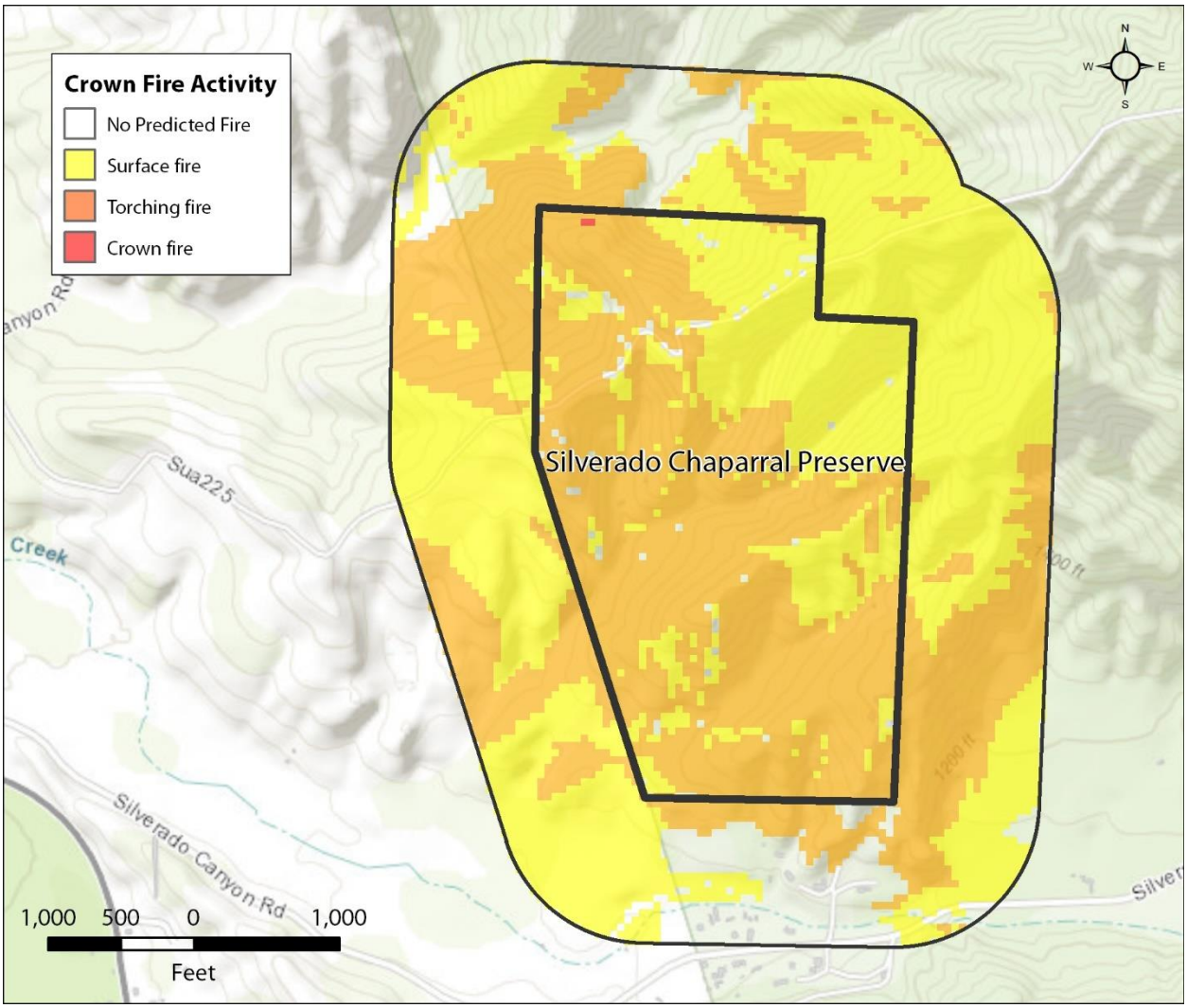


Figure 8b. Silverado Chaparral Preserve map showing crown fire activity for results from the uphill wind scenario.

Scenario I Northeast Wind (see Figure 8a)

Crown fire Activity	Acres
No Predicted Fire	3.31
Surface Fire	63.72
Torching Fire	136.60
Active Crown	0.00

Scenario II Uphill Wind (see Figure 8b)

Crown Fire Activity	Acres
No Predicted Fire	3.31
Surface Fire	63.68
Torching Fire	136.57
Active Crown Fire	0.08

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

C. Fire Hazard Severity Zone Ratings

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

Mapping is also categorized by who is responsible for fire suppression. For example, where the Federal government is fiscally responsible for fire suppression, the area is categorized as a Federal Responsibility Area. The Preserve lies within a State Responsibility Area, where the State of California is financially responsible for the prevention and suppression of wildfires.

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

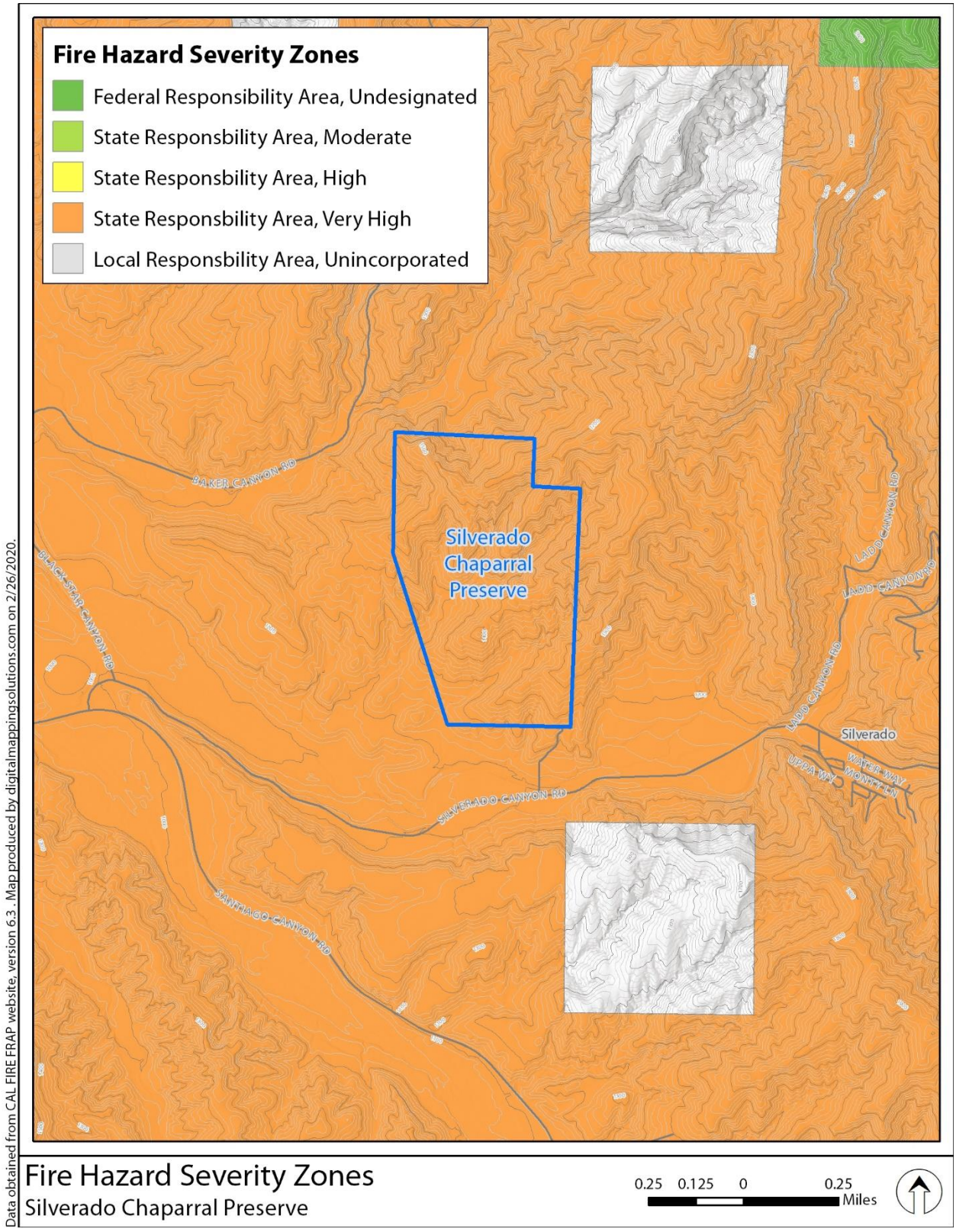


Figure 9. Fire Hazard Severity Zone of Silverado Chaparral.

VI. FIRE MANAGEMENT PROGRAM

The 2016 M2 Conservation Plan (section 7.2.5.9) recognizes the need for pre-fire activities. 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 and OCFA and other collaborating agencies such as Orange County Sherriff, Irvine Ranch Conservancy, and others that may be part of the Wildland-Urban Interface (WUI) Group.

OCTA benefits from relationships with other agencies. Cooperating partnerships, financial support, and other resources through the WUI (Wildland Urban Interface) Group, and mostly with OCTA's relationship with the OCFA Wildland Resource Planner, all support wildland fire protection of the Preserves. The Irvine Ranch Conservancy (IRC) is another cooperating partner that helps regionally to oversee and train FireWatch volunteers that patrol high-risk wildlands in order to prevent ignitions.

A. Pre-fire/Ignition Prevention

Pre-fire response includes both planning and physical fire prevention activities, such as offering public messages regarding ignition prevention and training. Responsibility for pre-fire activities overlaps between OCTA, OCFA, and Southern California Edison.

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 Orange County Fire Authority (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.
- Conduct pre-fire management, as appropriate, such as the limited removal of combustible, nonnative plants. Because the Preserve is within the jurisdiction of OCFA, OCFA [will work with OCTA to perform pre-fire vegetation management and does not hold OCFA responsible for the pre-fire vegetation management].[13]
- Establish fuel management zones. If necessary, exceptions to avoid impacts on sensitive species and habitats will be identified by the Preserve Managers, with concurrence sought from the local fire authority.

[13] The bracketed text does not appear in the M2 Conservation plan; rather, it is an updated agreement between the OCTA and OCFA, developed as a result of this FMP. The zones were delineated with OCFA.

- Coordinate with surrounding landowners to ensure that adequate setbacks are established that allow fuel management zones to be established outside of the Preserve (up to 100 feet from structures and 30 feet from roads) for new structures and facilities. For new structures or facilities constructed within the Preserve, ensure that a fuel management zone is established around these structures/facilities and include these areas as impacts against the caps allowed under the Plan.
- When available, establish fuel management zones that take advantage of existing roads and disturbed or developed habitats, thus avoiding sensitive habitats. Where feasible, provide approximately 15 feet of horizontal clearance to enable fire authority vehicle access to major access roads within the Preserve.
- Clear vegetation outside of the avian breeding season (as described in Section 7.3.1, "Species and Habitat Management," above), unless a preconstruction nesting survey determines that no nesting birds will be affected by clearing activities. If clearing must occur at a time or in a manner that may affect nesting birds, the Preserve Manager will consult with the Wildlife Agencies to review any issues prior to the initiation of activities.
- Avoid impacts on narrow endemic plant populations during fire road maintenance operations and the clearing of fuel management zones. However, if high fuel load levels develop in a given year, mowing/trimming may have to occur to meet fire management requirements.
- If clearing must occur at a time or in a manner that may adversely affect sensitive resources, the Preserve Manager will consult with the Wildlife Agencies and fire agency to minimize impacts prior to project initiation.
- Work with the local fire department 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.

The RMPs commit the OCTA Preserve Manager to monitor and address potential infestations of invasive insects and other pathogens that can threaten native habitat. In addition, the OCTA Preserve Manager will stay current on the latest information and science of invasive insects or other pathogens (e.g., invasive shot hole borer and goldspotted oak borer) and

monitor for signs of infestations as part of general stewardship monitoring. If an infestation is identified, the Preserve Manager will coordinate with the OCTA NCCP/HCP Administrator and Wildlife Agencies on appropriate control actions.

The RMP for the Silverado Chaparral (then MacPherson) Preserve also specifies duties regarding pre-fire management: "Prior to implementation of the FMP, the Preserve Manager will conduct regular maintenance of weeds along existing fire roads and maintain existing roads in a condition that will provide safe access for firefighters."

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 the 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 to wildfire ignition.

OCTA has the responsibility to ensure that access to the site is provided and maintained by ensuring the roadbed of the portion of Black Star Helo Road inside the Preserve is passable and the vegetation cleared on the roadway.

The M2 Conservation Plan establishes a Strategy/Management Action that "[t]he FMP will include maps of cactus patches and strategies to minimize direct impacts to cactus patches during fire suppression efforts, if feasible." All work to create and maintain the vegetation thinning zone would focus on removal of dead and down material/vegetation and line trimming of non-native grasses, and other non-native species. If more thinning is needed, then drier plant species such as chamise*, Adenostoma fasciculatum* and resprouting species within the mosaic would be targeted.

OCTA has the responsibility to meet with OCFA representatives to inform them of the conditions on the Preserve (because the entire Preserve is considered sensitive habitat), and express preferences for suppression strategies, as required by the M2 Conservation Plan. While the Incident Commander (IC) has complete authority for suppression decisions, the entire Preserve contains high quality habitat and only Black Star Helo Pad Road should be mapped as suitable for placement of a dozer line during response to a fire incident. This is consistent with supporting fire suppression "to reduce the threat of cactus patches being irreparably harmed by frequent and/or intense fires (priority 1)." The OCTA developed a map of environmentally sensitive areas. The Environmentally Sensitive Lands maps (Appendix C) inform the OCFA of riparian areas and locations of rare and sensitive species to avoid and is an important component to inform the decision-making process during a wildfire.

OCTA employees authorized to engage in suppression work or perform as fireline observers must have received wildland fire suppression training (including the use of a fire shelter) and wear proper safety equipment in accordance with CAL OSHA regulations (Title 8, General Industry Safety Orders, Section 3410).

ii. Orange County Fire Authority Responsibilities

The OCFA pre-fire/ignition prevention responsibilities are spearheaded by the OCFA Wildland Pre-Fire Management staff, including the Wildland Resource Planner. The responsibilities of the OCFA Wildland Pre-Fire Management include conducting vegetation management as approved by OCTA, coordinating with regulatory agencies such as the Wildlife Agencies, and enforcing compliance with vegetation management requirements for adjacent landowners. According to OCFA Vegetation Management Guidelines, all landowners are required to maintain vegetation management zones within 100 feet of dwellings and other habitable structures.[14] While no habitable structures are located within 100 feet of the Preserve, should any such structure be approved nearby, OCFA will ensure that any vegetation management needed for an adjacent structure be conducted on that adjoining parcel where the structure is proposed and shall not extend onto the OCTA Preserve per Section 7.2.5.9 of the Conservation Plan. Vegetation Management is prohibited under future conservation easements except as otherwise allowed under the RMP and FMP.

The OCFA is trained per the National Wildfire Coordinating Group qualifications. These qualifications span firefighting techniques as well as incident management. OCFA hand crews also continue to be trained in the value of natural resources.

As part of pre-fire activities, the OCFA commissioned a set of Wildland Urban Interface Pre-Fire Plans for portions of the wildland-urban interface in the County served by OCFA. These plans identify risks, hazards, and infrastructure that supports fire suppression, such as access and water sources. The portion of the Silverado-West Wildland Urban Interface Pre-Fire Plan that covers the Preserve appears in Figures 10 and 11. The Pre-Fire Plan identified three aerial hazards and one access road in the form of the Black Star Helo Pad Road. An additional aerial hazard is located very near the southern border of the Preserve. No staging areas and temporary refuge areas are identified within the Preserve. The plans also identified preferred tactics for containment and evacuation. Liaisons and important areas of avoidance are also identified.

Southern California Edison (SCE) also has fire prevention rights and responsibilities as a result of the easement that they have on the adjacent parcel. The easement includes fuel modification along SCE access roads, as well as access to the base of the transmission line towers for maintenance.

[14] https://www.ocfa.org/Uploads/SafetyPrograms/OCFA%20RSG%20-%20Vegetation%20Management%20Guidelines.pdf

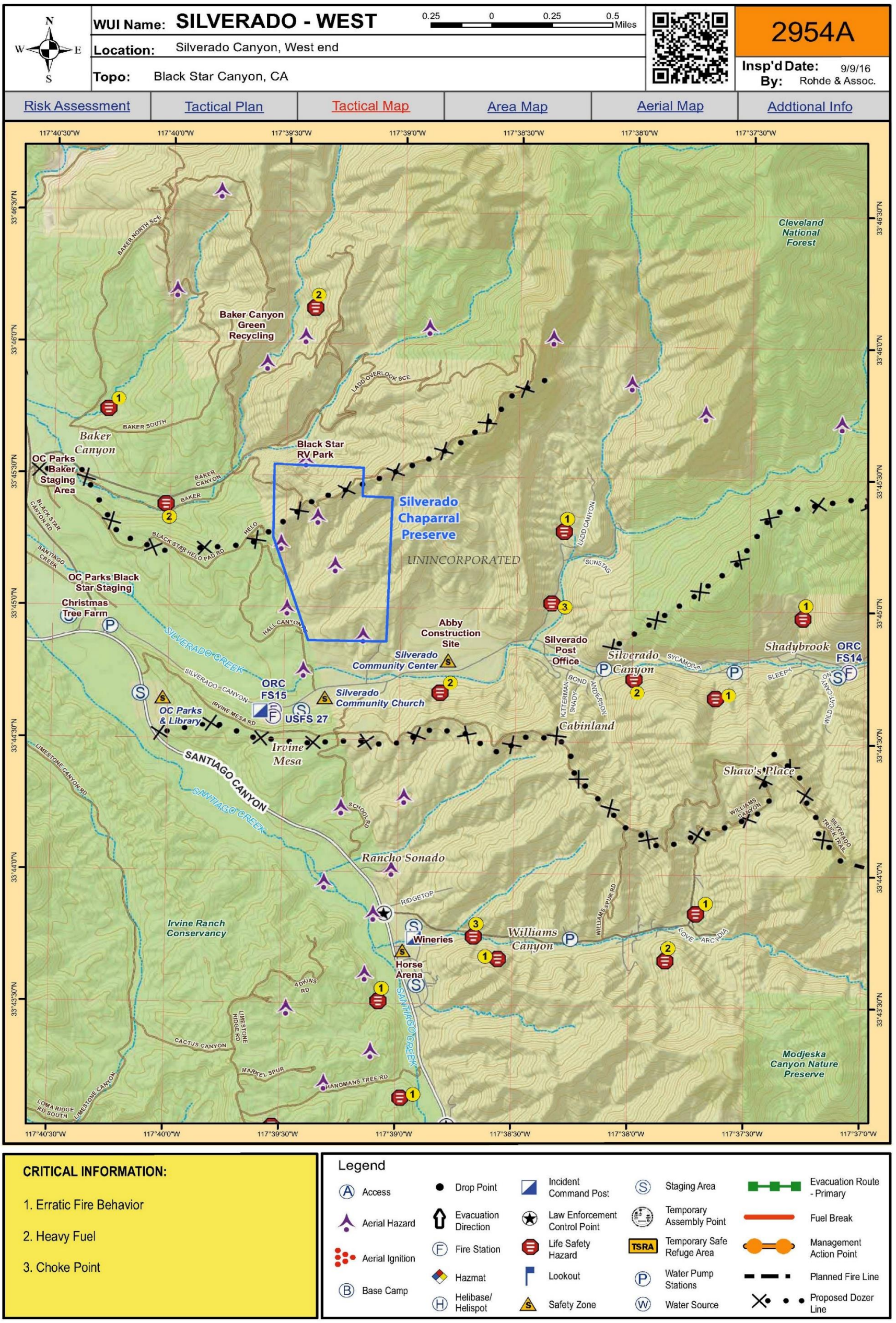


Figure 10. Location of a potential proposed dozer line along Black Star Helo Pad Road (from Rohde, 2016)

Figure 11. Location of a potential future dozer line along Black Star Helo Pad Road (from Rhode, 2016)

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, OCFA will establish defenses within and nearby any adjacent homes to protect life and property. The Preserve Manager, Conservation Plan Administrator and OCFA should collaborate to define the least damaging suppression strategy within the FMP and delineate this preferred area(s) graphically." Determining the least damaging suppression strategy includes weighing, for example, the impact of possible damage from soil disturbance from dozer lines with those of a possible larger fire size (and potential for facilitation of invasive plant species) due to the backfire.

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 coordinate and communicate with the WRP to prevent unnecessary damage to Preserve resources.

The OCTA RA will be the individual responsible for overseeing management of the Preserve if and/when management of the Preserve responsibility is transferred to another entity. That individual will take the required training, and wear suitable personal protection gear, so that they will be able to go behind the fireline, escorted by fire personnel, if necessary. An OCTA Operations staff member should receive the same training and equipment, so that they will be able to reconcile technical considerations and OCTA land management goals with OCFA firefighters in an expedient manner. Once notified of a wildfire, the OCTA RA will

report to the WRP and advise that position of sensitive features and landowner preferences on outcomes. The OCTA RA will also request activities such as a truck-washing facility, that would reduce resource impact of the wildfire during suppression, mop-up, and rehabilitation. The OCFA Incident Commander (IC) has complete authority for suppression strategy and outcomes and will take the landowner's preferences into advisement.

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

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

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

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

Emergency Evacuation: OCTA staff or contractors that may be within the Preserve during an uncontained wildfire must either be evacuated from the Preserve or brought to a "safe area." This Preserve is not part of an evacuation route for any adjacent parcels. In no circumstance should members of the public be brought to the Preserve during a wildfire incident. Evacuation routes will depend on conditions, circumstances, and staffing. The evacuation order is a command decision under ICS, which is carried out by the Orange County Sheriff department. In the Silverado Chaparral Preserve the preferred evacuation route to vacate the Preserve is along Black Star Helo Pad Road.

ii. Orange County Fire Authority Responsibilities

OCFA is responsible for providing fire protection for the Silverado Chaparral Preserve. As shown in Table 9, the nearest fire station is OCFA Station #14, in Silverado, which is equipped with vehicles suitable for wildland fire response.

Stations #14 is a Standalone Reserve Station, staffed by trained personnel who respond to incidents after notification by pager. Station #18 consists of a full-time staffed engine and a reserve engine. Station #18 staffing also includes two trained hand crews. Reserve firefighters report to the station (with maximum response time of 10 minutes) and respond

on assigned fire vehicles. Firecrew members assigned to Station #18 in Trabuco Canyon receive training in wildland firefighting and special equipment operation.

If a fire starts on USFS lands, USFS personnel would respond to that fire and the incident would be managed under Unified Command if it crosses onto private lands such as the Preserve. Unified Command is an application of the 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. When the fire threatens or spreads to OCTA property, OCTA personnel will be notified and authorized to fulfill the RA's role. OCTA's RA would fulfill the same role and report to the same position within ICS, regardless of the type of command system and where the fire started.

The WUI Pre-attack Plan (Rhode, 2016) identifies all infrastructure that supports wildland fire response in and around the Preserve. No water sources (hydrants, ponds, tanks) are located within the Preserve. There are also no life safety concerns noted in the Preserve. Aerial hazards (transmission powerlines) were identified on the western portion of the Preserve. While this will not prohibit aerial suppression support, it may affect tactics and containment and control.

Nearest Fire Station	Service Area	Fire Station Address	Route	Distance	Estimated Time
STATION #15	SILVERADO (USFS)	27172 Silverado Canyon RD., Silverado 92676	Via Silverado Canyon Rd	1.3 miles	5 minutes
STATION #14	SILVERADO	29402 Silverado Canyon Rd., Silverado 92676	Via Silverado Canyon Rd	3.5 miles	10 minutes
STATION #16	MODJESKA	28891 Modjeska Canyon Rd., Silverado 92676	Via Santiago Canyon Rd	6.5 miles	10 – 15 minutes
STATION #7	ORANGE	8501 E Fort Rd, Orange, CA 92869	Via Santiago Canyon Rd	8.9 miles	15 - 20 minutes
STATION #8	SKYLINE	10631 Skyline Dr., Santa Ana 92705	Via Santiago Canyon Rd	10.8 miles	15 - 20 minutes
Station #18	TRABUCO CANYON	30942 Trabuco Canyon Rd., Trabuco Canyon, CA 92579	Via Santiago Canyon Rd	11.6 miles	15-20 minutes
STATION #43	TUSTIN RANCH	11490 Pioneer Way, Tustin 92782	Via Jamboree Rd	12.2 miles	15 - 20 minutes
STATION #55	NORTHWOOD	4955 Portola Pky., Irvine 92620	Via Santiago Canyon Rd	12.3 miles	15 - 20 minutes
STATION #55	NORTHWOOD	4955 Portola Pky., Irvine 92620	Via Santiago Canyon Rd	12.3 miles	20 minutes
STATION #26	VALENCIA	4691 Walnut Ave., Irvine 92604	Via CA-261	15.1 miles	> 20 minutes
STATION #27	PORTOLA	12400 Portola Springs Rd., Irvine 92618	Via CA-241	15.7 miles	> 20 minutes

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

Two staging areas are located on Orange County Parks lands west of the Preserve, at the mouth of Baker Canyon and Silverado Canyon. The Tactical Plan notes, "Liaison with OC Parks for Parks lands- OC Parks Dispatch: (562)795-5410, or with the Forest Service for Cleveland National Forest lands. Dozer restrictions: use on ridge lines or to expand existing or legacy TT'[15]s, restrict use in canyon bottoms. Retardant avoidance areas and endangered

[15] "TT" indicates Truck Trails, also known as fire access roads or trails

species habitat in creek bottoms. Consider protection of key communication Sites on Main Divide peaks."

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

EMERGENCY RESOURCE NEEDS - FIRST SIX HOURS
(In addition to Initial Attack Resource)

Fire Ordering Point: ORC Dispatch: (714)573-6522 *COP
FS-CNF Dispatch (619)557-5262

Engines: The number range reflects the number of "minimum" to "preferred" resources.

Type 1	Type 3	Water
Strike Teams: 2-3	Strike Teams: 2-3	Tenders: 6
Crews	**Dozers**	**Overhead:** 4-5
Single: 6-8 STs:	Single: 2-4 STs:	Div. Sup.: 2-3

Aircraft:
Type 1 Helicopter (Large): 1
Type 2 Helicopter (Med.): 3
Type 3 Helicopter (Light): 1
Air Tankers: 4

WUI Engine Deployement - High Risk
1 engine/2-4 perimeter structures, 1 engine/isolated structures 2 engines/ multi-family structures

WUI Engine Deployement - Moderate Risk
1 engine/2-4 perimeter structures, 1 engine/isolated structure, 2 engines/multi-family structure

WUI Engine Deployement - Low Risk
1 strike team/2 blocks of perimeter hom

Law Enforcement Ordering Point: OCSD (714)288-6963

Law Enforcement:
50-60 officers, OCSD to evacuation, traffic control, and security. CHP to traffic. County Parks to evacuate Limestone Regional Park, IC-Lt., Capt.

Traffic Control on: Santiago Canyon Rd. x. Silverado Canyon Rd. Consider closure of Santiago Canyon between Cooks Corner and SR241. DO NOT EVACUATE OVER TRUCK TRAILS

Logistics
Open EOC to support aggressive fire or significant evacuation need. Consider responder fuel, water, and food needs. File F-MAG application with CAL-OES. Notify public works to assist in traffic management, Red Cross and Animal Services to assist in evacuation. Consult with SCE regarding electrical transmission & distribution issues.

Other
Liaison with OCParks for Parks lands- OCParks Dispatch: (562)795-5410, or with the Forest Service for Cleveland National Forest lands. Dozer restrictions: use on ridge lines or to expand existing or legacy TT's, restrict use in canyon bottoms. Retardant avoidance areas and endangered species habitat in creek bottoms. Consider protection of key comm. sites on Main Divide peaks.

Figure 12. Expected emergency resource needs for a wildfire in Silverado Canyon. 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 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 on the Preserve are identified and mitigated. Combined, OCTA and OCFA will form an Incident Rehabilitation (or Repair, or Remediation) Team to develop and implement the IRP.

i. Orange County Transportation Authority Responsibilities

Following a wildfire on the Preserve, a representative of 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 OCFA 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 regulatory 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 to 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 should be reimbursed by OCTA filing a compensation claim.

ii. Orange County Fire Authority Responsibilities

OCFA staff will be involved in the repair of fire suppression impacts on the Preserve after a major wildfire. 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 A for an example). The authority to complete suppression repair work lies within 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.

Wildfire suppression repairs conducted by OCFA equipment operators 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 sites returned to their natural state.

The creation of fire lines by heavy equipment on slopes can often be a source of considerable erosion and OCFA is 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 will only be necessary where all viable seed and rootstock have been consumed or killed. OCFA does 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 the 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 McCloud across the slope. Existing downed material and available debris will be scattered on top of raked area. Walking on the raked area will be avoided throughout this process.

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

D. Wildfire Recovery

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

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.

Because there are powerlines adjacent to the Preserve, some towers and lines may fall into the Preserve. If electrical or telephone lines are damaged and enter the Preserve during the fire, OCTA staff should contact the appropriate utility (SCE) as soon as the fire is declared contained to verify when repairs are scheduled. An OCTA representative should be on site for any required repairs on the Preserve.

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

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

The Resource Management Plan for the Silverado Chaparral (then MacPherson) 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 OCTA Conservation Plan Administrator and Preserve Manager will work with the Wildlife Agencies and OCFA, as necessary, to determine if fire severity and frequency meet the requirements of a Changed Circumstance as defined in the Conservation Plan 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 OCFA 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 OCFA to recontour any dozer lines created within the Preserve. Restoration of dozer lines by OCFA 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 OCFA and 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."

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 fire management plan. Possible responses to a Changed Circumstance fire may involve the following, per the M2 Conservation Plan:

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

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APPENDICES

A. Fire Suppression Repair Standards and Example of Plan

B. Glossary of Terms

C. Environmentally Sensitive Lands Maps

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

GENERAL SUPPRESSION REPAIR POLICY

Suppression damage is defined as adverse impacts to resources caused by firefighting efforts. The authority to complete suppression repair work lies with the California 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, heli-spots 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 dozer 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.

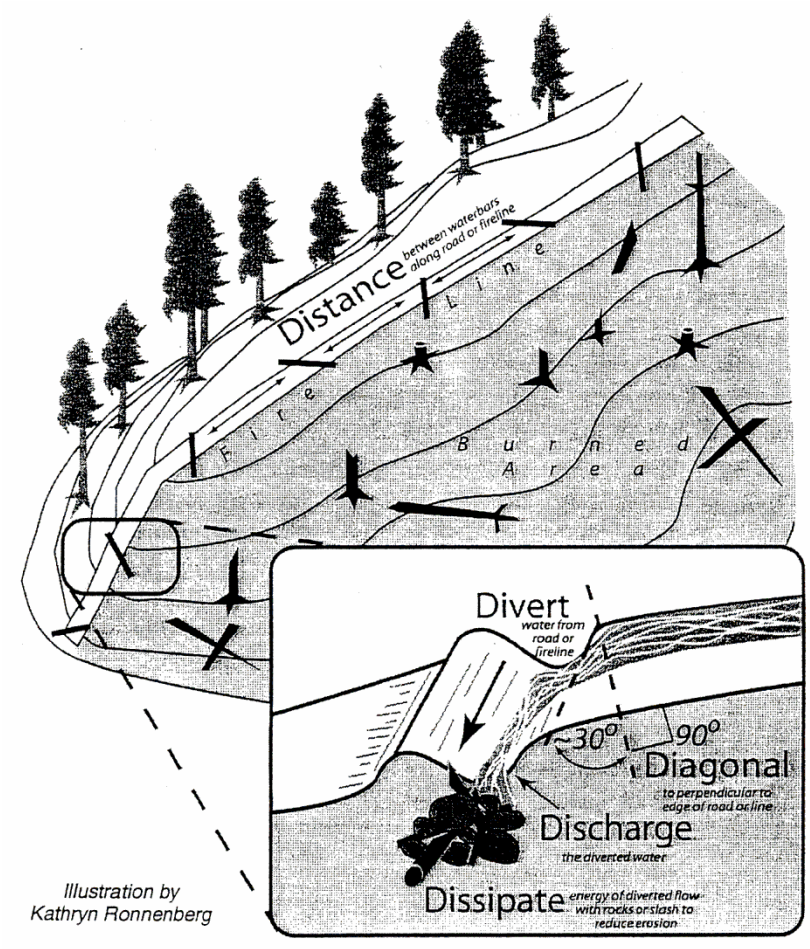
Waterbreaks should be located to discharge into natural vegetation. Where this is not possible, rocks or slash should be placed at the discharge point to effectively dissipate water, if feasible. If slash is used, it shall be hand-packed or tractor packed to make effective contact with the ground.

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 REMDIATION PLAN
SANTIAGO FIRE
CA-ORC-18-64103
Suppression Repair Plan for SRA Lands
June 12, 2018

General

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

Staging Areas/Safety Zones

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

Roads

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

Firelines

Dozers:

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

Handlines

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

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

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 B: GLOSSARY OF TERMS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Fireline Intensity – 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 3 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.

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 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.

Response time - The time between notification of an 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.

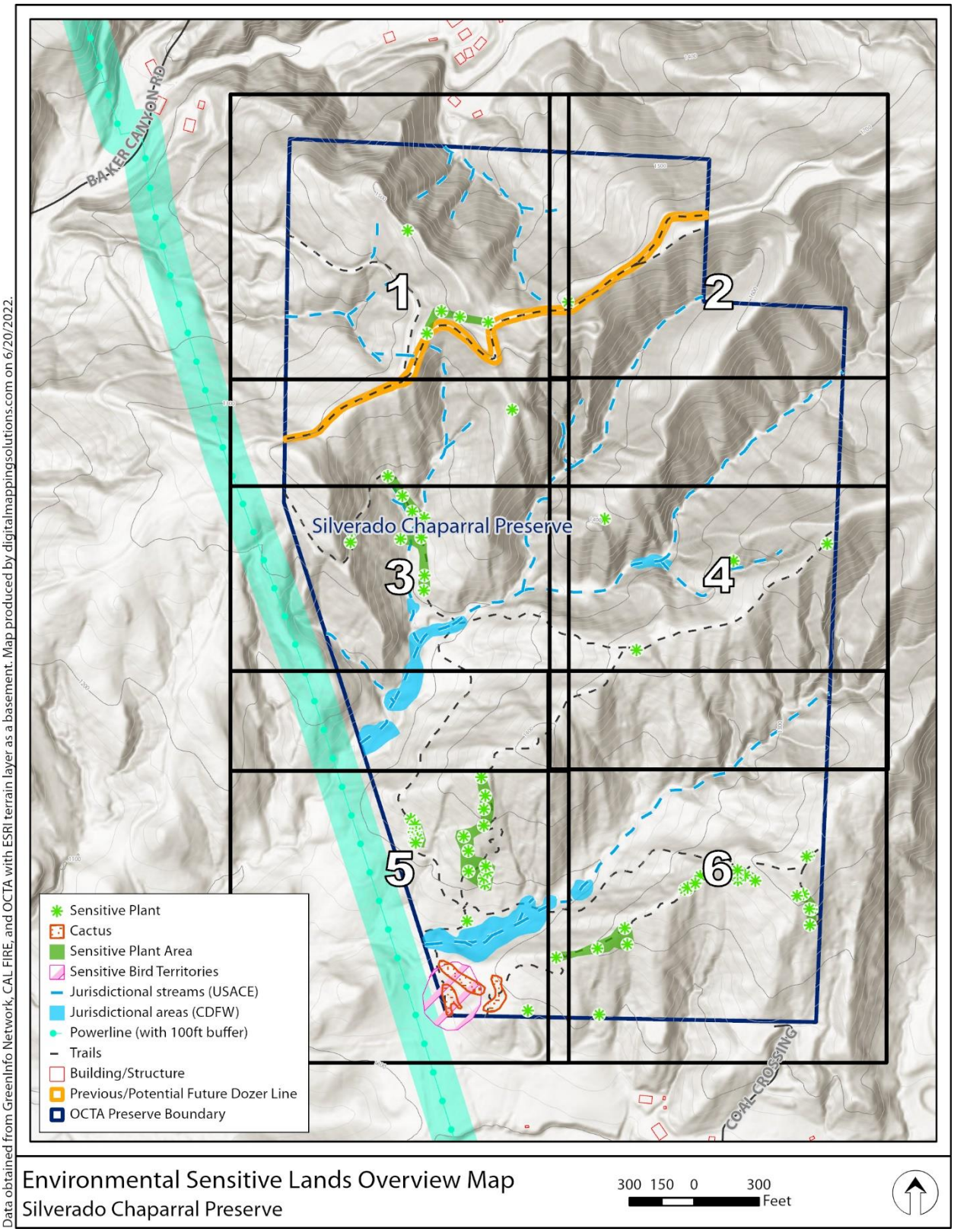
Torching - The burning of the foliage of a single tree or a small group of trees, from the bottom up.

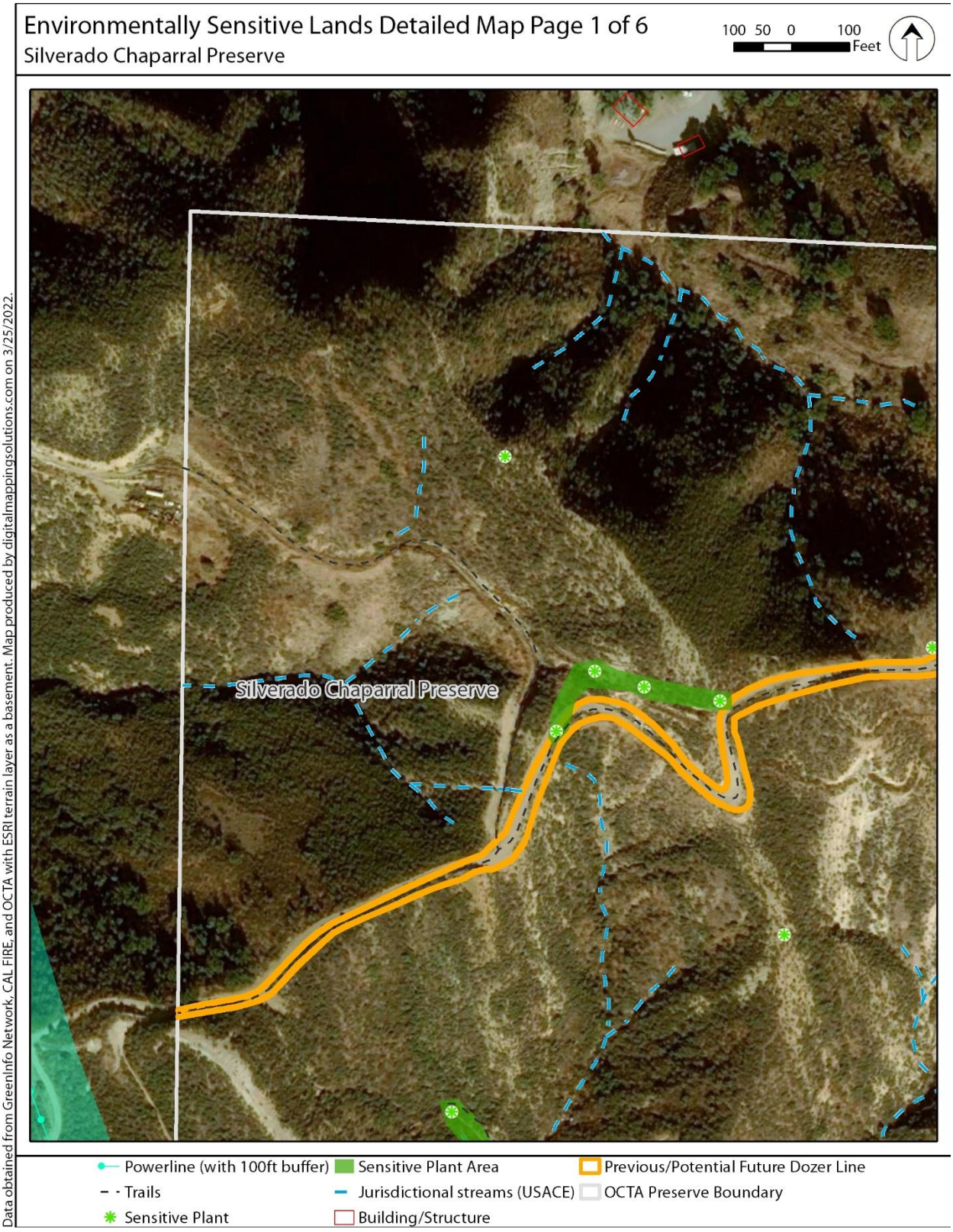
Unified Command - In ICS, unified command is a unified team effort which allows all agencies with jurisdictional responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies. This is accomplished without losing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

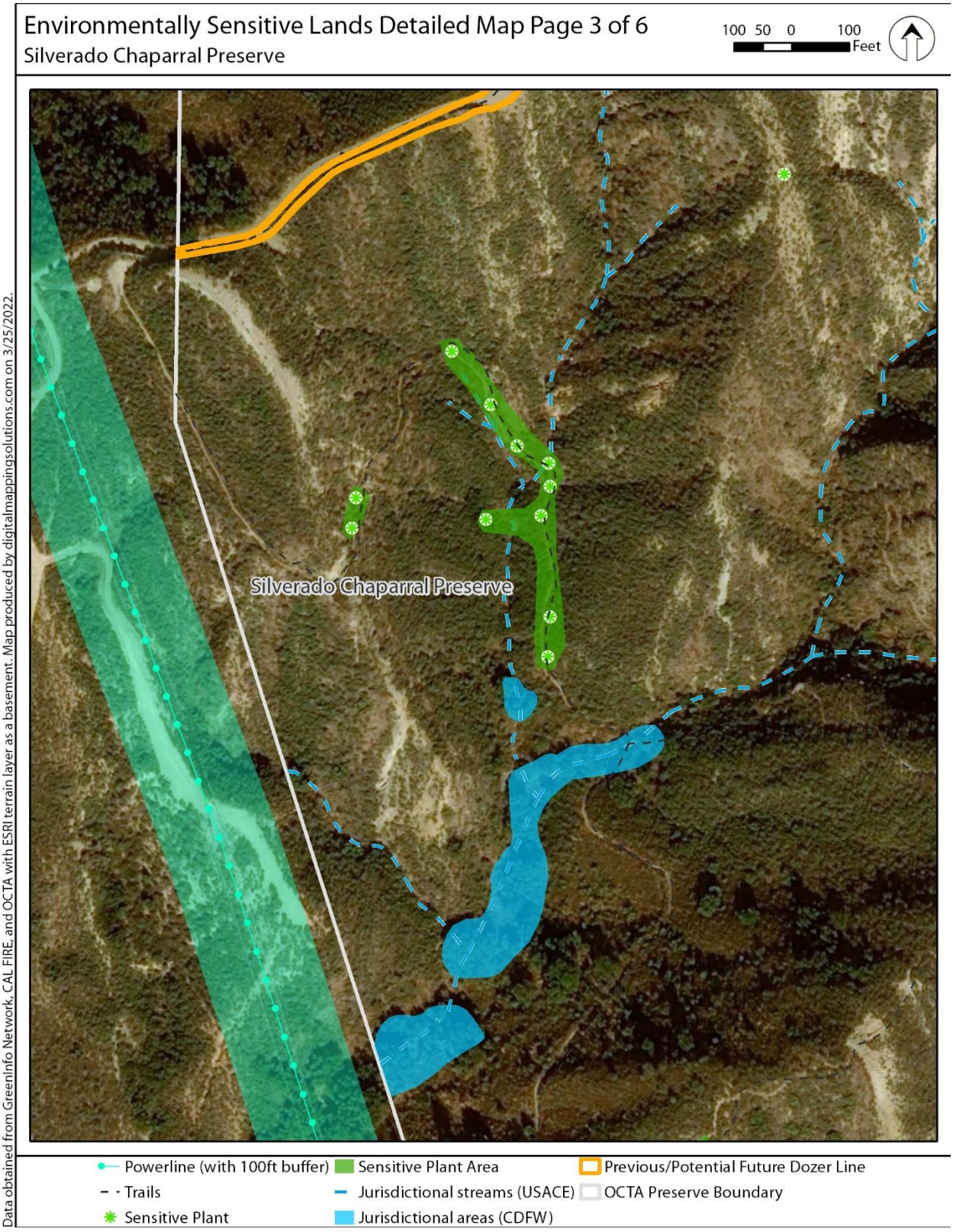
Waterbar- A shallow channel or raised barrier, e.g., a ridge of packed earth or a thin pole laid diagonally across the surface of a road or trail so as to lead off water, particularly storm water. (Frequently installed in firelines on steep slopes to prevent erosion.)

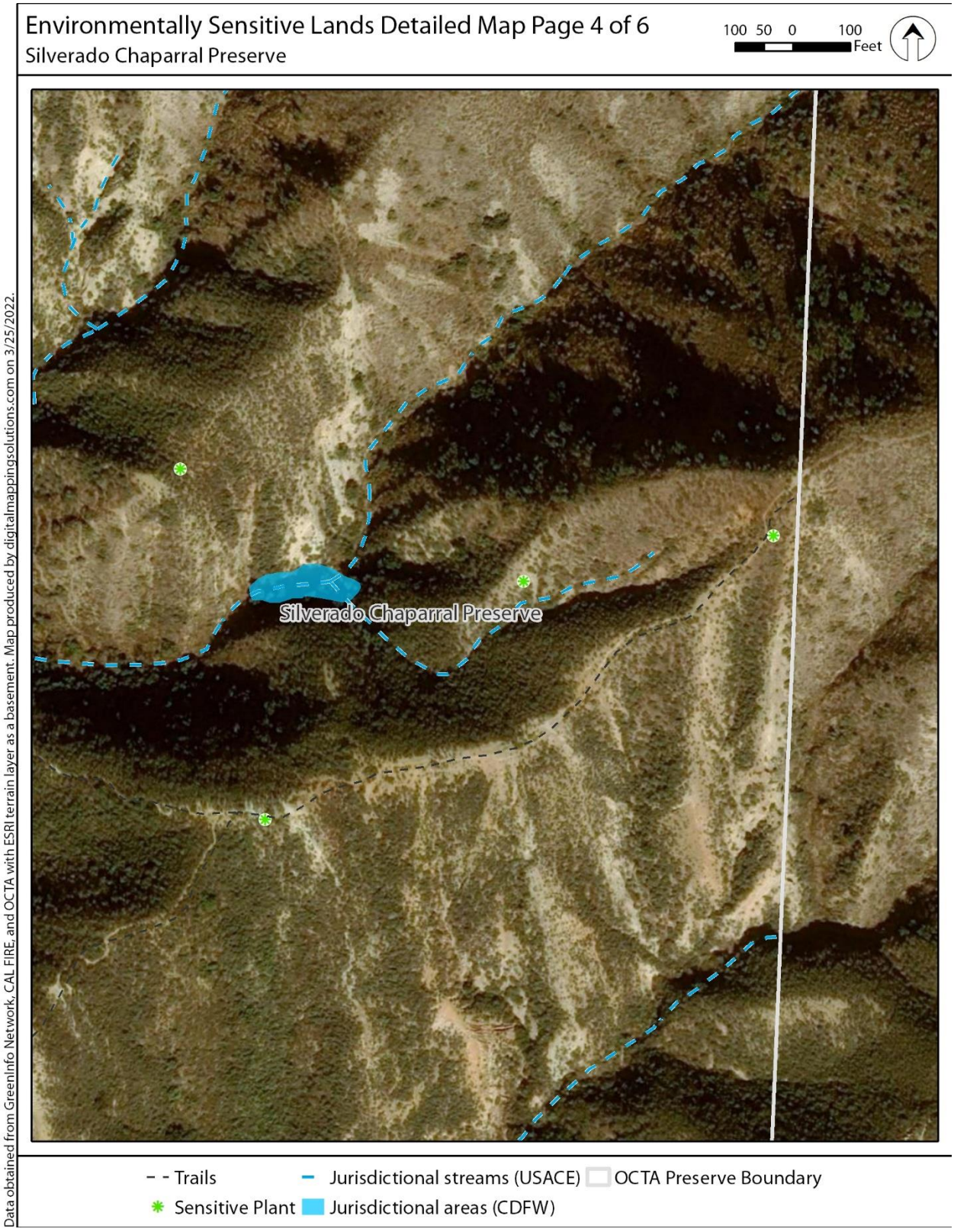
APPENDIX C: ENVIRONMENTALLY SENSITIVE LANDS MAPS
SILVERADO CHAPARRAL PRESERVE




Environmentally Sensitive Lands Detailed Map Page 1 of 6
Silverado Chaparral Preserve
100 50 0 100
Feet
Silverado Chaparral Preserve
Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 3/25/2022.
Powerline (with 100ft buffer)
Sensitive Plant Area
Previous/Potential Future Dozer Line
Trails
Jurisdictional streams (USACE)
OCTA Preserve Boundary
Sensitive Plant
Building/Structure


Environmentally Sensitive Lands Detailed Map Page 2 of 6
Silverado Chaparral Preserve
100 50 0 100
Feet
Silverado Chaparral Preserve
Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 3/25/2022.
Trails
Jurisdictional streams (USACE)
OCTA Preserve Boundary
Sensitive Plant
Previous/Potential Future Dozer Line


Environmentally Sensitive Lands Detailed Map Page 3 of 6
Silverado Chaparral Preserve
100 50 0 100
Feet
Silverado Chaparral Preserve
Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 3/25/2022.
Powerline (with 100ft buffer)
Sensitive Plant Area
Previous/Potential Future Dozer Line
Trails
Jurisdictional streams (USACE)
OCTA Preserve Boundary
Sensitive Plant
Jurisdictional areas (CDFW)


Environmentally Sensitive Lands Detailed Map Page 4 of 6
Silverado Chaparral Preserve
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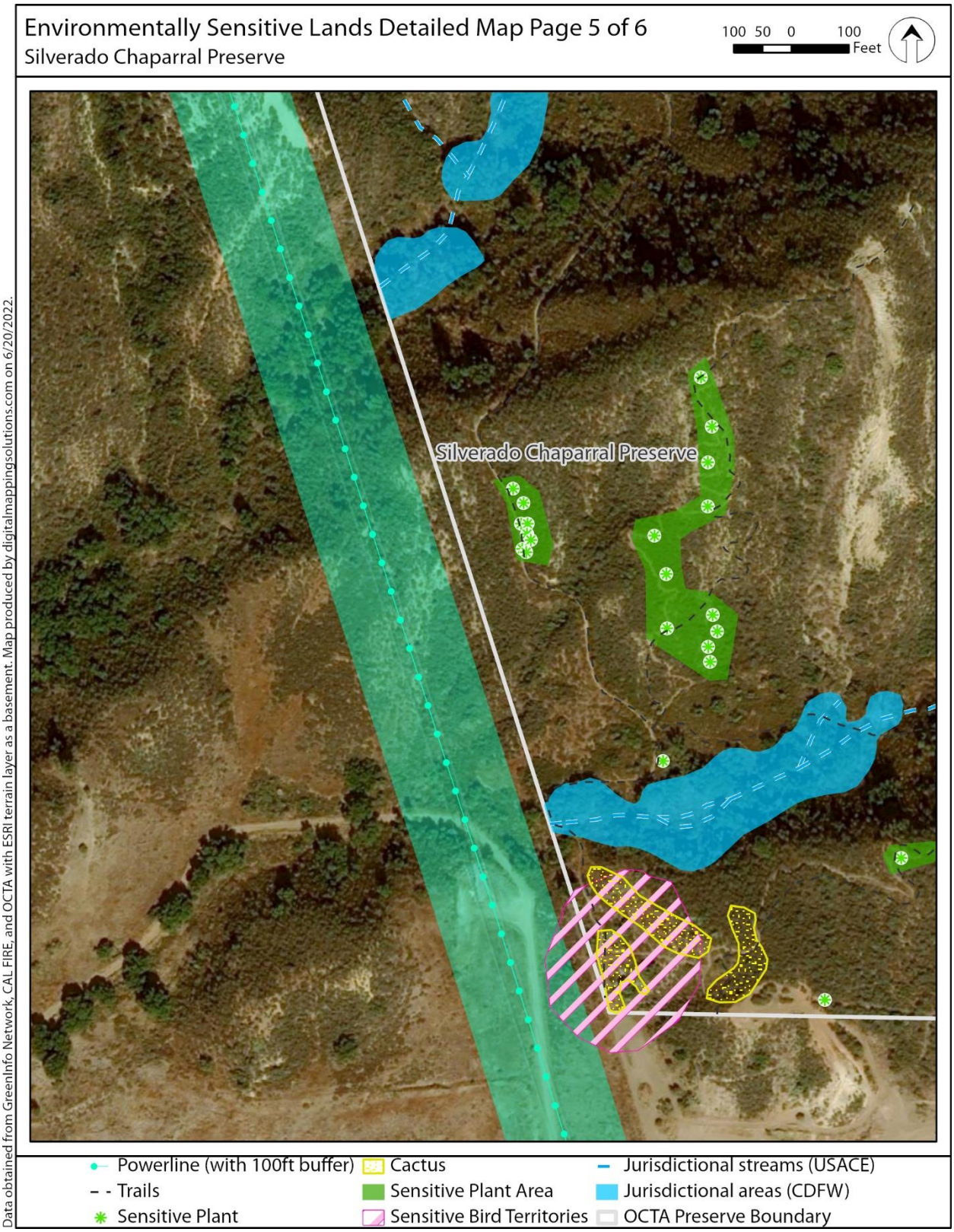
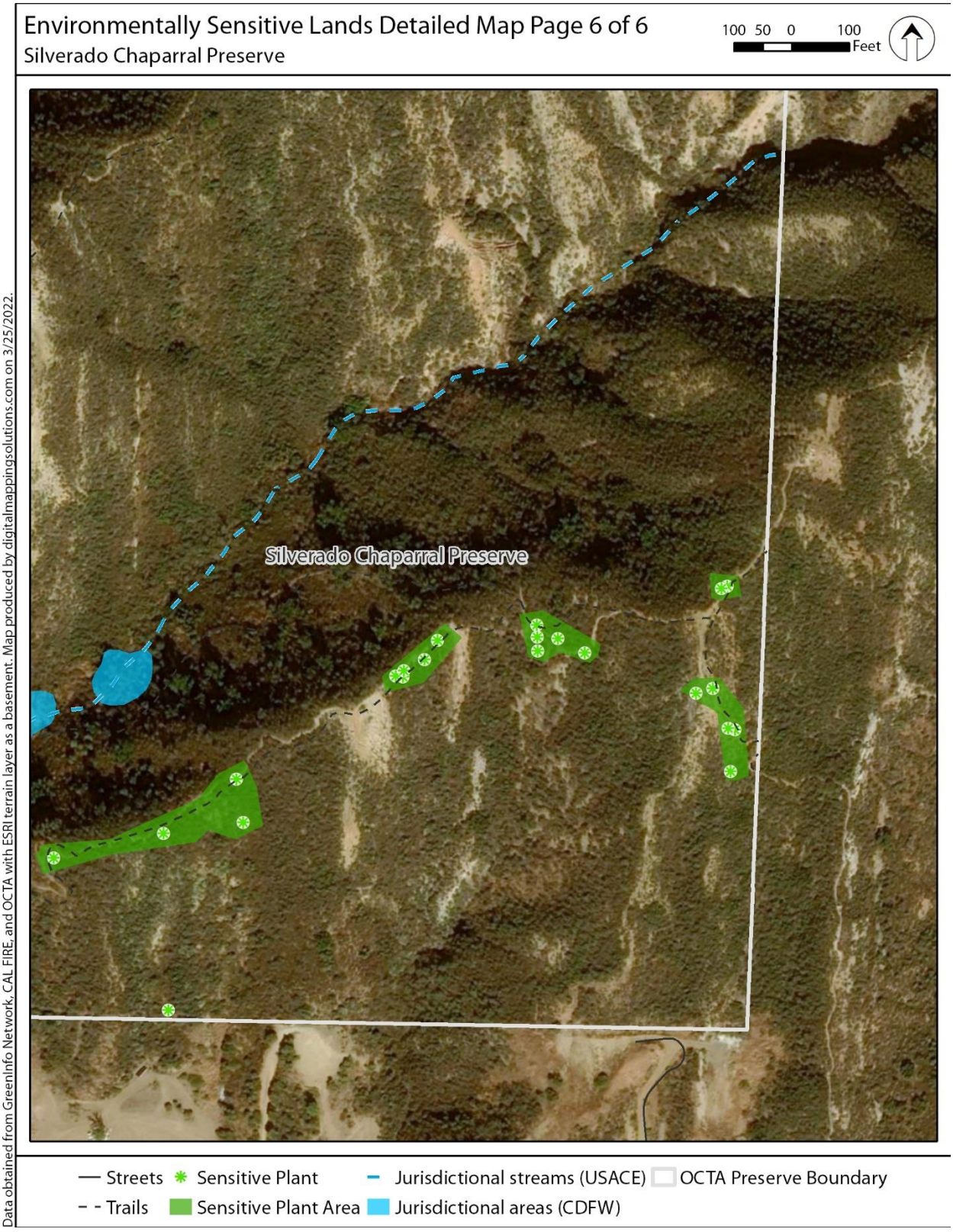
Feet
Silverado Chaparral Preserve
Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 3/25/2022.
Trails
Jurisdictional streams (USACE)
OCTA Preserve Boundary
Sensitive Plant
Jurisdictional areas (CDFW)


Environmentally Sensitive Lands Detailed Map Page 5 of 6
Silverado Chaparral Preserve
100 50 0 100
Feet
Silverado Chaparral 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.
Powerline (with 100ft buffer)
Trails
Sensitive Plant
Cactus
Sensitive Plant Area
Sensitive Bird Territories
Jurisdictional streams (USACE)
Jurisdictional areas (CDFW)
OCTA Preserve Boundary


Environmentally Sensitive Lands Detailed Map Page 6 of 6
Silverado Chaparral Preserve
100 50 0 100
Feet
Silverado Chaparral Preserve
Data obtained from GreenInfo Network, CAL FIRE, and OCTA with ESRI terrain layer as a basement. Map produced by digitalmappingsolutions.com on 3/25/2022.
Streets
Trails
Sensitive Plant
Sensitive Plant Area
Jurisdictional streams (USACE)
Jurisdictional areas (CDFW)
OCTA Preserve Boundary