Appendix J

Fire Protection Plan for Proposed Cancer Center Site

DRAFT

Fire Protection Plan
Los Robles Comprehensive Cancer Center Project
Thousand Oaks, California

DECEMBER 2023

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AMSL	Above Mean Sea Level
APN	Assessor's Parcel Number
BTU	British Thermal Unit
CAWC	California American Water Company
CAL FIRE	California Department of Forestry and Fire Protection
CBC	California Building Code
CDFW	California Department of Fish and Wildlife
CC&Rs	Covenants, Conditions and Restrictions
CCR	California Code of Regulations
CFC	California Fire Code
CCS	Chaparral and Coastal Sage Scrub
FAHJ	Fire Authority Having Jurisdiction
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
FRAP	Fire and Resource Assessment Program
GIS	Geographic Information Systems
IFC	International Fire Code
ISO	Insurance Service Office
LRA	Local Responsibility Area
MPH	Miles Per Hour
NFPA	National Fire Protection Association
PRC	Public Resource Code
Project	Los Robles Comprehensive Cancer Center Project
SRA	State Responsibility Area
U.S. 101	United States Route 101
USGS	United States Geological Survey
VCFD	Ventura County Fire Department
VCFPD	Ventura County Fire Protection District
VHFHSZ	Very High Fire Hazard Severity Zone
WRCC	Western Regional Climate Center
WUI	Wildland Urban Interface

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Executive Summary

This Fire Protection Plan (FPP) has been prepared for the Los Robles Comprehensive Cancer Center Project (Project), which proposes the development of a new medical office building in order to expand needed medical services to better serve the community and patients of Los Robles Hospital and Medical Center. The project is proposed on approximately 4.7-acres in the southern portion of the City of Thousand Oaks (City), Ventura County, California. Primary access to the proposed project will be off Rolling Oaks Drive, requiring reconfiguration of the existing drive; a secondary access point will be accommodated off Los Padres Drive. The proposed project site is currently vacant after a daycare facility was demolished and is vegetated with numerous ornamental trees, protected status trees (oak and California bay laurel), and shrubs. The site is bounded by Rolling Oaks Drive to the north, single-family residential homes in unincorporated Ventura County to the east, open space to the south, and Los Padres Drive to the west.

The proposed project site lies within an area considered a Very High Fire Hazard Severity Zone (VHFHSZ), as designated by the Ventura County Fire Department (VCFD) and California Department of Forestry and Fire Protection (CAL FIRE). Fire hazard designations are based on topography, vegetation, and weather, amongst other factors. In summary, the project is located in the southern portion of the City of Thousand Oaks, adjacent to open space areas to the south, is currently undeveloped and vacant, and is covered primarily by flashy grass fuels. The area, like many areas of Ventura County, is subject to seasonal weather conditions that can heighten the likelihood of fire ignition and spread, and, considering the site's terrain and vegetation, may result in a moderate to fast moving and moderate-intensity wildfire.

This FPP evaluates and identifies the potential fire risk associated with the Project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, and fire protection systems, among other pertinent fire protection criteria. The purpose of this plan is to generate and memorialize the fire safety requirements and standards of the VCFD, along with Project-specific measures based on the project site, its intended use, and its fire environment. This document provides analysis of the site's fire environment and its potential impact on the proposed Project as well as the project's potential impact on the existing fire protection service. The fire safety measures included herein are based on site-specific fire environment analysis, Project characteristics, while incorporating area fire planning documents, site risk analysis, and standard principles of fire protection planning.

The proposed project site is within the jurisdiction of the VCFD. The VCFD operates four fire stations that are nearby and could respond to an incident on the site, including Station Nos. 30, 31, 34, and 35 (ladder truck). Based on the proposed Los Robles Comprehensive Cancer Center site location in relation to existing VCFD stations, travel time to the site for the first responding engine from Station 30 is approximately 3 minutes to either entrance into the Project site. Based on these calculations, emergencies within the project can be responded to by VCFD's first arriving unit (average maximum initial response of no more than 8 minute 30 second for fire apparatus and 5 minutes for ambulance, 90% of calls) in accordance with the County's emergency response standard. In addition, automatic/mutual aid agreements are in place with all surrounding communities and have been recently improved through the implementation of a computer aided dispatch system.

As determined during the analysis of the site and its fire environment, the project site, in its current condition, may include characteristics that, under favorable weather conditions, could have the potential to facilitate fire spread. Under extreme conditions, wind-driven wildfires from the east/northeast are likely to cast embers onto the property.

Once the Project development is constructed, the on-site fire potential will be much lower than its current condition due to the conversion of the property to a building footprint meeting the most recent ignition and ember resistant fire and building codes, non-combustible parking areas, managed landscape areas, requirements for water supply, fire apparatus access, improved accessibility for fire personnel, fuel modification zone implementation, interior fire sprinkler system, and 8 minute 30 second or less fire response travel times were integrated into the code requirements and internal VCFD guidelines based on the County of Ventura Strategic Plan. When it became clear that specifics of how structures were built, how fire and embers contributed to ignition of structures, what effects fuel modification had on structure ignition, how fast firefighters could respond, and how much (and how reliable) water was available, were critically important to structure survivability, the Fire and Building codes were revised appropriately. Ventura County now boast some of the most restrictive codes for building within Wildland Urban Interface (WUI) areas that focus on preventing structure ignition from heat, flame, and burning embers.

As detailed in this FPP, the project's fire protection systems will include a redundant layering of protection methods that have proven to reduce overall fire risk. The fire safety measures included herein, both required and recommended, are performance based and site–specific, considering the Project's unique characteristics rather than a prescriptive, one-size-fits-all approach. The fire protection systems are designed to increase building safety, as well as the safety of those occupying the building, reduce the fire risk on site, to minimize risks associated with typical uses, and aid the responding firefighters during an emergency. No singular measure is intended to be relied upon for the site's fire protection, but rather, a system of fire protection measures, methods, and features combine to result in enhanced fire safety, reduced fire potential, and improved safety in the development.

Based on the results of this FPP's analysis and findings, the following FPP implementation measures will be provided as part of the proposed development plan. Based on the analysis conducted herein, the project meets all fire and building code requirements and includes appropriate protections for the fire environment in which it is located. These measures are discussed in more detail throughout this FPP.

Implementation Measures

1. The project's building will be constructed of ignition resistant[1] construction materials and include a National Fire Protection Association (NFPA) 13 automatic fire sprinkler system based on the latest adopted Building and Fire Codes for occupancy types.
2. Fuel Modification will be provided around the perimeter of the structure, as required by VCFD and will provide 100 feet of Zone 0, Zone 1, and Zone 2 fuel modification, as described in VCFD Standard 515, *Defensible Space and Fuel Modification Zones Standard* and VCFD Guideline 418, *Defensible Space*, including off-site equivalent fuel modification along Rolling Oaks Drive to the north and Los Padres Drive to the west. The Ventura County Fire Department will conduct annual inspections to determine fuel modification zone compliance; should areas within the development not be able to achieve a minimum 100 feet of onsite fuel modification, additional fire protection measures may be proposed to provide the functional equivalency of a full 100 feet of defensible space. The additional fire protection measures will be to the satisfaction of the VCFD and may include structural hardening enhancements or landscape features, like dual pane dual tempered windows on the exposed side of the structure.
3. Paved parking areas are provided throughout the development site, both on site and existing off site.

[1] A type of building material that resists ignition or sustained flaming combustion sufficiently to reduce losses from wildland-urban interface conflagrations under worst-case weather and fuel conditions with wildfire exposure of burning embers and small flames, as prescribed in CBC, Chapter 7A and State Fire Marshal Standard 12-7A-5, Ignition-Resistant Materials.

4. Landscape plantings will not utilize prohibited plants that have been found to be highly flammable (see Appendix F).
5. Fire apparatus access roads will be provided throughout the development and will provide at least the minimum required unobstructed travel lanes, lengths, turnarounds, and clearances required by applicable codes. Primary access and internal circulation will comply with the requirements of the VCFD.
6. The structure will be equipped with an NFPA 13 automatic interior fire sprinkler systems meeting VCFD requirements for this type of facility.
7. Water capacity and delivery provide for a reliable water source for operations and during emergencies requiring extended fire flow.

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1 Introduction

The Fire Protection Plan (FPP) has been prepared for the proposed Los Robles Comprehensive Cancer Center Project (Proposed Project) in the City of Thousand Oaks, an incorporated city in Ventura County, California. The purpose of the FPP is to evaluate the potential impacts resulting from wildland fire hazards and identify/verify the proposed implementation measures to adequately mitigate those risks to a level consistent with the VCFD and City of Thousand Oaks thresholds. Additionally, this FPP establishes and memorialize the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which is the VCFD. Requirements and recommendations detailed in the FPP are based on Project site-specific characteristics, applicable code requirements, and input from the Project's applicant, planners, engineers, and architects, as well as the VCFD.

As part of the assessment, this FPP has considered the fire risk presented by the site including the property location and its topography, geology, surrounding combustible vegetation (fuel types), climatic conditions, fire history, and the proposed land use. The FPP addresses water supply, access, structural ignitability, and ignition resistive building features, fire protection systems, and equipment, impacts to existing emergency services, defensible space, and vegetation management. The FPP also identifies and prioritizes fuel modification zones and recommends the types and methods of treatment that when implemented and maintained, are designed to protect this structure and its essential infrastructure. The FPP recommends measures that developer/builders and property owners will take to reduce the probability of structural and vegetation ignition.

The Project is located within the boundaries of the VCFD and thus the FPP addresses VCFD's response capabilities and response travel time to the proposed project site, along with projected funding for facility improvements and fire service maintenance.

The following tasks were performed toward completion of this FPP:

- Gather site-specific climate, terrain, and fuel data;
- Collect site photographs[2];
- Process and analyze project related data using the latest geographic information system (GIS) technology;
- Predict fire behavior using scientifically based fire behavior models, comparisons with actual wildfires in similar terrain and fuels, and experienced judgment;
- Analyze and guide the design of proposed infrastructure;
- Analyze the existing emergency response capabilities;
- Assess the risk associated within and adjacent to the Project site;
- Evaluate nearby firefighting and emergency medical response resources; and
- Prepare this FPP detailing how fire risk will be mitigated through a system of fuel modification, structural ignition resistance enhancements, and fire protection delivery system upgrades.

[2] Field observations were used to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in the FPP. Refer to Appendix A, Representative Site Photographs, for site photographs of existing site conditions.

1.1 Applicable Codes and Existing Regulations

The Ventura County Fire Protection District's Fire Ordinance Number 32 is referenced to as the Ventura County Fire Code by repealing Ordinance 31 (adopting portions of the 2021 International Fire Code and 2022 California Fire and Building Codes adopted by reference with several modifications) governs the building, infrastructure, and defensible space requirements detailed in this FPP. This FPP is consistent with the uniform emergency access and installation standards used throughout the State of California as described in the 2022 California Building Code (CBC) including those standards identified within Chapter 7A, which focuses primarily on preventing ember penetration into structures. Furthermore, the requirements outlined within the California Code of Regulations (CCR), specifically Titles 14 and 24, and those outlined within the 2022 California Fire Code (CFC), including Chapter 49, as well as the operational procedures and capabilities particular to the VCFD emergency vehicles and suppression personnel. The Ventura County Fire Code and the Ventura County Fire Protection District (VCFPD) Ordinance No. 32 and Ordinance No. 29 are even more restrictive and, in most instances, this FPP requires inclusion of these local code requirements for the construction of the proposed Los Robles Comprehensive Cancer Center Project. The purpose of this plan is to generate and memorialize the fire safety requirements of the FAHJ, namely the VCFD. Requirements are based on site-specific characteristics and incorporate input from project planners, engineers, biologists, architects, and the VCFD.

Chapter 7A of the CBC addresses structural ignition resistance and reducing ember penetration into structures, a leading cause of structure loss from wildfires (California Building Standards Commission 2019). Thus, code compliance is an important component of the requirements of the FPP, given the Project's wildland-urban interface (WUI) location that is within an area statutorily designated as a Very High Fire Hazard Severity Zone (VHFHSZ) within a Local Responsibility Zone (LRA) by the California Department of Forestry and Fire Protection (CAL FIRE) (FRAP 2010.Fire hazard designations are based on topography, vegetation, and weather, among other factors with more hazardous sites, including steep terrain, unmaintained fuels/vegetation, and WUI locations. Projects situated in VHFHSZ's require fire hazard analysis and the application of fire protection measures to create ignition-resistant structures and defensible communities within these WUI locations. VHFHSZ designations do not, in and of themselves, indicate that it is unsafe to build in these areas.

As described in this FPP, the Project will meet all applicable fire and building code requirements for building in these higher fire hazard areas or meet the intent of the code through the application of Project site-specific fire protection measures. These codes have been developed through decades of after fire structure save and loss evaluations to determine what causes building loss during wildfires. The resulting fire codes now focus on mitigating former structural vulnerabilities through construction techniques and materials so that the buildings are resistant to ignitions from direct flames, heat, and embers, as indicated in the 2022 California Building Code (Chapter 7A, Section 701A Scope, Purpose and Application).

Field observations were utilized to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in this FPP. Refer to Appendix A for site photographs of existing site conditions.

1.2 Proposed Project Summary

1.2.1 Project Overview

The proposed project site comprises approximately 4.7 gross acres of land that the City of Thousand Oak's General Plan designates the property as Very Low Rural Residential and is zoned Rural-Exclusive (R-E-1AC). A General Plan Amendment and Zone Change is proposed to change the land use and zoning from Very Low Density/Rural-Exclusive Residential to Commercial Office (C-O). The project would be consistent with the purpose of the C-O zone. The project is adjacent to medical office to the north, residential multifamily apartments to the west and single-family communities further to the south and east. The project would be developed as professional medical offices, designed to be compatible in scale and character with the surrounding uses. The project meets the City's high standards related to concentration of buildings through its careful consideration of building placement and its split-level design in response to the topography. The project meets the City's standards for landscaping and provides adequate parking, pedestrian, and vehicular circulation.

1.2.2 Project Location

The proposed project area lies within the southern portion of the City of Thousand Oaks and is south of the U.S. 101. The site is approximately 4.7 gross acres (ac) and is bounded by Rolling Oaks Drive to the north, the Rolling Oaks residential tract to the east, naturally-vegetated open space areas directly to the south, and Los Padres Drive to the west. More specifically, surrounding uses include an existing Medical Office Building across the street and to the north; vacant, OS-PR (Open Space, Protected Ridgeline Overlay) directly to the south; vacant land and semi-rural Single-Family Residences in unincorporated Ventura County, R-O-3AC (Single-Family Estate Zone – 3 AC Min. Lot Size) to the east; and existing Multi-Family Residential Development, R-3 (Multi-Family Residential Zone) across Los Padres Drive to the west. From a regional perspective, the Project site is located approximately 0.2 mile south of U.S. 101. (Refer to Figure 1. Project Location Map and Figure 2. Project Site Map). The Project site encompasses Assessor's Parcel Numbers (APN 681-0180-265) (the "Property"). Primary Access to the project site would be via Rolling Oaks Drive or Los Padres Drive with secondary access provided by Haaland Drive.. The site is located in Section 16, Township 1 North, Range 19 West as found on the USGS – Thousand Oaks Quadrangle, 7.5 Minute Series topographic. The entirety of the proposed property lies within the local responsibility area (LRA) VHFHSZ, as statutorily designated by CAL FIRE (2010) and VCFD (Figure 3, Fire Hazard Severity Zone Map).

1.2.3 Current Land Use

The property is currently vacant after a daycare facility was recently demolished. As a prior children's day care operation (Young Set Club), the facility included a main building, a swimming pool, basketball court, playground, and other recreational facilities. The property is vegetated with numerous ornamental trees, protected status trees (oaks and a California bay laurel) and shrubs. Disturbed coastal sage scrub is found on the southern part of the site blending to open space on the adjacent vacant parcel. Elevations range between approximately 770 feet above mean sea level (amsl) in the northeast portion of the property to 870 feet amsl along in the southwest portion of the property. The proposed project site is currently used for surface parking for the existing Los Robles Regional Medical Center and supporting medical services.

The project site, like many areas throughout Southern California and Ventura County, is subject to seasonal weather conditions that can heighten the likelihood of fire ignition and spread, and, considering the adjacent terrain and vegetation, may result in a moderate-moving and intense wildfire.

1.2.4 Project Description

The proposed project is for the construction of a new medical office building, with the primary access off Rolling Oaks Drive and secondary access off Los Padres Drive. Parking will be provided on-site, including a drop-off area for patients at the front of the building (north side).

The project will include the construction of a new 58,000 square foot (SF) medical office building and associated improvements, including a drop-off location for patients, parking areas, and landscaping. The building will have a split level amongst two stories with a mechanical rooftop screened with mansard roofing; the front portion of the building (northern portion of the building) will include two stories and be up to approximately 43 feet tall. However, as you move to the rear portion of the building (southern portion of the building), the tiered building is reduced to a single story and approximately 27 feet tall. This will be an OSHPD 3 building, requiring state review and approval of building permits. The medical building would contain patient rooms, treatment services, office area for staff and physicians, conference/consultation rooms, lounge areas, general storage, and utility areas.

Primary access is proposed off Rolling Oaks Drive with secondary access accommodated off Los Padres Drive. The Project would include a patient drop off area, 233 surface parking spaces, in accordance with the City Municipal Code requirements, 26 electric vehicle charging spaces and 28 clean air stalls per CalGreen standards. In addition, 12 on-site bicycle parking (short-term and long-term) would also be provided.

The project will also provide 14 percent landscape coverage (17,204 SF), providing enhanced perimeter landscape treatment. There is a 20-foot side and front setback from property line to building along Rolling Oaks Drive and Los Padres Drive. The proposed project accommodates a 20-foot rear setback and a 25-foot utility easement from the property line along the east edge of the property. Table 1 below, provides a summary of the applicable development standards and compliance (Figure 4, Project Site Plan Map).

Table 1, Development Standards Summary

Development Standards			
Standard and Code Section	**Commercial Office (C-O)**	**Proposed**	**Notes**
Permitted Uses *Section 9-4.1102*	Medical and dental offices, including urgent care (DP)	Comprehensive Cancer Center/Medical	
Height *Sec. 9-4.1106. Height regulations (C-O).*	2 Stories 25-feet A building or structure exceeding such height may be approved by the Commission if it finds the purposes of this article have been met.	2 Stories 27 to 43-feet split-level.	Compliant with number of Stories, exceeds maximum height due to grade differential. Request to increase height in feet will be made to the Planning

Development Standards				
Standard and Code Section		**Commercial Office (C-O)**	**Proposed**	**Notes**
				Commission as part of the Development Permit.
Setback *Sec. 9-4.1107. Area regulations (C-O).*	Front	20-feet	20-feet	Compliant
	Side	5-feet	20-feet along Los Padres Drive; 25-feet on east side	Compliant
	Rear	20-feet	20-feet	Compliant
Parking *Sec. 9-4.2402. Parking spaces required.* *Sec. 9-4.2403(d)(1)* *Sec. 9-4.4001* *Sec. 9-4.2404. General installation requirements of parking areas.* *CA Building Code*	City Ratio	1 stall/200 SF Med Office 224 Spaces Application of Gross Leasable SF for Multi-tenant buildings: 44,811 Net SF	233 Parking Spaces Current stall count	Compliant
	Parking Stall Dimensions	Standard: 20'x9' w/Overhang: 18'x9' Compact: 16'x9'	Standard: 20'x9' w/Overhang: 18'x9' Compact: 16'x9'	Compliant
	Compact Spaces	25%	23%	Compliant
	EV Spaces Clean Air Spaces		26 spaces 28 spaces	Compliant Compliant
	Disability	CBC 2022 Table 11B 208.2 – 5 percent requirement. 243 x 0.05 = 13 ADA stalls CBC 2022 11B-208.2.4 Van Accessible – Every 6 stalls = 3 Van Total	14 ADA (2 Van Accessible)	Compliant
	Bicycle	5% of New Visitor Motorized Parking	12 Bicycle Stalls	Compliant

Development Standards			
Standard and Code Section	**Commercial Office (C-O)**	**Proposed**	**Notes**
Landscape *Sec. 9-4.1109. Landscaping, lighting, and storage (C-O).*	3 percent or more of the parking area shall be landscaped, and such landscaping shall be considered as part of the required 10 percent landscape requirement.	14% Landscape Area	Compliant
	Parking Areas that Abuts Public Street: Planting strip 1.5 - to 4.5-feet wide, maintained at a minimum height of 2.5-feet or less if affect sight distance.		Compliant

INFRASTRUCTURE

Domestic water service would be provided by the California American Water Company and will connect to the existing water main in Rolling Oaks Drive and will connect to the building on the west side of the building.

Two sewer point of connections will collect all waste and connect to an existing manhole at the intersection of Rolling Oaks Drive and Los Padres Drive.

Off-site drainage will be redirected via a valley gutter so as to ultimately connect to their original drainage pattern. A portion of the existing valley gutter along Los Padres Drive will be demolished. Additionally, the project proposes to construct a headwall and connect to a proposed underground pipe.

There are a series of storm drain inlets and pipes throughout the Property that will gather rainwater and route it to four proposed Low Impact Development (LID) stormwater treatment planters. The treated water will then be conveyed to one of two on-site storm water detention chambers used to monitor flow before connecting to public storm drain facilities. Along the site's north side, an energy dissipating structure is proposed to outlet water to the natural channel. The southern detention system will connect to a proposed storm drainpipe along Los Padres Drive that will replace an existing valley gutter. To provide adequate fire coverage, two on-site fire hydrants are provided, as well as an underground fire water line which will be connected to fire sprinklers inside the building. One fire connection will be made on Rolling Oaks Drive along with another connection along Los Padres Drive.

SANITARY SEWER

Sanitary sewer service would be provided by the City of Thousand Oaks. Existing sanitary sewer lines include sewer lines Rolling Oaks Drive and Los Padres Drive. The proposed Project would connect to the existing sanitary sewer lines at two points of connection, and would connect to an existing manhole at the intersection of Rolling Oaks Drive and Los Padres Drive.

STORM DRAINAGE

Off-site drainage would be redirected via a valley gutter so as to ultimately connect to their original drainage pattern. A portion of the existing valley gutter along Los Padres Drive would be demolished as part of the Project. Additionally, the Project proposes to construct a headwall and connect to a proposed underground pipe.

A series of existing storm drain inlets and pipes throughout the Property that would gather rainwater and route it to four proposed Low Impact Development (LID) stormwater treatment planters. The treated water would then be conveyed to one of two on-site storm water detention chambers used to monitor flow before connecting to public storm drain facilities. Along the Project site's north side, an energy dissipating structure is proposed to outlet water to the natural channel. The southern detention system would connect to a proposed storm drainpipe along Los Padres Drive that would replace an existing valley gutter.

GAS, ELECTRIC, AND TELECOMMUNICATION FACILITIES

Upgrades would be required with respect to electric power, natural gas, and telecommunication facilities (i.e., cable television services). These utilities would be part of a dry utility package that would be installed on site from their locations immediately fronting the Project site to provide service to the Project.

PROJECT CONSTRUCTION

Based on information provided by the Project Applicant, it is assumed that construction of the Project would commence February 2024[3] and would last approximately 13 months, ending in March 2025. The analysis contained herein is based on the following assumptions (duration of phases is approximate):

- Demolition (1 month)
- Site preparation (1 week)
- Grading (2 days)
- Building construction (11 months)
- Paving (1 month)
- Architectural coating (1 month)

Construction activities would include site preparation (e.g., vegetation clearing, grubbing, tree removal, discing), grading, building construction, paving, and architectural coating.

Construction activities would generally occur across six phases: site preparation (e.g., vegetation clearing, grubbing, tree removal, discing), grading, building construction/utility installation, paving, and architectural coating.

The Project would involve the export of approximately 12,470 cubic yards of earthwork materials to balance the site during the grading phase.

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[3] The analysis assumes a construction start date of February 2024, which represents the earliest date construction would initiate. Assuming the earliest start date for construction represents the worst-case scenario for criteria air pollutant and GHG emissions because equipment and vehicle emission factors for later years would be slightly less due to more stringent standards for in-use off-road equipment and heavy-duty trucks, as well as fleet turnover replacing older equipment and vehicles in later years.

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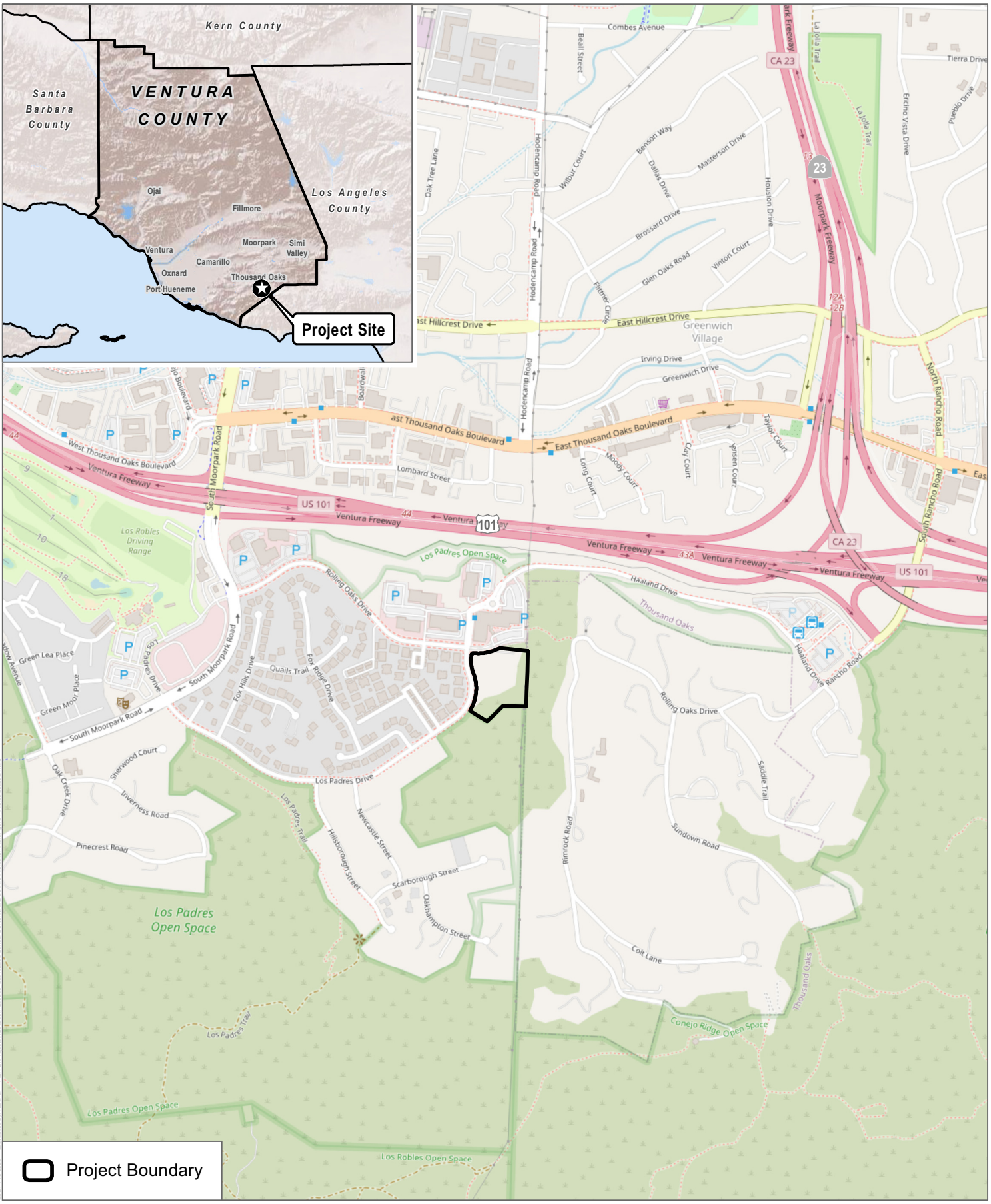

SOURCE: Open Street Map, City of Thousand Oaks

DUDEK

0 400 800 Feet

FIGURE 1

Project Location Map

Los Robles Comprehensive Cancer Center Project

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SOURCE: Bing, Open Street Maps 2019

DUDEK

0 50 100 Feet

FIGURE 2

Project Site Map

Los Robles Comprehensive Cancer Center Project

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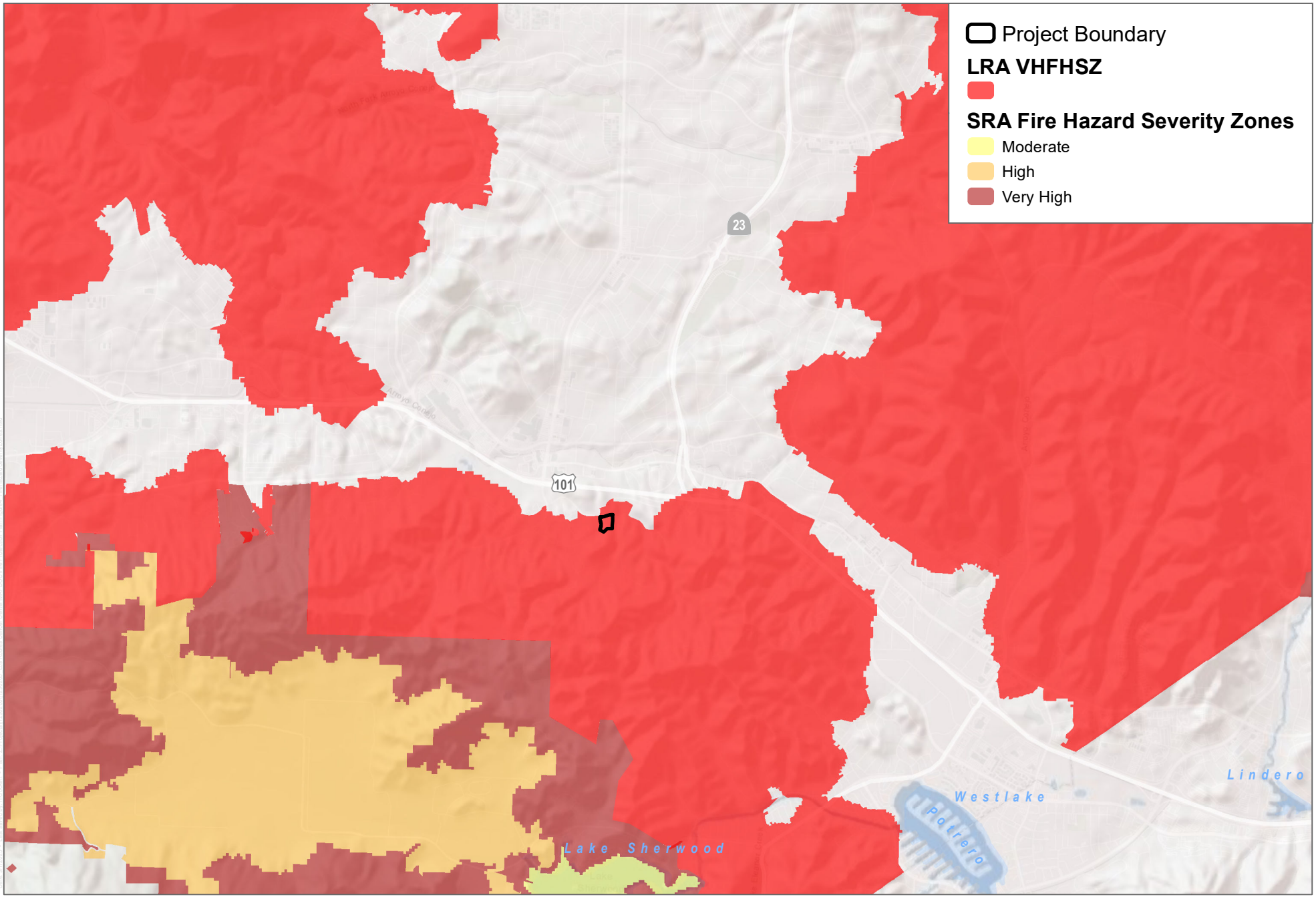

SOURCE: CalFire FRAP

DUDEK

0 0.5 1 Miles

FIGURE 3

Fire Hazard Severity Zones

Los Robles Comprehensive Cancer Center Project

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SOURCE: HKS Architect 2023

DUDEK

0 35 70 Feet

FIGURE 4

Project Site Plan

Los Robles Comprehensive Cancer Center Project

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2 Project Site Risk Analysis

2.1 Environmental Setting and Field Assessment

After review of available digital Study Area information, including topography, vegetation types, fire history, and the Project's Development Footprint, a Dudek Fire Protection Planner conducted a field assessment of the Los Robles Comprehensive Cancer Center project site in March 2023, in order to confirm/acquire site information, document existing site conditions, and to determine potential actions for addressing the protection of the Project's structure. While on-site, Dudek's Fire Planner assessed the area's topography, natural vegetation, and fuel loading, surrounding land use, and general susceptibility to wildfire. Among the field tasks that were completed included:

- Topography evaluation;
- Vegetation/fuel assessments;
- Photograph documentation of the existing condition;
- Confirmation/verification of hazard assumptions;
- Off-site, adjacent property fuel and topography conditions;
- Surrounding land use confirmations;
- Necessary fire behavior modeling data collection;
- Ingress/egress documentation;
- Nearby Fire Station reconnaissance.

Study Area photographs were collected (refer to Appendix A, *Representative Site Photographs*), and fuel conditions were mapped using aerial images. Field observations were utilized to augment existing site data in generating the fire behavior models and formulating the requirements and recommendations detailed in the FPP.

2.2 Site Characteristics and Fire Environment

Fire environments are dynamic systems and include many types of environmental factors and site characteristics. Fires can occur in any environment where conditions are conducive to ignition and fire movement. Areas of naturally vegetated open space are typically comprised of conditions that may be favorable to wildfire spread. The three major components of the fire environment are topography, vegetation (fuels), and climate. The state of each of these components and their interactions with each other determines the potential characteristics and behavior of a fire at any given moment. It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition. Structure ignition depends on a variety of factors and can be prevented through a layered system of protective features including fire-resistive landscapes directly adjacent to the structure(s), application of known ignition resistive materials and methods, and suitable infrastructure for firefighting purposes. Understanding the existing wildland vegetation and urban fuel conditions on and adjacent to the site is necessary to understand the potential for fire within and around the Project site. The following sections discuss the characteristics of the Project area and the surrounding region, local climate, and fire history within and surrounding the site. The property is similar concerning topography, vegetative cover, and proximity to adjacent residential areas, available access, and planned use. The intent of evaluating conditions at a macro-scale provides a better understanding of the regional fire environment, which is not constrained by property boundary delineations.

2.2.1 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower spread down-slope in the absence of wind. Terrain that forms a funneling effect, such as chimneys, chutes, or saddles on the landscape can result in especially intense fire behavior. Conversely, flat terrain tends to have little effect on fire spread, resulting in fires that are driven by vegetation and wind.

Due to previous development on site, the site's topography is relatively flat on the north and west portions of the site but has foothill slopes on the southern side of the property. Elevations range between approximately 770 feet amsl in the northeast portion of the property to 870 feet amsl along in the southwest portion of the property.

2.2.2 Climate

The Project site, like much of Southern California, is influenced by the Pacific Ocean and a seasonal, migratory subtropical high-pressure cell known as the "Pacific High." Wet winters and dry summers with mild seasonal changes characterize the Southern California climate. This climate pattern is occasionally interrupted by extreme periods of hot weather, winter storms, or dry, easterly Santa Ana winds. The climate of Thousand Oaks is typical of a Mediterranean area, with warm, dry summers and cold, wet winters. Temperatures average (average annual) around 36°F at night and during the winter and reach up to 100°F during the summer. Precipitation has been averaging about 15 inches and typically occurs between November and April (Western Regional Climate Center, 2022).

The prevailing wind pattern is from the west (on-shore), but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are from the west–southwest (sea) and at night winds are from the northeast (land), averaging 2 miles per hour (mph). During the summer season, the diurnal winds may average slightly higher (approximately 14 mph) than the winds during the winter season due to greater pressure gradient forces. Surface winds can also be influenced locally by topography and slope variations. The highest wind velocities are associated with downslope, canyon, and Santa Ana winds. This project site does not include topography that would create unusual weather conditions. However, the site may be subject to periodic extreme fire weather conditions that occur throughout Ventura County, although, unlikely because of the location of this site.

From a regional perspective, the fire risk in southern California can be divided into three distinct "seasons" (Nichols et al. 2011, Baltar et al 2014). The first season, the most active season and covering the summer months, extends from late May to late September. This is followed by an intense fall season characterized by fewer but larger fires. This season begins in late September and continues until early November. The remaining months, November to late May cover the mostly dormant, winter season. Mensing et al. (1999) and Keeley and Zedler (2009) found that large fires in the region consistently occur at the end of wet periods and the beginning of droughts. Fires can be a significant issue during summer and fall, before the rainy period, especially during dry Santa Ana wind events. Although Santa Ana events can occur anytime of the year, they generally occur during the autumn months, although the last few years have resulted in spring (April - May) and summer events. Santa Ana winds may gust up to 50 miles per hour (mph) or higher. The project site is situated in an area that historically doesn't seem to be subject to the extreme Santa Ana winds, however, there still is a chance.

2.2.3 Vegetation

2.2.3.1 Fuels (Vegetation)

As mentioned above, the site is bordered to the north by Rolling Oaks Drive and an existing medical building, to the west by Los Padres Drive and multi-family residential development, to the east by undeveloped and semi-rural single-family residential development, and to the south by an undeveloped, open space hillside designated as the Los Padres Open Space. More specifically, the northwest portion of the site has remnants of the previous development with multiple concrete slabs and left over utilities; the northeast portion of the site contains a small riparian area consisting of willows and coast live oak trees, as well as an ephemeral drainage. There are several ornamental trees that line the western property boundary and extend around the northern boundary as well. The center of the site includes mainly non-native grasses and barren areas that extend up into the foothills that are covered with coastal sage scrub, which the coastal sage scrub continues to the south and connects within the Los Padres Open Space at the south end of the project site (LSA's – Project Biological Resources Assessment, 2022).

Five types of vegetation/land cover classifications were mapped in the project site, with the dominant vegetation community being coastal sage scrub. Additional vegetation/land cover classifications include coast live oak/willow woodlands, ornamental land cover, developed land cover, and the dominant land cover is ruderal/barren. The area proposed for development and within the project grading limits will be converted to roads, structures, and landscaped vegetation following project completion. Proposed fuel modification zones will consist primarily of non-combustible hardscape and parking areas, as well as well-irrigated tree and plant species not found on VCFD's prohibited plant list. Areas outside of proposed development and fuel modification zones can be classified primarily as annual grasslands and sage scrub. Table 2, Mapped Vegetation/Land Cover Classifications, and the following discussion provide a description of the botanical characteristics of each of the plant communities found on the project site.

Table 2. Mapped Vegetation/Land Cover Classifications

Vegetation Community or Land Cover Type	Acres*	Percent of Site (%)
Developed	0.75	15.78
Coastal Sage Scrub	1.78	37.47
Ornamental	1.06	22.32
Ruderal/Barren	1.08	22.74
Coast live oak/Willow Woodland	0.09	1.89
Total	**4.75**	**100.0**

Source: LSA. Biological Resources Assessment Report 2022. Refer to LSA's Biological Resources Assessment Report for descriptions of the vegetation communities or land cover classifications.

2.2.3.2 Vegetation Dynamics

The vegetation characteristics described above are used to model fire behavior, discussed in Section 3.0 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, non-native grass dominated plant communities become seasonally prone to ignition and produce lower intensity, higher spread rate fires. In comparison, sage scrub can produce higher heat intensity and higher flame lengths under strong, dry wind patterns, but does not typically ignite or spread as quickly as light, flashy grass fuels. The corresponding fuel models for each of these vegetation types are designed to capture these differences.

As described, vegetation plays a significant role in fire behavior, and is an important component to the fire behavior models discussed in this report. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes disrupts plant succession, setting plant communities to an earlier state where less fuel is present for a period of time as the plant community begins its succession again. In summary, high frequency fires tend to convert shrublands to grasslands or maintain grasslands, while fire exclusion tends to convert grasslands to shrublands, over time. In general, biomass and associated fuel loading will increase over time, assuming that disturbance (fire, or grading) or fuel reduction efforts are not diligently implemented. It is possible to alter successional pathways for varying plant communities through manual alteration. This concept is a key component in the overall establishment and maintenance of the proposed fuel modification zones on site. The fuel modification zones on this site will consist of non-combustible hardscapes and parking lot areas with irrigated and maintained landscapes that will be subject to regular “disturbance” in the form of maintenance and will not be allowed to accumulate excessive biomass over time, which results in reduced fire ignition, spread rates, and intensity. Conditions adjacent the project’s footprint (outside the fuel modification zones), where the wildfire threat will exist post-development, are classified as low to medium fuel loads due to the dominance of sage scrub-grass fuels.

2.2.4 Fire History

Fire history is an important component of a site-specific FPP. Fire history data provides valuable information regarding fire spread, fire frequency, ignition sources, and vegetation/fuel mosaics across a given landscape. One important use for this information is as a tool for pre-planning. It is advantageous to know which areas may have burned recently and therefore may provide a tactical defense position, what type of fire burned on the Project site, and how a fire may spread.

Fire history represented in the FPP uses the California Department of Forestry and Fire Protection (CAL FIRE) Fire and Resource Assessment Program (FRAP) database and the VCFD Fire History dataset which has been incorporated into the FRAP dataset since 2000 (VCFD, 2021). FRAP summarizes fire perimeter data dating to the late early 1900’s, but which is incomplete due to the fact that it only includes fires over 10 acres in size and has incomplete perimeter data, especially for the first half of the 20th century (Syphard and Keeley 2016). However, the data does provide a summary of recorded fires and can be used to show whether large fires have occurred in the Project area, which indicates whether they may be possible in the future.

According to available data from the CAL FIRE in the FRAP database, sixty (60) fires have burned within 5 miles of the project site since the beginning of the historical fire data record (1930 was the first year recorded in the area).

Recorded wildfires within 5 miles range from approximately 10 acres to approximately 96,949 acres (2018 Woolsey Fire) and the average fire size is approximately 8,833 acres. The 2020 Erbes Fire (approximately 27 acres) is the most recent fire; before the 2020 Erbes Fire, the next most recent fire that occurred within 5 miles of the project site was the 2019 Potrero Fire which burned approximately 11 acres and before that the 2018 Woolsey Fire that burned 94,949 acres. With that said, there are no recorded fires that have burned on the project site, however, there was a wildfire that burned to within 700 feet of the Project site. VCFD may have data regarding smaller fires (other fires less than 10 acres) that have occurred on-site that have not been included herein. Fire history for the general vicinity of the project site is illustrated in Appendix B, Fire History Map.

Based on an analysis of the fire history data set, specifically, the years in which the fires burned, the average interval between wildfires within 5 miles of the project site was calculated to be approximately two years with intervals ranging between 0 (multiple fires in the same year) to 10 years. Based on the analysis, it is expected that wildfire that could burn in available unmaintained landscapes may occur, if weather conditions coincide, possibly every two to 10 years, with the realistic possibility of longer interval occurrences, as observed in the fire history records and considering the recent past and ongoing development of the region. Based on fire history, wildfire risk for the project site is associated primarily with an on-shore more typical wildfire burning or spotting on-site from the south or west, although a fire approaching from the north and east during a Santa Ana wind-driven fire weather patterns is also possible.

2.2.5 Analysis of Wildfire Risk from Adding a New Structure and People

Humans (i.e., human related activities or human created features, services, or processes) are responsible for the majority of California wildfires (Syphard et al. 2007, 2008; Romero-Calcerrada et al. 2008). Certain human activities result in sparks, flames, or heat that may ignite vegetative fuels without proper prevention measures in place. These ignitions predominantly occur as accidents, but may also be purposeful, such as in the case of arson. Roadways are a particularly high source for wildfire ignitions due to high usage and vehicle caused fires (catalytic converter failure, overheated brakes, dragging chains, tossed cigarette, and others) (Harris 2019; Dudek 2008). In Southern California, and Ventura County, the population living at, working in, or traveling through the wildland urban interface is vast and provides a significant opportunity for ignitions every day. However, it is a relatively rare event when a wildfire occurs, and an even rarer event when a wildfire escapes initial containment efforts. Approximately 90 to 95 percent of wildfires are controlled below 10 acres (CAL FIRE 2019)

Various recreational opportunities, both legal and illegal exist today. If a wildfire were to ignite from human activity today, fire detection and response could be delayed due to the remoteness of the area not directly visible from populated areas. Delayed detection would contribute to delayed response to the scene due to the lack of site access. Fire size up (determining the needed firefighting resources) and requests for additional resources, including aerial support, also are delayed in comparison to post-construction of the Project structures. If a hiker or mountain biker in the area was to start a fire, detection and response would be anticipated on a fast timeline due to the residents that would be living within the community with the ability to detect fires throughout the property. The quick detection and call to 911 would result in faster response from the nearby fire stations, which can reach the project quickly. If a fire is detected and cannot be accessed by a responding fire engine, it can be sized up and additional aerial and other support requested quickly.

2.2.6 Fire Protection Features' Beneficial Effect on Wildfire Ignition Risk Reduction

Each of the fire protection features provided as part of the code requirements or customized for this project are based on the FPP's evaluation work to protect the site, its structures, and their occupants from wildfires. These features also have a similar positive impact on the potential for wildfire ignitions caused by the project and its inhabitants.

As mentioned previously, the ignition resistant landscapes and structure and the numerous specific requirements would minimize the ability for an on-site fire to spread to off-site fuels, as follows:

1. **Ignition resistant, planned and maintained landscape** – the entire site's landscaping of common areas and fuel modification zones will be subject to strict plant types that are lower ignition plants with those closest to structures requiring irrigation to maintain high plant moistures which equates to difficult ignition. These areas are closest to structures, where ignitions would be expected to be highest, but will be prevented through these ongoing maintenance efforts.

2. **Wide Fuel Modification Zone around perimeter of project** – the wide FMZ (extends up to 100 feet wide) includes specifically selected plant species, very low fuel densities (only 50% retention of native plants in outer zone and irrigated inner zones), and ongoing Property Management funded and applied maintenance, resulting in a wide buffer between the developed areas and the off-site native fuels.

3. **Ignition resistant structure** – the structure will be built to the Chapter 7A (CBC) ignition resistant requirements that have been developed and codified as a direct result of after fire save and loss assessments. These measures result in structures that are designed, built and maintained to withstand fire and embers associated with wildfires. It must be noted that the FMZs would not result in wildfire directly next to the structure. Buildings can be built in the VHFHSZs and WUI areas when they are part of an overall approach that contemplates wildfire and provides design features that address the related risk. A structure within a VHFHSZ that is built to these specifications can be at lower risk than an older structure in a non-fire hazard severity zone. The ignition resistance of the medical office building would result in a low incidence of structural fire, further minimizing potential for project-related wildfires.

4. **Interior automatic fire sprinklers** – automatic fire sprinklers in buildings are designed to provide additional time for occupants to escape the structure. Sprinklers in commercial structures are designed to provide structural protection. The common benefit of fire sprinklers is that they are very successful at assisting responding firefighters by either extinguishing a structural fire or at least, containing the fire to the room of origin and delaying flash over. This benefit also reduces the potential for open space vegetation ignition by minimizing the possibility for structure fires to grow large and uncontrollable, resulting in embers that are blown into wildland areas. This is not the case with older existing homes in the area that do not include interior fire sprinkler systems.

5. **Fire access roads/driveway** – roads/driveway provide access for firefighting apparatus. Project driveways provide code-consistent access throughout the development. Better access to wildland areas may result in faster wildfire response and continuation of the fire agencies' successful control of wildfires at small sizes.

6. **Water** – providing firefighting water throughout the property with two on-site fire hydrants accessible by fire engines is a critical component of both structural and vegetation fires. The project provides firefighting water volume, availability and sustained pressures to the satisfaction of VCFD. Water accessibility helps firefighters control structural fires and helps protect structures from and extinguish wildfires.

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3 Anticipated Fire Behavior

3.1 Fire Behavior Modeling

Following field data collection efforts and available data analysis, fire behavior modeling was conducted to document the type and intensity of the fire that would be expected on or adjacent to the project site given characteristic features such as topography, vegetation, and weather. Dudek utilized BehavePlus software package version 6 (Andrews, Bevins, and Seli 2008) to analyze potential fire behavior. As is customary for this type of analysis, three fire scenarios were evaluated, including one summer, onshore weather condition (south/southwest from the project site) and two extreme fall, offshore weather condition (northeast and east of the project site), with assumptions made for the pre- and post-project slope and fuel conditions. Results are provided below, and a more detailed presentation of the modeling inputs and results is provided in Appendix C, Fire Behavior Modeling Summary.

3.2 Fire Behavior Modeling Analysis

An analysis was conducted to evaluate fire behavior variables and to objectively predict flame lengths, intensities, and spread rates for three fire scenarios. These fire scenarios incorporated observed fuel types representing the dominant vegetation representative of the site and adjacent land, in addition to slope gradients, wind, and fuel moisture values. Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent to the site.

To support the fire behavior modeling efforts conducted for the Project's Fuel Modification Plan (see Figure 5), a Dudek Fire Protection Planner analyzed the different vegetation types observed on and adjacent to the site and were classified into the aforementioned numeric fuel models. As is customary for this type of analysis, the terrain and fuels directly adjacent to the Project site and fuel modification zones (FMZ) are used for determining flame lengths and fire spread. Vegetation types, which were derived from the field assessment for the project site, were classified into a fuel model. Fuel models are selected by their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that are both on and adjacent to the proposed development. Fuel models were also assigned to illustrate post-project fire behavior changes. Fuel models were selected from Standard Fire Behavior Fuel Models: a Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan 2005).

Based on the anticipated pre- and post- project vegetation conditions, five different fuel models were used in the current conditions of the fire behavior modeling effort and one additional fuel model was used to depict a fire post construction, as presented herein. Modeled areas including the low-load grass fuels (Gr2) intermixed with moderate- to- high-load shrub and grass-shrub fuels (Fuel Models Gs2, Sh2, Sh4, and Sh5) found surrounding the perimeter areas of the project site on the east and south sides; the interior portion of the project site include low lying grass fuels and disturbed land uses from the previous day care facility, all of which will be constructed to include a new medical facility and hardscape/irrigated landscape. These fuel types can produce flying embers that may affect the project, but defenses have been built into the structure to prevent ember penetration. Table 3 provides a description of the fuel models observed that were subsequently used in the analysis for the project. For modeling the post-development condition, fuel model assignments were re-classified to Gr1 representing an irrigated landscape up to 100 feet from the structure.

Table 3. Fuel Models Used for Fire Behavior Modeling

Fuel Model	Description	Location of Fuel Models	Fuel Bed Depth (Feet)
Existing Conditions			
Gr2	Low-load, Dry climate grass	Represents the grass fuels located in the adjacent unmaintained open space areas to the northeast.	<1.0 ft.
Gs2	Moderate-load, Dry climate grass-shrubs	Represents the grass-shrub fuels located in the adjacent unmaintained open space areas to the south and east.	<2.0 ft.
Sh2	Moderate-load, Dry Climate Shrubs	Represents the shrub fuels located in the adjacent unmaintained open space areas to the south and east.	<2.0 ft.
Sh4	Riparian and coast live oak understory fuels	Represents the willow and coast live oak habitat directly northeast of the project site.	3.0 ft.
Sh5	High-load, Dry Climate Shrubs	Represents the shrub fuels located in the adjacent unmaintained open space areas to the south.	>4.0 ft.
Post-Development Conditions			
Gr1	Short, sparse, dry climate grasses	Fuel Modification Zones 0 and 1: irrigated landscape throughout the Project site	<1.0 ft.

A total of three fire modeling scenarios were completed for the project area. These modeling scenario locations were selected based on the probability of a fire approaching from these directions during a Santa Ana wind-driven fire event (fire scenarios 1 and 2) and an on-shore weather pattern (fire scenario 3). Fuel modification includes the establishment of fully-irrigated landscape areas and parking lot/hardscape areas throughout the project site surrounding the medical facility structure.

Table 4 summarizes the weather and wind input variables used in the BehavePlus modeling process.

Table 4. Fuel Moisture and Wind Inputs

Model Variable	Summer Weather Condition (50th Percentile)	Peak Fall Weather Condition (97th Percentile)
Fuel Models	Gr1 (Post); Gs2, Sh2, and Sh5 (Pre)	Gr1 (Post); Gr2, Gs2, Sh2, Sh4, and Sh5 (Pre)
1 hr. Moisture	8%	2%
10 hr. Moisture	9%	3%
100 hr. Moisture	14%	8%
Live Herbaceous Moisture	55%	30%
Live Woody Moisture	111%	60%
20-foot Wind Speed (mph)	18 mph (sustained winds)	16 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	180	45 and 95
Wind adjustment factor	0.4	0.4
Slope (uphill)	27%	2% to 26%

3.3 Fire Behavior Modeling Results

The results of fire behavior modeling analysis for pre- and post-project conditions are presented in Table 5 and Table 6, respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 5, BehavePlus Fire Behavior Analysis Map.

As presented, in the Fire Behavior Analysis Summary (Appendix C), the BehavePlus fire behavior modeling software package was utilized in evaluating anticipated fire behavior around the project site, which was modeled to be primarily of low to moderate intensity through the non-maintained surface grass and grass-shrub dominated fuels northeast, east, and south of the project site. Three focused analyses were completed for both the existing project site conditions and the post project conditions, each assuming worst-case fire weather conditions for a fire approaching the project site from the northeast, east, and south. The results of the modeling effort included anticipated values for surface fires flame length (feet), rate of spread (mph), fireline intensity (Btu/ft/sec.), and spotting distance (miles). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2008). Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts (Rothermel and Rinehart 1983). Spotting distance is the distance a firebrand or ember can travel down wind and ignite receptive fuel beds. Three fire modeling scenario locations were selected to better understand the different fire behavior that may be experienced on or adjacent the site based on slope and fuel conditions; these fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

- **Scenario 1:** A fall, extreme off-shore fire (97th percentile weather condition) burning through low- to moderate-load grass and grass-shrub dominated vegetation northeast of the property. The terrain is flat (approximately 2% slope) with potential ignition sources from fire spotting in the small open space area or possibly from a car fire along U.S. 101 or within the existing medical facility parking lot, and/or structure fire originating within the existing residential community east/northeast of the project site. This type of fire would typically spread through the grass and grass-shrub dominated vegetation relatively slow towards the northern portions of the project site, pre-development.
- **Scenario 2:** A fall, extreme off-shore fire (97th percentile weather condition) burning through moderate-load grass-shrub dominated vegetation east of the property. The terrain is moderately sloped (up to approximately 26% slope) with potential ignition sources from fire spotting in the small open space area or possibly from a car and/or structure fire originating within the existing residential community east of the project site. This type of fire would typically spread through the grass-shrub dominated vegetation relatively slow towards the eastern portion of the project site, pre-development.
- **Scenario 3:** A summer, on-shore fire (50th percentile weather condition) burning through moderate- to high-load grass-shrub dominated vegetation south of the property. The terrain is moderately sloped (up to approximately 27% slope) with potential ignition sources from a fire spotting or transitioning into the small

open space hillside that is separating the proposed medical facility from an existing residential community farther to the south. This type of fire would typically spread relatively slow downhill towards the southern portions of the project site, pre-development.

The results presented in Tables 5 and 6 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

3.3.1 Existing Conditions

Based on the BehavePlus analysis result presented below and in Tables 5 and 6, wildfire behavior through the non-maintained grass and grass-shrub dominated fuels south of the project site being fanned by 18 mph sustained winds, from the south/southwest and pushed by on-shore ocean breezes typically exhibit less severe fire behavior due to lower wind speeds and higher humidity. Under typical onshore weather conditions, a surface vegetation fire could have flame lengths approaching 15 feet in height and spread rates of approximately 0.8 mph. Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, can originate approximately 0.6 miles away.

A worst-case fire behavior under peak weather conditions (represented by Fall Weather, Scenario 1) is anticipated to be a wind-driven fire from the east/northeast during the fall. Under such conditions, expected surface flame length are expected to reach approximately 23 feet with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 11,564 BTU/feet/second with moderate spread rates of 4.1 mph and could have a spotting distance up to 1.5 miles away.

Table 5: RAWS BehavePlus Fire Behavior Model Results – Existing Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 2% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (NE of project site)				
Low-load grass dominated fuels (Gr2)	8.4 (14.1)[3]	577 (1,791)	1.4 (4.2)[3]	0.3 (1.1)[3]
Low-load timber-shrubs (Sh4)	11.3 (23.2)	1,103 (5,261)	0.9 (4.1)	0.4 (1.5)
Scenario 2: 26% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (SE/E of project site)				
Moderate-load grass-shrub fuels (Gs2)	9.2 (19.0)[3]	702 (3,405)	0.8 (3.9)[3]	0.4 (1.3)[3]
Moderate-load shrubs fuels (Sh2)	7.7 (15.2)	483 (2,110)	0.2 (0.9)	0.3 (1.1)
Scenario 3: 3% slope; Summer on–shore winds (50th percentile) – Pre-FMZ (S of project site)				
Moderate-load grass-shrub fuels (Gs2)	5.0	187	0.3	0.3
High-load grass-shrub fuels (Gs4)	15.1	2,063	0.4	0.6
Moderate-load shrub fuels (Sh2)	1.7	18	0.0	0.1
High-load shrub fuels (Sh5)	14.3	1,831	0.8	0.5

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.

3. Flame length, spread rate, and spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph

3.3.2 Post-Development Conditions

As previously mentioned, Dudek conducted modeling of the site for post-fuel modification zones. Typical fuel modification includes establishment of minimum 100-foot wide fully-irrigated fuel modification zone (Zones 0 and 1) beginning at the structure. For modeling the post-FMZ treatment condition, the fuel model assignment was determined based on the specific fuels management (e.g., irrigated, fire resistive landscaping) treatment that will be used throughout the Comprehensive Cancer Center project area.

Based on the BehavePlus analysis, post development fire behavior expected in the irrigated and replanted with plants that are acceptable with the VCFD (FMZ Zones 0 and 1 – Gr1) under peak weather conditions experience a reduction in flame length and intensity. Fuel modification would result in a reduction to approximately 3.1 feet by the time the interior irrigated landscapes of the FMZ (Zones 0 and 1) are reached. During on-shore weather conditions, a fire approaching from the west/southwest towards the development footprint would have low fire intensity and spotting distances due to the higher live and dead fuel moisture contents. These reduction of flame lengths and intensities are assumed to occur within the 100 feet of fuel modification that is achieved for the entire site. Therefore, the FMZs proposed for the Project are approximately 5-times the flame length of the worst-case fire scenario under peak weather conditions in the small open space area and riparian/coast live oak area northeast of the project site.

Table 6: RAWS BehavePlus Fire Behavior Model Results – Post Project Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 2% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (NE of project site)				
Fuel Model NB1	N/A	N/A	N/A	N/A
Fuel modification zones 0 and 1 (Gr1)	3.1 (3.1)[3]	67 (67)[3]	0.5 (0.5)[3]	0.2 (0.3)[3]
Scenario 2: 26% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (SE/E of project site)				
Fuel Model NB1	N/A	N/A	N/A	N/A
Fuel modification zones 0 and 1 (Gr1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.2 (0.4)
Scenario 3: 3% slope; Summer on–shore winds (50th percentile) – Pre-FMZ (S of project site)				
Fuel Model NB1	N/A	N/A	N/A	N/A
Fuel modification zones 0 and 1 (Gr1)	1.8	19	0.2	0.1

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.
3. Flame length, spread rate, and spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph

The following describes the fire behavior variables (Heisch and Andrews 2010) as presented in Tables 3 and 4:

Surface Fire:

- Flame Length (feet): The flame length of a spreading surface fire within the flaming front is measured from midway in the active flaming combustion zone to the average tip of the flames.

- Fireline Intensity (Btu/ft/s): Fireline intensity is the heat energy release per unit time from a one-foot-wide section of the fuel bed extending from the front to the rear of the flaming zone. Fireline intensity is a function of rate of spread and heat per unit area and is directly related to flame length. Fireline intensity and the flame length are related to the heat felt by a person standing next to the flames.
- Surface Rate of Spread (mph): Surface rate of spread is the "speed" the fire travels through the surface fuels. Surface fuels include the litter, grass, brush, and other dead and live vegetation within about 6 feet of the ground.

The information in Table 7 presents an interpretation of the outputs for five fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Tables 3 and 4. Identification of modeling run locations is presented graphically in Figure 5 of this FPP.

Table 7. Fire Suppression Interpretation

Flame Length (ft)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4 feet	Under 100 BTU/ft/s	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 to 8 feet	100-500 BTU/ft/s	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 to 11 feet	500-1000 BTU/ft/s	Fires may present serious control problems -- torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11 feet	Over 1000 BTU/ft/s	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

3.4 Project Area Fire Risk Assessment

Wildland fires are a common natural hazard in most of southern California with a long and extensive history. Southern California landscapes include a diverse range of plant communities, including vast tracts of shrublands and grasslands, like those found on and adjacent to the project site. Wildfire in this Mediterranean-type ecosystem ultimately affects the structure and functions of vegetation communities (Keeley 1984) and will continue to have a substantial and recurring role (Keeley and Fotheringham 2003). Supporting this are the facts that 1) native landscapes, from forest to grasslands, become highly flammable each fall and 2) the climate of southern California has been characterized by fire climatologists as the worst fire climate in the United States (Keeley 2004) with high winds (Santa Ana) occurring during autumn after a six-month drought period each year. Based on this research, the anticipated growing population expanding into WUI areas, and the regions' fire history, it can be anticipated that periodic wildfires may burn onto or spot into the site. The most common type of fire anticipated in the vicinity of the Project Area is a wind-driven fire from further east/southeast, moving through the sage scrub intermixed with non-native grasses on the adjacent lands.

With the conversion of the landscape to ignition-resistant development, wildfires may still encroach upon and drop embers on the site but would not be expected to burn through the site or produce sustainable spot fires due to the lack of available fuels. Studies indicate that even with older developments that lacked the fire protections provided for this project, wildfires declined steadily over time (Syphard, et. al., 2007 and 2013) and further, the acreage burned remained relatively constant, even though the number of ignitions temporarily increased. This is due to the conversion of landscapes to ignition resistant, maintained areas, more humans monitoring areas resulting in early fire detection and discouragement of arson, and fast response from the fire suppression resources that are located within these developing areas.

Therefore, it will be important that the latest fire protection technologies, developed through intensive research and real-world wildfire observations and findings by fire professionals, for both ignition resistant construction and for creating defensible space in the ever-expanding WUI areas, are implemented and enforced. The project, once developed, would not facilitate wildfire spread and would reduce projected flame lengths to levels that would be manageable by firefighting resources for protecting the medical office structure, especially given the ignition resistance of the structure and the planned ongoing maintenance of the on-site landscape. The project will implement the latest fire protection measures, including 100 feet of fuel modification around the perimeter of the development.

Given the climatic, vegetative, topographic characteristics, and local fire history of the area, the project site, once developed, may be subject to periodic wildfires that start on, burn toward, or spot into the site. The potential for off-site wildfire encroaching on or showering embers on the site is considered low to moderate, but the risk of ignition from such encroachments or ember showers is considered low based on the type of ignition resistant landscapes, building construction, and fire protection features that will be provided for the medical office structure.

While it is true that humans are the cause of most fires in California, there is no data available that links increases in wildfires with the development of ignition-resistant structures. The Project will include a robust fire protection system, as detailed in the Project's FPP. This same robust fire protection system provides protections from on-site fire spreading to off-site vegetation. The landscape throughout the project and on its perimeter will be highly maintained and much of it irrigated, which further reduces its ignition potential. The structure will be highly ignition resistant on the exterior and the interiors will be protected with an automatic interior sprinkler system, which have a very high success rate for confining fires or extinguishing them.

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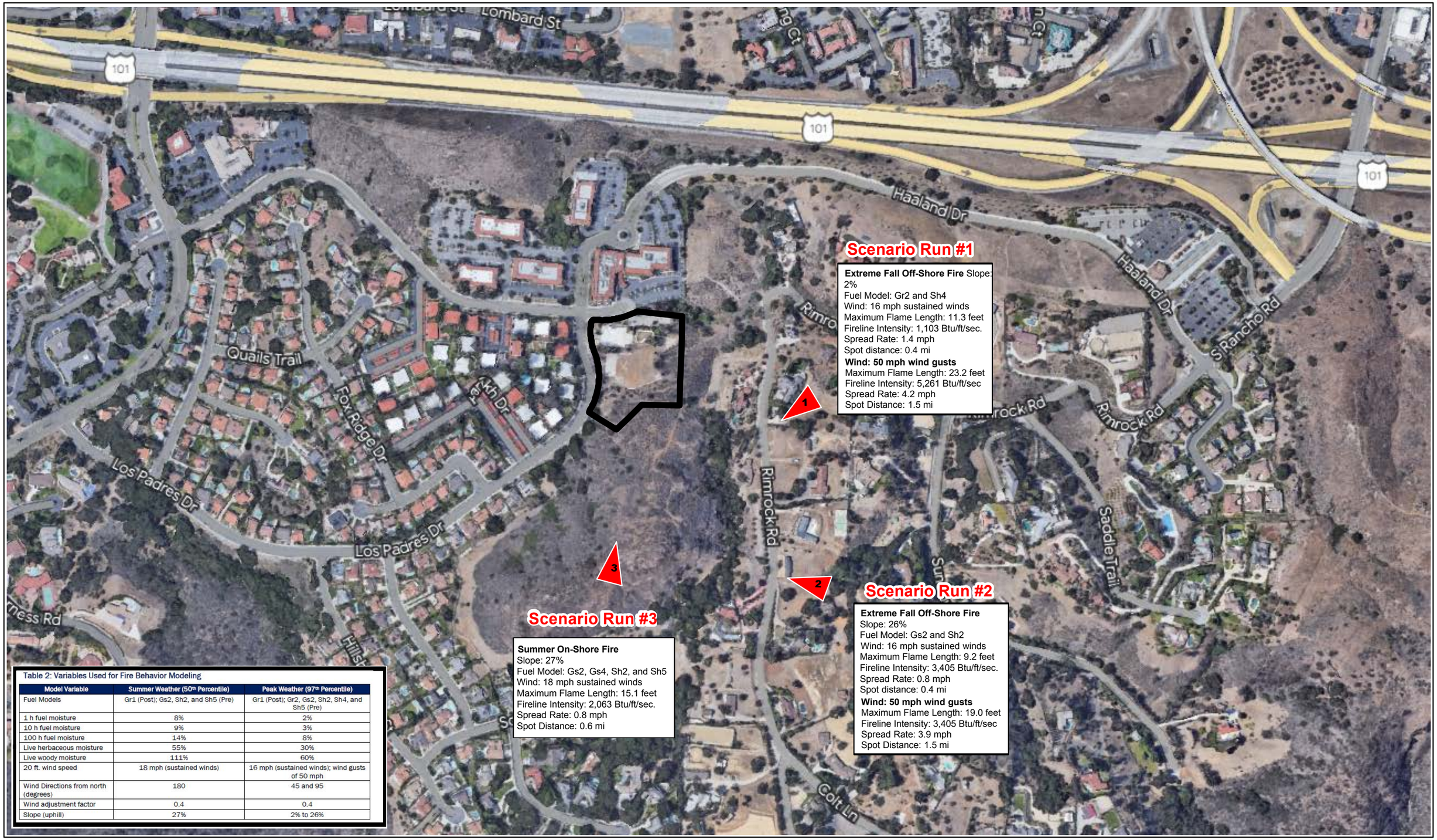

Table 2: Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Fuel Models	Gr1 (Post); Gs2, Sh2, and Sh5 (Pre)	Gr1 (Post); Gr2, Gs2, Sh2, Sh4, and Sh5 (Pre)
1 h fuel moisture	8%	2%
10 h fuel moisture	9%	3%
100 h fuel moisture	14%	8%
Live herbaceous moisture	55%	30%
Live woody moisture	111%	60%
20 ft. wind speed	18 mph (sustained winds)	16 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	180	45 and 95
Wind adjustment factor	0.4	0.4
Slope (uphill)	27%	2% to 26%

SOURCE: AERIAL-GOOGLE EARTH AERIAL IMAGERY 2023

DUDEK

0 250 500 1,000 Feet

FIGURE **5**

BehavePlus Fire Analysis Map

Fire Protection Plan for the Los Robles Medical Office Project

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4 Emergency Response and Service

The following sections analyze the Project in terms of current Ventura County Fire Department (VCFD) Fire Service capabilities and resources to provide Fire Protection and Emergency Services to the Comprehensive Cancer Center project. The analysis that follows examines the ability of the existing nearby VCFD fire stations to adequately serve the proposed project. Response times were evaluated using anticipated medical office occupant numbers. It was assumed that the shortest access route to the building would be utilized.

4.1 Emergency Response Fire Facilities

The project site is located within the jurisdiction of the VCFD, and consequently, VCFD provides initial response. The VCFD jurisdictional response area encompasses approximately 848 square miles including seven of its cities, including Ojai, Port Hueneme, Moorpark, Camarillo, Santa Paula, Simi Valley, and Thousand Oaks with a population of more than 850,000 people in Ventura County (VCFD Overview, 2022 and VCFD 2021 Snapshot Annual Report)[4]. The VCFD consists of nearly 588 dedicated men and women personnel, including about 445 full-time safety (including safety Chief Officers) and 143 full-time non-safety employees that provides fire protection and emergency medical services. The Los Robles Comprehensive Cancer Center Project will accommodate the construction of a 58,000 square foot medical office building with 264 on-site parking spaces (including 14 ADA and 27 Electric Vehicle charging spaces). The project will be compatible with the existing medical facilities adjacent to the project site. Service level requirements can cause a decline in the response times and capabilities for existing residents. The proposed project estimated call volume generation is based on 300 maximum persons, including 40 employees and their patients, working or being attended to at the medical office facility during any given time period during the week and on weekends. It's assumed that most, if not all, the population would be new to the area of the VCFD's response area. The proposed project is projected by call volume analysis (using VCFD per capita call generation factor of 0.058/year or 58 calls per 1,000 persons per year) to add approximately 18 calls per year to the VCFD's existing call load. This call volume (less than 1 call per week) is not considered enough of an increase to require additional resources.

The VCFD currently operates 33 Fire Stations, four of which are analyzed herein due to their proximity to the proposed project site and could respond to an incident at the Los Robles Comprehensive Cancer Center facility (Stations 30, 31,34, and 35), although primary response would be from Station 30, with Stations 31 34, and 35 responding shortly thereafter if needed. Station 30 is located at 325 W. Hillcrest Drive, Thousand Oaks, California, approximately 1.4 miles northwest of the project site. In addition to the chief officers, the station is staffed daily by three full-time firefighters and houses a Battalion Chief Command Vehicle (Battalion 3), one engine (Engine 30), one Rescue Ambulance (Rescue 30), and one brush engine (Brush Engine 330). VCFD also includes a Brush High Response, which includes five (5) engines, a water tender, a dozer, two (2) hand crews, one (1) Captain, and two (2) Battalion Chiefs. Table 5 presents a summary of the four closest VCFD Station locations, the fire apparatus equipment at each station, station staffing levels, maximum travel distances, and estimated time travel for the three closest VCFD stations that have the ability to respond to a fire or medical emergency at the site. Travel distances are derived from Google road data while travel times are calculated applying the nationally recognized RAND Corporation formula used by the Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard: (T=0.65 + 1.7D), where T=time and D=distance). The ISO response travel time formula

[4] https://vcfd.org/wp-content/uploads/2023/03/AnnualReport2021.pdf

discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout donning time. Automatic and/or Mutual Aid agreements with surrounding fire departments are in place and would potentially result in additional resources that are not analyzed in this FPP.

Table 8. VCFD Closest Responding Fire Stations Summary

Station No.	Location	Equipment	Staffing	Maximum Travel Distance*	Travel Time**
30	325 W. Hillcrest Drive, Thousand Oaks, California	-(1) Engine Company (Engine 30); -(1) Command Vehicle (Battalion 3); -(1) Rescue Ambulance ~~Truck~~ (Rescue 30); -(1) Brush Engine (Brush Engine 330)	On Duty: 3 Battalion Chief Officer: 1	1.5 mi.	3 min. 10 sec.
31	151 N. Duesenberg Drive, Thousand Oaks, California	- Medic/Engine (Medic/Engine 31); - Rescue Engine (Rescue 31);	On Duty: 5	3.2 mi.	6 min. 5 sec.
34***	555 E. Avenida de Los Arboles, Thousand Oaks, California	- Medic/Engine (Medic/Engine 34); - Reserve Engine (Engine 134); - Utility Pickup Truck (Utility 34)	On Duty: 3	3.6 mi.	6 min. 45 sec.
35	751 Mitchell Road, Newbury Park, CA	-Engine 35 -Ladder Truck 35 -Reserve Engine OES 344 -Command 11	On Duty: 7	3.9 mi.	7 min 17 sec.

Note:

* Assumes travel distance and time to the Los Robles facility site from Stations 30, 31, or 34. Travel Time is one portion of the "total reflex time", which also includes call processing, dispatch, arrival and set up times.

** Assumes travel to the project entrance, and application of the ISO formula, T=0.65+1.7(Distance), a 35-mph travel speed, and does not include turnout time.

*** It should be noted that the construction of a new Fire Station 34 is slated to be located at the intersection of Avenida de los Arboles and Mountclef Blvd.

Based on the proposed project site location in relation to existing VCFD stations, travel time to the site for the first responding engine from Station 30 is approximately 3 minutes and 10 seconds to the front entrance/drop off area of the facility. Secondary response would arrive in approximately 6 minutes and 5 seconds. Based on these calculations, emergencies within the project can be responded to by VCFD's first arriving unit (average maximum initial response of no more than 8 minutes 30 seconds for fire apparatus and 5 minutes for ambulance, 90% of calls for suburban areas) in accordance with the County's standard. It should be noted VCFD has an initial response of no more than 12 minutes for fire apparatus, 90% of calls for rural areas.

In addition, there are automatic aid agreements and dropped boundary agreements on first alarm or greater emergency calls with surrounding communities, ensuring that the closest unit will be dispatched, regardless of jurisdictional boundaries. VCFD has a number of mutual aid agreements with other fire services agencies within Ventura and Los Angeles Counties. If the resources of these agencies are depleted, assistance can also be obtained through various state and federal agencies including the Office of Emergency Services, the Department of Forestry and Fire Protection (Cal Fire), the State Fire Marshal, the U.S. Forest Service, the National Park Service and Bureau of Land Management, and the Department of Defense (City of Thousand Oaks 2014). The VCFD is also part of the State of California Master Mutual Aid Agreements.

4.2 Emergency Service Level

The VCFD responded to a total of 49,678 annual calls in 2021 (VCFD's 2021 Annual Report Snapshot) and Ventura County's population of approximately 850,000 (VCFD Overview, 2022). The per capita call volume is roughly 0.58 for the County of Ventura. Based on the proposed development plans, the project's estimated 300 maximum persons, including 40 employees and their patients, working or being attended to at the cancer center facility during any given time period during the week and on weekends, would generate roughly 18 calls per year, most, or all, are expected to be medical-related calls, consistent with typical emergency call statistics.

Service level requirements are not expected to be significantly impacted with the increase of approximately 29 calls per year or 0.08 calls per day for a station (VCFD Station 30) that currently responds to roughly 5 calls per day (1,734 calls[5] in 2021) in its primary service area. Therefore, the project is not expected to cause a decline in VCFD's emergency response times. Additional response, rounding out the effective firefighting force (the manpower needed to effectively fight a structure fire and/or respond to serious medical emergency) would be provided by Stations 31, 34, and 35.

4.3 Cumulative Impact Analysis

Cumulative impacts from multiple projects within a fire agency's jurisdiction, like VCFD, can cause fire response service decline and must be analyzed for each new project. The proposed project represents a facility that could increase the existing call volume by less than 1 call per week, on average. The resulting impact on fire services has been analyzed within this report and despite the increased number of people to this area and anticipated very small call volume increase, the existing fire service delivery system is considered to have capacity to serve the Los Robles Comprehensive Cancer Center project. When compared to standard utilization rates for busy (10 calls per day for an urban station) fire stations (Hunt 2010), it is clear there is capacity to serve the proposed project. Other future projects in the vicinity of Stations 30, 31, 34, and 35 are not known at the time of this FPPs preparation, but when considered cumulatively, the potential impact of multiple projects is considered less than significant, mitigated by increased funding available from each project to the VCFD through property taxes and other fees associated with each project, including this project. This funding would be utilized to maintain or enhance fire response capabilities and at least maintain the current standards for firefighting and emergency response.

[5] Data derived from VCFD's 2021 annual report snapshot which states that there were 13,870 calls within the Battalion 3 service area. There are 8 stations within Battalion 3 service area.

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5 Fire Safety Requirements – Building Ignition Resistance, Infrastructure, And Defensible Space

The Ventura County Fire Protection District's Fire Ordinance Number 32 (adopting portions of the 2021 International Fire Code and 2022 California Fire and Building Codes adopted by reference with several modifications) governs the building, infrastructure, and defensible space requirements detailed in this FPP. It should be noted that new State and local building and fire codes have been in effect starting January 1, 2023. The project will meet or exceed applicable codes or will provide alternative materials and/or methods. While these standards will provide a high level of protection to the proposed Los Robles Comprehensive Cancer Center building, there is no guarantee that compliance with these standards will prevent damage or destruction of a structure by fire in all cases. A response map update, including roads and fire hydrant locations, in a format compatible with current department mapping shall be provided to the VCFD.

The following summaries highlight important fire protection features. Prior to bringing combustible materials onto the site, all underground utilities shall be in place, fire hydrants operational, water mains, curbs, gutters, and sidewalks will be installed, the driveway surface shall be approved, and fuel modification zones established and approved.

5.1 Fire Apparatus Access

5.1.1 Primary Access Driveways

The proposed project would result in the development of a new medical office building in the location of a recently demolished daycare facility, including the development of site access driveway and parking lot areas. The project would involve the construction of a new 58,000 SF structure, internal, looped driveway and parking lot areas, and would generate new trips to and from the project site. Site access, including road widths and connectivity, will comply with the County's Fire Apparatus Access Code - Ordinance 29 and the High Fire Area (HFA) Access Requirements within Chapter 5 of the VCFD's Standard 501, as well as compliance with applicable emergency access standards that would facilitate emergency vehicle access during project construction and operation. Additionally, an adequate water supply and an approved paved access driveway shall be installed prior to any combustibles on site and will include:

- The project site would be accessible from three roadways (Rolling Oaks Drive, Los Padres Drive, and Haaland Drive), with primary access into the site provided via two entrances, one to the north via Rolling Oaks Drive and one to the west via Los Padres Drive. Secondary access to the project site to the site is via Haaland Drive to the north and east.
- The existing perimeter roads comply with all fire apparatus access road standards. An interior circulation driveway will be used for traffic flow throughout the Comprehensive Cancer Center site and for fire department access serving all portions of the proposed structure; all access internal driveway areas designed

for two-way traffic shall have an unobstructed width of not less than 24 feet. Although a portion of the proposed building exceeds 30 feet in height Fire access roadways designed to allow parking shall provide a minimum clear width of not less than 32 feet for parking on one side and a clear width of not less than 36 feet for parking on both sides. The access roads shall be designed for the weight load requirements of the California Vehicle Code, City Road Standards, or 75,000 pounds, whichever is more restrictive.

- Vertical clearance of vegetation (lowest-hanging tree limbs), along the driveway throughout the development will be maintained at clearances of 13 feet, 6 inches to allow fire engines passage. Unobstructed vertical clearance must be clear to the sky to allow aerial ladder truck operation.
- Roads with a median or center divider will have a minimum 20 feet unobstructed width on both sides of the center median or divider. Maximum road grade will not exceed 16%.
- Fire apparatus turnaround/turnout locations will meet requirements and VCFD Standards.
- Roadways and/or driveways will provide fire department access to within 150 feet of all portions of the exterior walls of the first floor of the structure.
- Roadway design features (e.g., speed bumps, humps, speed control dips, planters, and fountains) that could interfere with emergency apparatus response speeds and required unobstructed access road widths will not be installed or allowed to remain on roadways. Traffic Calming features may be allowed following review and approval of the fire code official.

5.1.2 Road width and Circulation

On-site roadways will be constructed to current Ventura County Fire Apparatus Access Code standards (Standard 501, Chapter 5 – High Fire Area Access Requirement as required by Title 14 of the California Code of Regulations) and 2022 CFC, including all fire access roadways designed for one-way traffic shall have an unobstructed width of not less than 20 feet; all access roadways designed for two-way traffic shall have an unobstructed width of not less than 24 feet. Fire access roadways designed to allow parking shall provide a minimum clear width of not less than 32 feet for parking on one side and a clear width of not less than 36 feet for parking on both sides (see Table 5.3.1 of Standard 501, Chapter 5). Horizontal turning radius shall be determined by public road standards based upon width and speed and no road shall have a centerline horizontal radius of less than 50 feet (Section 5.1.4). Fire apparatus access roads serving commercial and industrial occupancies shall have a structural cross section and surface complying with the public road standards for the jurisdiction in which the project is located and grades shall not exceed 10%.

Aerial fire apparatus access shall be required when the vertical distance between the ground and the highest roof surface exceeds 30 feet. One aerial fire apparatus access road shall be provided per 50,000 square feet of building area. Aerial fire apparatus access roads shall have a minimum unobstructed width of 30 feet, exclusive of shoulders and a minimum of one required aerial apparatus access road shall be located within a minimum of 15 feet and a maximum of 30 feet from the building. It should be noted that the Los Robles Comprehensive Cancer Center building is multi-tiered; the front portion of the building (northern portion of the building) will include two stories and designed to be up to approximately 43 feet tall. However, as you move to the rear portion of the building (southern portion of the building), the tiered building is reduced to a single story and approximately 27 feet in height. With that said, two points of roof access will be provided; aerial fire apparatus access will be provided at the front of the medical office facility and engine ladder access will be provided along the rear portions of the facility. Furthermore,

automatic interior fire sprinklers will be installed throughout the structure in accordance with NFPA 13. All portions of the exterior walls of the structure, at grade level, allows for 150 feet of access from a road.

5.1.3 Gates

No gates are currently proposed.

5.1.4 Driveways

All driveway grades shall be 7% or less consistent with the City of Thousand Oaks Road Design and Construction Standards, with surfacing and sub-base consistent with VCFD requirements.

5.1.5 Premises Identification

Identification of roads and structures will comply with VCFD Standard 502, Chapter 6 and CFC, Section 505.1. This standard provides the general requirements for property identification within the jurisdiction of VCFD/VCFPD. This standard shall be used in conjunction with the specific conditions contained in the current adopted edition of the Ventura County Fire Code, the current adopted edition of the California Building Code, and any other applicable standards, as follows:

1. Commercial and industrial buildings shall have address numbers installed to meet the following requirements:
   a) The minimum height of the numbers shall be 10-inches.
   b) The minimum width of each number shall be 5-inches.
   c) The minimum stroke width of each number shall be 1-inch.
2. Where buildings are set back from the street, larger numbers may be required as determined by the Fire District. To calculate the required width and stroke width of each number, the following shall apply: width = 1/2 of the required height and stroke width = 1/10 of the required height.
3. Each suite shall have its suite numbers posted above or adjacent to the entrance door. Multi-unit buildings with rear doors shall also provide suite numbers above or adjacent to each rear door. If the suite door is normally closed, the suite numbers may be placed on the door. Suite numbers shall meet the requirements of Sections 3.6 and 4.1 of Standard 502.
4. Complexes with multiple buildings may be required to provide directories, premises maps and directional signs at locations approved by the Fire District. When required, the requirements of Chapter 7 of Standard 502 shall be met (**DOES NOT APPLY**).

5.2 Ignition Resistant Construction

The new medical office structure will be constructed to Building Code standards. The proposed building will comply with the enhanced ignition-resistant construction standards of the 2022 CBC (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows and doors, and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of exposure to the flaming-front of burning vegetation from wildfires.

While these standards will provide a high level of protection to structures in this development, there is no guarantee that compliance with these standards will prevent damage or destruction of structures by fire in all cases.

There are three primary concerns for structure ignition: 1) radiant and/or convective heat, 2) burning embers, and 3) direct flame contact (NFPA 1144 2008, IBHS 2008, and others). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the WUI built to these codes have proven to be very ignition resistant. Likewise, radiant and convective heat impacts on structures have been minimized through the Chapter 7A exterior fire ratings for walls, windows and doors. Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided the project are required by the VCFD, but are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of a required NFPA 13 automatic interior fire sprinkler system to extinguish interior fires, should embers succeed in entering a structure. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well they were adopted into the code. The following project features are required for new development in WUI areas and form the basis of the system of protection necessary to minimize structural ignitions as well as providing adequate access by emergency responders:

1. The Chapter 7A Materials and Construction Methods for Exterior Wildfire Exposure (CBC) chapter details the ignition resistant requirements for the following key components of building safely in wildland urban interface and fire hazard severity zones:

    a) Roofing Assemblies (covering, valleys and gutters)
    b) Vents and Openings
    c) Exterior wall covering
    d) Open Roof Eaves
    e) Closed Roof Eaves and Soffits
    f) Exterior Porch Ceilings
    g) Floor projections and underfloor protection
    h) Underfloor appendices
    i) Windows, Skylights and Doors

2. New class-A fire rated roof and associated assembly. With the proposed class-A fire rated roof, areas where there will be attic or void spaces requiring ventilation to the outside environment, the attic spaces will require either ember-resistant roof vents or a minimum 1/16-inch mesh (smaller sizes restrict air flow) and shall not exceed 1/8-inch mesh for side ventilation (recommend BrandGuard, O'Hagin or similar vents). All vents used for this project will be approved by VCFD.

3. Per Chapter 7A of the CBC, multi- pane glazing with a minimum of one tempered pane, fire-resistance rating of not less than 20 minutes when tested according to NFPA 257 (such as SaftiFirst, SuperLite 20-minute rated glass product), or be tested to meet the performance requirements of State Fire Marshal Standard 12-7A-2.

4. Automatic, Interior Fire Sprinkler System to code by occupancy type.

5. Modern infrastructure and water delivery system.

5.3 Fire Protection Systems

5.3.1 Water Supply

Water service for the proposed project site will be provided by the California American Water Company (CAWC) and will be consistent with VCFD requirements. The public water system will be through connections to existing water mains running along Rolling Oaks Drive and Los Padres Drive. The required fire flow for a fire hydrant is based on building size (square feet), use/occupancy type, and type of construction; the closest existing fire hydrant was observed at 1,450 gallons per minute (gpm) fire flow for minimum duration of two hours at 20 psi residual pressure, with calculated gpm at 2,500 gpm for minimum duration of two hours at 20 psi residual pressure (see Appendix D, Signed Fire Flow Report).

5.3.2 Fire Hydrants

Four fire hydrants have been strategically placed throughout the development footprint, specifically along the fire access driveway/roadway and adjacent to the structure. Final location of the on-site fire hydrants will be determined by the VCFD and current fire code requirements to meet operational needs. Fire Hydrants will be consistent with applicable Design Standards, including Standard 14.5.3.

5.3.3 Automatic Fire Sprinkler System

The Los Robles Comprehensive Cancer Center structure will be protected by an automatic, internal fire sprinkler system. The fire sprinkler system shall be in accordance with VCFD standards, and National Fire Protection Association (NFPA) Standards for occupancy type, specifically NFPA 13 standards. A Fire Sprinkler Plan will be submitted and reviewed by VCFD for compliance with the applicable fire and life safety regulations, codes, and ordinances as well as the VCFD Fire Prevention Standards and Guidelines for fire protection systems.

5.3.4 Ongoing Infrastructure Maintenance

The property owner/property management company shall be responsible for long term funding and maintenance of FMZs, internal private driveway areas, fire protection system, and interior fire sprinkler system.

5.3.5 Pre-Construction Requirements

Prior to bringing lumber or combustible materials onto the site, site improvements within the active development area shall be in place, including utilities, operable fire hydrants, an approved roadway surface, and fuel modification zones established. These features will be approved by the fire department their designee prior to combustibles being brought on site.

5.4 Defensible Space and Vegetation Management

5.4.1 Defensible Space and Fuel Modification Zone (FMZ) Requirements

An important component of a fire protection system for this project is the provision for ignition resistant landscapes and modified vegetation buffers. FMZs are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. FMZs are arguably more important when situated adjacent to older structures that were built prior to the latest ignition resistant codes and interior sprinkler requirements. The Comprehensive Cancer Center structure will be highly ignition resistant based on required construction design, materials, and methods.

The proposed project site will be exposed to naturally-vegetated open space areas along the northeast, east, and south portions of the site. The rest of the proposed development is adjacent to existing roadways to the west and north, existing residential communities to the west, southwest, and further south, and an existing Medical Office facility with on-site parking directly to the north. 100 feet or more of Fuel Modification will be provided around all sides of the proposed Los Robles Comprehensive Cancer Center structure, except for along the eastern side of the structure, which achieves up to approximately 85 feet of on-site fuel modification. The on-site FMZs consist of a combination of irrigated, thinned, and hardscape and ornamental landscape areas and will be in accordance with the VCFD's Ordinance 32 Appendix W, VCFD Guideline 418 – Defensible Space, Standard 515 – Defensible Space and Fuel Modification Zones, and Standard 517 – Application of Mulch and Chips in Defensible Space (revised January 2023). On-site FMZs for the property will include between approximately 85 and 100 feet of fuel modification (Zones 0, 1, and 2) around all sides of the structure and throughout the development. Specifically for the eastern side of the building where the on-site FMZs are less than 100 feet, the project's structure will be augmented with mitigations that meet or exceed the level of protection 100 feet of fuel modification provides. **These mitigations include window upgrades that are code-exceeding, dual pane both panes tempered, and adding an additional layer of code-exceeding 1-hour rated 5/8-inch Type X fire rated gypsum sheathing applied behind the exterior covering or cladding (stucco or exterior siding) on the exterior side of the framing, from the foundation to the roof for a facade on the exposed sides of the structure (ONLY along the east side of the structure)**.

Section 1.4 and 1.4.1 of VCFD's Standard 515 – Defensible Space and Fuel Modification Zones and Guideline 418 – Defensible Space, states that all properties located within a State mapped Fire Hazard Severity Zone (FHSZ), or a local Hazardous Fire Area (HFA) as determined by the fire department, are required to provide defensible space in accordance with California Public Resource Code 4291; California Government Code 51182; California Code of Regulations Title 14, Section 1299.03; CCR Title 19, Section 3.07; and the current adopted edition of the VCFD Ordinance. VCFD's Local Ordinance is more restrictive than State laws and states that property owners are required to provide a 100-foot defensible space on their property around any buildings, including buildings on neighboring properties. A property owner is only responsible for the portion of the 100-foot zone that is on their own property, and the adjacent property owner is responsible for implementing the remaining defensible space to achieve a full 100 feet of fuel modification around structures. Properties without buildings are also subject to the 100-foot defensible space requirements if a structure on a neighboring property is located within 100-feet of natural

vegetation.[6] Although the remaining approximately 15 feet of fuel modification that is not achievable on-site is required to be maintained off-site by the adjacent property owner(s) to the east, per VCFD's Local Ordinance and Guideline 418 and Standard 515, Section 1.4, subsection1.4.1, the project also proposes the additional mitigations listed above in order to meet or exceed the level of protection 100 feet of on-site fuel modification provides.

The fuel modification zones will be constructed from the structure outwards towards undeveloped areas. Figure 6 illustrates the FMZ Plan proposed for the proposed project site, including a five-foot Zone 0 (0 to 5 feet around the structures), a minimum 25-foot-wide limited planting area Zone 1 (5 to 30 feet from the structures and decks), and a minimum 70-foot-wide limited planting area Zone 2 extending from the structures towards the undeveloped areas. Also being provided, either by the conditions of the development, voluntarily by the property owner, or required by the VCFD, a more progressive 50% thinning zone (Zone 3) would lessen the spread of fire as it approaches the primary FMZ adjacent to structures. **It should be noted that the full 100-foot defensible space zone from project buildings is required by the VCFPD Ordinance 32, thus additional mitigations are being proposed, even though the remaining defensible space that cannot be achieved on-site is required to be maintained by the adjacent property owner(s).**

Based on the predicted fire intensity and duration along with flame lengths for this project site and the provided FMZs, the highest concern is considered to be from firebrands or embers as a principal ignition factor. To that end, this site, based on its location and ember potential, is required to include the latest ignition and ember resistant construction materials and methods for roof assemblies, walls, vents, windows, and appendages, as mandated by the VCFD and City Fire and Building Codes (e.g., Chapter 7A).

5.4.1.1 VCFD Fuel Modification Zone Standards

A fuel modification zone (FMZ) is a strip of land where combustible vegetation has been removed and/or modified and partially or totally replaced with more adequately spaced, drought-tolerant, fire resistant plants in order to provide a reasonable level of protection to structures from wildland fire. The purpose of this section is to document VCFD's standards (Standards 515 and 517) and make them available for reference. However, we are proposing a site-specific fuel modification zone program with additional measures that are consistent with the intent of the standards. VCFD is consistent with the 2022 California Fire Code (Section 4907 — Defensible Space), and Government Code 51175 – 51189which require that fuel modification zones be provided around every building that is designed primarily for human habitation or use within a VHFHSZ. Fuel modification consists of at least 100 feet, measured in a horizontal plane, from the exterior façade of all structures towards the undeveloped areas. A typical landscape/fuel modification installation per the County's Fire Code consists of a five-foot Zone 0 (0 to 5 feet around a structure), a 25-foot-wide Zone 1 (5 to 30 feet from a structure), and a 70-foot-wide Zone 2 (30 to 100 feet from a structure) for a total of 100 feet in width. An additional up to 100 feet of thinning zone (Zone 3) is required for the areas adjacent to natural-vegetated, open space areas (riparian are in the northeast corner of the property). Per VCFD, the full 100-foot defensible space zone from project buildings is required by the VCFPD

[6] VCFD's Guideline 418 – Defensible Space can be reference at https://s44762.pcdn.co/wp-content/uploads/2021/10/418-Defensible_Space.pdf and Standard 515 - Defensible Space and Fuel Modification Zones can be referenced at https://s44762.pcdn.co/wp-content/uploads/2020/02/515-Defensible-Space-and-Fuel-Modification-Zones-Standard.pdf.

Ordinance 32. Any portion off-site will be the responsibility of that affected property owner. General VCFD FMZ standards are outlined in VCFD Ordinance No. 32 Section 4907.7.6.

To ensure long-term identification and maintenance, a fuel modification area shall be identified by a permanent zone marker meeting the approval of VCFD. All markers will be located along the perimeter of the fuel modification area at a minimum of 500 feet apart or at any direction change of the fuel modification zone boundary. FMZs will be maintained on at least an annual basis or more often as needed to maintain the fuel modification buffer function.

Zone 0 – from the structure outward 5 feet

Zone 0 reduces the likelihood of structure ignition by reducing the potential for direct ignition of the structure from flame contact, by embers that accumulate at the base of a wall, and/or indirect ignitions when embers ignite vegetation, vegetation debris or other combustible materials located close to the structure that result in either a radiant heat and/or a direct flame contact exposure to the structure. As required by State Law, Assembly Bill 3074 (Chaptered September 2020), new State regulations for Zone 0, currently under development by the State Board of Forestry and Fire Protection, are scheduled to take effect in early 2023 for all new buildings, and one (1) year thereafter, for all existing buildings. Any State regulation more restrictive than this ordinance or the requirements of Defensible Space and Fuel Modification Standards, as issued and approved by the Fire Code Official, will apply.

Zone 0 is the horizontal area within the first five feet around the structure and stairs. Zone 0 is measured from the edge of a structure and floor projections above grade. The zone also includes the area under attached projections and stair landings.

The requirements and allowable items in the “lean” or no planting Zone 0 include the following:

a. Ground cover not exceeding three inches in height.

b. Non-woody small herbaceous or succulent plants not exceeding two (2) feet high. Plants shall be spaced a minimum of two-times the height from other plants.

c. Plants shall have a minimum clearance of two-times the plant height below and adjacent to windows or other openings into the structure, including vents.

d. All ground cover and plants shall be set back from structures and decks one-time the height of the plant or 12-inches, whichever is greater.

e. Vines and climbing plants are not allowed on structures, including decks, patio/shade structures, and any fences within 5 feet of a building.

f. No combustible landscape mulch or wood chips. Use clear soil, rocks, gravel, or concrete.

g. New trees are no allowed in Zone 0. See Section 3.2.2a of VCFD Standard 515 and Section 4907.7.2.4 of VCFC Ordinance No. 32 regarding tree canopy setback from structures.

h. Firewood is prohibited in Zone 0.

i. Combustible mulch and wood chips are prohibited in Zone 0.

j. Vegetation is prohibited underneath any deck. Other fuels underneath decks may be limited and shall not cause an ignition due to embers.

k. Artificial or synthetic grass is prohibited.

l. Landscape roofs shall comply with Section 317, 4907.7.1, and 4907.7.2. of VCFD Ordinance No. 32.

m. Vegetation on decks shall meet the requirements of this zone regardless of the distance to the structure.

n. VCFD highly recommends no combustible fences and gates within five (5) feet of a structure or deck. The new State Zone 0 Regulations currently under development may prohibit these in 2023 and also may require removal of existing installations starting in 2024.

Note: *As required by State Law, regulations for Zone 0 are under development by the State Board of Forestry and are scheduled to take effect January 1, 2023, for all new buildings and January 1, 2024, for all existing buildings. Any State regulation more restrictive than this standard will apply.*

Zone 1 – 5 feet from the structure outward to minimum 30 feet

Zone 1 reduces the likelihood of fire burning directly to the structure. This is accomplished by modifying fuels and creating a discontinuity between planting groups that limits the pathways for fire to burn to the structure and reduces the potential for near-to-building ember generation and radiant heat exposures. An additional purpose of this zone is to provide a defendable area for fire personnel to stage and take direct action.

Zone 1 is an area within 5 to 30 feet of structure with slopes not greater than 20 percent; 5 to 50 feet from buildings and decks when slopes are greater than 20 percent.

The requirements and allowable items in a minimal planting and very limited trees of a fire-resistive type Zone 1 include the following:

a. Trees shall be spaced to allow a minimum 10-feet of clearance next to a structure.

b. Firewood shall be relocated outside Zone 1 unless completely covered in a secured, fire-resistant enclosure or covered with a secured, fire-resistant material, and not exceeding 1,000-cubic feet.

c. Plants and trees identified as “Target” (undesirable plants) by VCFD shall not be planted within Zone 1. See Appendix E – VCFD’s Plant Reference Guide and Appendix F – VCFD Prohibited Plant List.

Zone 2 – from outer edge of Zone 1 to 100 feet from structure

Zone 2 is designed to reduce the potential behavior of an oncoming fire in such a way as to drop an approaching fire from the crown of trees to the ground, reducing the flame heights, and the potential for ember generation and radiant heat exposure to structures. Additional benefits of the Zone 2 include facilitating direct defense actions and improving the function of Zone 0 and 1. Zone 2 is the area from the outer edge of Zone 1 to 100 feet from a structure. See Table 3, *VCFD FMZ Spacing Requirements* of VCFD Standard 515.

Spacing of vegetation and trees at the outer edge of Zone 2 shall be based upon the height of the vegetation within Zone 2 or the adjacent area beyond the 100-foot zone, which ever provides for the greater spacing. This may require clearance outside the 100-foot zone or setting back vegetation and trees within Zone 2 away from the 100-foot line.

Zone 3 – Thinning Zone (from outer edge of Zone 2 to up to 200 feet from a structure)

Zone 3 is considered a thinning zone and is any FMZ greater than 100 feet from a structure. When provided, either by condition of development, voluntary by the property owner, or required by the Fire Department, this zone is more of a progressive thinning zone to lessen spread of fire as it approaches the primary FMZ adjacent to structures. The amount of fuel reduction and removal should take into consideration the type and density of fuels, aspect, topography, weather patterns, and fire history.

5.4.2 Other Vegetation Management

Special Management Areas

On the proposed project site, tree planting in the fuel modification zones and along roadways is acceptable, as long as they meet the following restrictions as described below and in the County's Fire Code and the VCFD's Standard 515 – Defensible Space and Fuel Modification Zones spacing requirements:

- For driveway/streetscape plantings, trees should be planted 10 feet from edge of curb to center of tree trunk. Care should be given to the type of tree selected, that it will not encroach into the roadway, or produce a closed canopy effect.
- Crowns of trees located within defensible space shall comply with VCFD Standard 515 when located within Zones 0, 1, and 2; tree crowns must maintain a minimum horizontal clearance of 20 feet for a single tree. Mature trees shall be pruned to remove limbs one-third the height or 6 feet, whichever is less, above the ground surface adjacent to the trees.
- Dead wood and litter shall be regularly removed from trees.
- Ornamental trees shall comply with VCFD Standard 515 when located within Zones 0, 1, and 2; ornamental trees shall be limited to groupings of 2–3 trees with canopies for each grouping separated horizontally as described in Table 3 of the VCFD Standard 515.

Specific Landscaping Requirements

The following requirements are provided for on-site maintained fuel modification zone areas. All landscaping shall be maintained by the property management company hired by the property owner.

Plants used in the fuel modification areas or landscapes will include drought-tolerant, fire resistive trees, shrubs, and groundcovers; no invasive plants to be included in the landscape. The planting list and spacing will be reviewed and approved by VCFD, included on submitted landscape plans. The plantings will be consistent with VCFD's Plant Reference Guide (Appendix E)[7]. The intent of the suggested plant reference guide is to provide examples of plants

[7] Note that the current VCFD Plant Reference Guide may be updated, and the current versions must be used when designing and submitting landscape /fuel modification plans.

that are less prone to ignite or spread flames to other vegetation and combustible structures during a wildfire. Additional Plants can be added to the landscape plant material palette with the approval from VCFD.

Pre-Construction Requirements

- On-site fuel modification zones must be implemented and approved by the VCFD prior to combustible materials being brought on site.
- Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuel shall be removed and trees/shrubs shall be properly limbed, pruned, and spaced per this plan.

Undesirable Plants

Certain plants are considered to be undesirable in the landscape due to characteristics that make them highly flammable. These characteristics can be physical or chemical. The plants included in the VCFD Prohibited Plant List (Appendix F) are unacceptable from a fire safety standpoint, and shall not be planted on the site unless otherwise approved by the VCFD[8].

5.4.3 Vegetation Management Maintenance

All fuel modification area vegetation management shall be completed annually by May 1 of each year and more often as needed for fire safety, as determined by the VCFD.

The Los Robles Comprehensive Cancer Center property maintenance company shall be responsible for all on-site fuel modification vegetation management for all common areas, driveway/roadside clearance, fuel modification zones, medians, planters, etc. The property maintenance company will assure the entire property complies with this fuel modification plan initially and on an ongoing basis. Additionally, the project's property maintenance company shall be responsible for ensuring long-term funding and ongoing compliance with fuel modification and maintenance requirements with all provisions of this report.

Maintenance of FMZ's and Defensible Space is an important component for long term fire safety of the project. Maintenance obligations will be as follows:

Los Robles Comprehensive Cancer Center Property Maintenance Company:

- All maintenance of access roads/driveways.
- Annual Maintenance of FMZs (or as needed).
- Maintenance of all common areas, including trees planted along driveway/interior roadways and in other areas throughout project.

Annual Fuel Modification Zone Compliance Inspection To confirm that the proposed project's FMZs and landscape areas are being maintained according to this FPPs and the VCFD's requirements, the VCFD will conduct annual inspections within the community to determine fuel modification zone compliance. If the FMZ areas are not compliant, the property management and/or maintenance company will have a specified period to correct any

[8] Note that the current VCFD Prohibited Plant List may be updated, and the current versions must be used when designing and submitting landscape /fuel modification plans.

noted issues so that a re-inspection can occur, and certification can be achieved. Annual inspection fees are subject to the current Fire Department Fee Schedule.

5.4.4 Construction Phase Vegetation Management

Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management for the proposed project area shall be performed pursuant to this FPP and VCFD Ordinance 32 and Chapter 49 Appendix V for fire safety requirements in Hazardous Fire Areas that will be applicable prior to the start of work, prior to any import of combustible construction materials, and during construction. Adequate firebreaks shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation. Combustible Materials will not be brought on site without prior fire department approval.

In addition to the requirements outlined above, the project will comply with the following important risk-reducing vegetation management guidelines:

- All new power lines shall be underground for fire safety during high wind conditions or during fires on a right-of-way that can expose aboveground power lines. Temporary construction power lines may be allowed in areas that have been cleared of combustible vegetation.
- Caution must be used not to cause erosion or ground (including slope) instability or water runoff due to vegetation removal, vegetation management, maintenance, landscaping, or irrigation.

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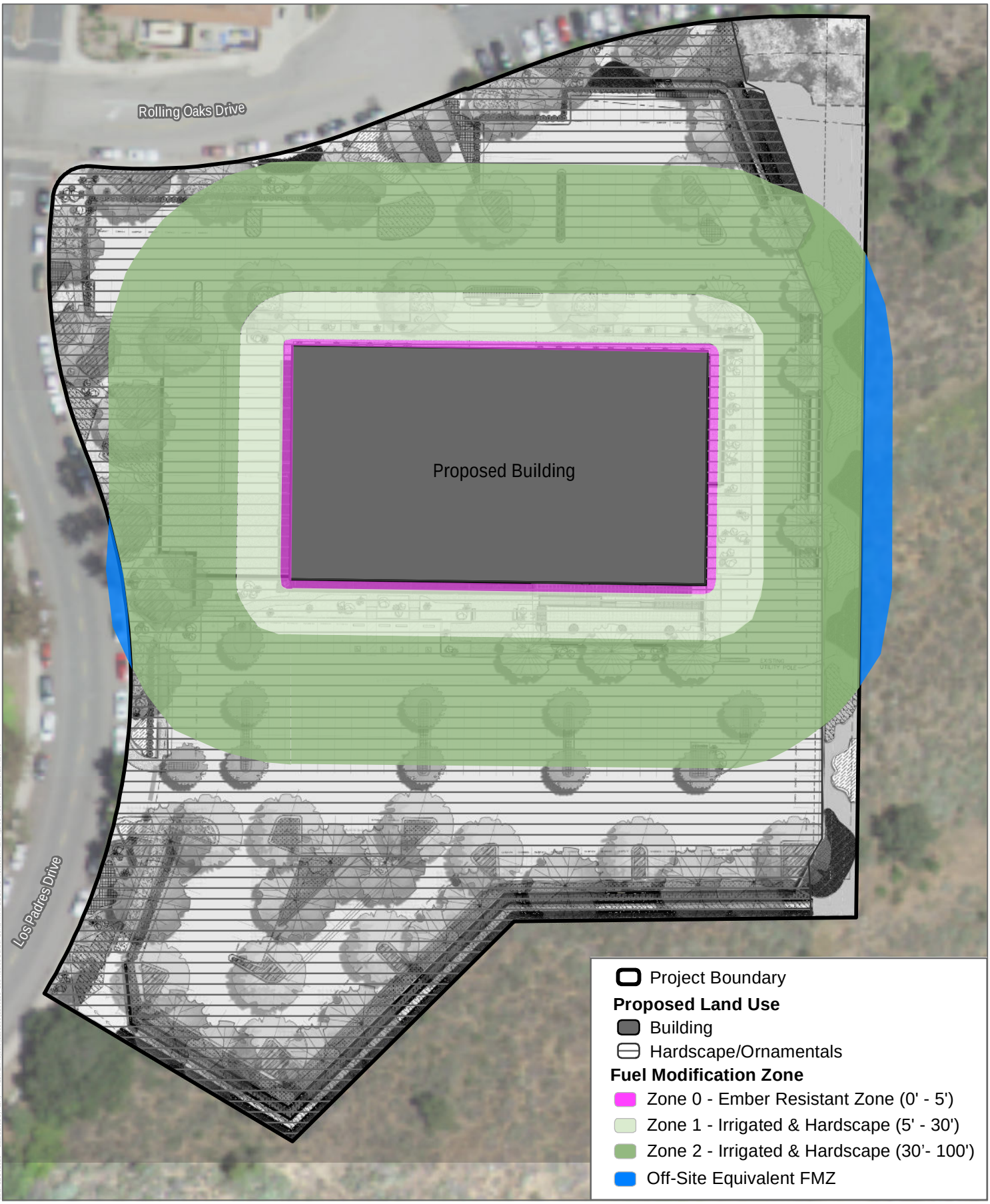

SOURCE: Ventura County Fire Defensible Space and Fuel Modification Zones Standards

DUDEK

0 35 70 Feet

FIGURE 6

Fuel Modification Plan Exhibit

Los Robles Comprehensive Cancer Center Project

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6 Alternative Materials and Methods for Non-Conforming Fuel Modification

As previously mentioned, due to property boundary constraints, it is not feasible to achieve the State required standard 100 feet of on-site FMZ along the eastern side of the structure. Although the remaining approximately 15 feet of fuel modification that is not achievable on-site is required to be maintained off-site by the adjacent property owner(s) to the east, per VCFD's Local Ordinance and Guideline 418 and Standard 515, Section 1.4, subsection1.4.1, the project also proposes the additional mitigations listed above in order to meet or exceed the level of protection 100 feet of on-site fuel modification provides. As such, this FPP describes additional measures options that will be implemented to mitigate the non-conforming fire-related threats and reduced fuel modification zone. These measures are customized for this site based on the analysis results and focus on providing functional equivalency as a County-defined, full fuel modification zone.

As experienced in numerous wildfires, the most recent fire storms in Ventura and San Diego Counties, structures in the WUI are potential fuel. The distance between the wildland fire that is consuming wildland fuel and the structure ("urban fuel") is the primary factor for structure ignition (not including burning embers). The closer a fire is to a structure, the higher the level of heat exposure (Cohen 2000). However, studies indicate that given certain assumptions (e.g., 10 meters (roughly 32 feet) of low fuel landscape, no open windows), wildfire does not spread to homes unless the fuel and heat requirements (of the structure) are sufficient for ignition and continued combustion (Cohen 1995, Alexander et al. 1998). Construction materials and methods can prevent or minimize ignitions. Similar case studies indicate that with nonflammable roofs and vegetation modification from 10–18 meters (roughly 32–60 feet) in southern California fires, 85–95% of the homes and structures survived (Howard et al. 1973, Foote and Gilless 1996). Similarly, San Diego County after fire assessments indicates strongly that the building codes are working in preventing home loss: of 15,000 structures within the 2003 fire perimeter, 17% (1,050) were damaged or destroyed. However, of the 400 structures built to the 2001 codes (the most recent at the time), only 4% (16) were damaged or destroyed. Further, of the 8,300 homes that were within the 2007 fire perimeter, 17% were damaged or destroyed. A much smaller percentage (3%) of the 789 homes that were built to 2001 codes were impacted and an even smaller percentage (2%) of the 1,218 structures built to the 2004 Codes were impacted (IBHS 2008). Damage to the structures built to the latest codes is likely from flammable landscape plantings or objects next to structures or open windows or doors (Hunter 2007).

These results support Cohen's (2000) findings that if a community's homes or similar structures have sufficiently low home ignitability, the structures can survive exposure to wildfire without major fire destruction. This provides the option of mitigating the wildland fire threat to homes/structures at the location without extensive wildland fuel reduction. Cohen's (1995) studies suggest as a rule-of-thumb, larger flame lengths, and widths require wider fuel modification zones to reduce structure ignition. For example, valid SIAM results indicate that a 20-foot-high flame has minimal radiant heat to ignite a structure (bare wood) beyond 33 feet (horizontal distance). Whereas a 70-foot-high flame may require about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). This study utilized bare wood, which is more combustible than the ignition-resistant exterior walls for structures built today. The proposed FMZ is approximately three to five times the length of the predicted flame length.

As indicated in this report, the FMZs and additional fire protection measures proposed for the eastern side of the structure will provide the equivalent wildfire buffer but are not standard zones. Rather, they are based on a variety of analysis criteria including predicted flame length, fire intensity (Btu), site topography and vegetation, extreme and typical

weather, the position of structure on the pad, position of interior driveway/roadways, adjacent fuels, fire history, current vs. proposed land use, neighboring communities relative to the proposed project, and type of construction. The fire intensity research conducted by Cohen (1995), Cohen and Butler (1996), and Cohen and Saveland (1997), and Tran et al. (1992) supports the fuel modification alternatives proposed for this project.

6.1 Additional Structure Protection Measures

The following additional measures options will be implemented to "mitigate" potential structure fire exposure related to the eastern side of the structure where 100 feet of on-site FMZ is not achievable. These measures are customized for this site, its unique topographical and vegetative conditions, and focus on providing functional equivalency as a full fuel modification zone. In order to provide compensating structural protection in the absence of a 100-foot wide FMZ on the eastern side of the structure, and in addition to the structure being constructed to the latest ignition resistant codes, the structure will include the following features for additional fire prevention, protection, and suppression:

1. The north, south, and west sides of the proposed Los Robles Comprehensive Cancer Center structure, which achieve a minimum of 100 feet of on-site FMZ and have existing land uses along Rolling Oaks Drive and Los Padres Drive, shall be constructed with multi- pane glazing with a minimum of one tempered pane windows.

   For the east side of the proposed structure, which achieves up to approximately 85 feet of on-site fuel modification and is adjacent to naturally-vegetated open space areas, **shall be constructed with code exceeding dual pane dual tempered glass windows facing the open space and naturally vegetated areas to the east**. Dual pane, one pane tempered glass has been shown during testing and after a fire, assessments to significantly decrease the risk of breakage and ember entry into structures. Therefore, requiring code-exceeding dual-pane, both panes tempered is anticipated to be an important safety measure that provides enhanced structure protection and provides mitigation for reduced fuel modification zones and limited setbacks from adjacent structures. *The window upgrade also exceeds the requirements of Chapter 7A of the CBC and provides additional protection for the structure's most vulnerable, exterior side*; AND

2. On the east side of the proposed structure, which achieves up to approximately 85 feet of on-site fuel modification and is adjacent to naturally-vegetated open space areas, **shall also include 5/8-inch Type X fire rated gypsum sheathing applied behind the exterior covering or cladding (stucco or exterior siding) on the exterior side of the framing, from the foundation to the roof for a facade facing the open space and naturally vegetated areas**. 5/8-inch Type X fire rated gypsum sheathing is required to be manufactured in accordance with established ASTM standards defining type X wallboard sheathing as that which provides not less than one-hour fire resistance when tested in specified building assemblies and has been tested and certified as acceptable for use in a one-hour fire rated system. CertainTeed Type X Gypsum Board has a Flame Spread rating of 15 and Smoke Developed rating of 0, in accordance with ASTM E 84, (UL 723, UBC 8-1, NFPA 255, CAN/ULC-S102); UL classified for Fire Resistance (ANSL/UL 263; ASTM E119) and listed under UL File No. CKNX.R3660 (Certainteed, 2021). **CODE EXCEEDING MITIGATION MEASURES**

The information provided herein supports the ability of the proposed structure and on-site FMZs to withstand the predicted short duration, low- to moderate-intensity wildfire, and ember shower that would be expected from a wildfire burning in the vicinity of the site or within the site's landscape.

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7 Wildfire Education Program

Early evacuation for any type of wildfire emergency at the Los Robles Project site is the preferred method of providing for occupant and business safety, consistent with the VCFD's current approach for evacuation. As such, the Project's Owner and Property Management Company will formally adopt, practice, and implement a "Ready, Set, Go!" [9] (Ventura County Fire Department 2016) approach to site evacuation. The "Ready, Set, Go!" concept is widely known and encouraged by the state of California and most fire agencies, including the VCFD. Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing potential for errors, maintaining the site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and site uses during periods of fire weather extremes.

[9] https://vcfd.org/images/ready-set-go/VCFD-RSG-Wildfire-Action-Plan-Booklet-2016.pdf

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8 Conclusion

This FPP for the Los Robles Comprehensive Cancer Center Project is submitted in compliance with requirements of the VCFPD Ordinance's and the Ventura County Fire Code. The requirements in this document meet fire safety, building design elements, fuel management/modification, and landscaping recommendations of the VCFD. Fire and Building Codes and other local, county, and state regulations in effect at the time of each building permit application supersede these recommendations unless the FPP recommendation is more restrictive. Where the project does not strictly comply with the Code, alternative materials and methods have been proposed that provide functional equivalency as the code intent. The recommendations provided in this FPP have been designed specifically for the proposed structure within the vicinity of a very high fire hazard severity zone on the project site. The project site's fire protection system includes a redundant layering of code compliant fire-resistant construction materials and methods that have been shown through post-fire damage assessments to reduce risk of structural ignition. The project design features, asphalt roads and parking stalls, and a fully irrigated landscape/hardscape areas, along with proposed structure fire protection mitigation measures, would provide a level of safety equal to a 100-foot wide FMZ along the eastern side of the development site.

Ultimately, it is the intent of this FPP to guide, through code and other project specific requirements, the construction of a structure that is defensible from wildfire and, in turn, do not represent significant threat of ignition source for the adjacent communities. It must be noted that during extreme fire conditions in a VHFHSZ, there are no guarantees that a given structure will not burn. Precautions and mitigating actions identified in this report are designed to reduce the likelihood that fire would impinge upon the proposed structure. There are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes and the mitigating fuel modification requirements provided in this FPP will accomplish the goal of this FPP to assist firefighters in their efforts to defend the structure and reduce the risk associated with this project's WUI location. For maximum benefit, the developer, contractors, engineers, and architects are responsible for proper implementation of the concepts and requirements set forth in this report. The property owner is responsible to maintain the structure and landscaping as required by this report, the applicable Fire Code, and the VCFD. While wildfires under extreme wind conditions can be unpredictable, the project has been designed with a layered system of protections and would include the necessary features to perform well during wildfires. With these features, the project would be considered a "Fire Safe" project."

This FPP does not provide a guarantee that all employees, patients and other visitors will be safe at all times because of the advanced fire protection features it requires. There are many variables that may influence overall safety. This FPP provides requirements and recommendations for implementation of the latest fire protection features that have proven to result in reduced wildfire related hazard, resulting in reduced risk. Even then, fire can compromise the fire protection features through various, unpredictable ways. The goal is to reduce the likelihood that the system is compromised through implementation of the elements of this FPP and a regular occurring maintenance program.

The goal of the fire protection features, both required and those offered above and beyond the codes, provided for the Los Robles Project is to provide the structure with the ability to survive a wildland fire with little intervention of firefighting forces. Preventing ignition to a structure will likely result in reduction of the exposure of firefighters, employes, and visitors to hazards that threaten personal safety. It will also reduce property damage and losses. Mitigating ignition hazards and fire spread potential reduces the threat to a structure and can help the fire

department optimize the deployment of personnel and apparatus during a wildfire. The analysis in this FPP provides support and justifications for acceptance of the proposed fuel modification zones based on the site-specific fire environment.

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Appendix A

Representative Project Photograph Log

Photograph 1: Overview photograph of the northeast portion of the project site standing in the lower portion of the site near the entrance into the property. Photograph taken facing east.

Photograph 2: Overview photograph of the center of the project site standing in the lower portion of the site near the entrance into the property. Photograph taken facing south.

Photograph 3: Overview photograph of the northwest portion of the project site standing in the lower portion of the site near the entrance into the property. Photograph taken facing west.

Photograph 4: Overview photograph of the west/southwest portion of the project site standing near the center of the development site. Photograph taken facing west.

Photograph 5: Overview photograph of the southern portion of the project site standing near the center of the development site. Photograph taken facing south.

Photograph 6: Overview photograph of the east/southeast portion of the project site standing near the center of the development site. Photograph taken facing southeast.

Photograph 7: Overview photograph of the east/northeast portion of the project site standing near the center of the development site. Photograph taken facing east.

Photograph 8: Overview photograph of the existing unmaintained vegetation south of the project site. Photograph taken facing south.

Photograph 9: Overview photograph of the existing unmaintained vegetation south/southeast of the project site. Photograph taken facing south.

Photograph 10: Overview photograph of the existing unmaintained vegetation along the eastern property boundary, separating the project site from the existing semi-rural residential community to the east. Photograph taken facing south.

Photograph 11: Overview photograph of the existing vegetation east of the project site that separates the existing semi-rural residential community to the east. Photograph taken facing east.

Photograph 12: Overview photograph of the existing vegetation east/northeast of the project site that separates the existing semi-rural residential community to the east. Photograph taken facing northeast.

Photograph 13: Photograph of the existing riparian area located in the northeastern corner of the project site. Photograph taken facing south.

Photograph 14: Overview photograph of the existing vegetation east/northeast of the project site that separates the existing semi-rural residential community to the east. Photograph taken facing southeast.

Photograph 15: Overview photograph of the existing grass vegetation northeast of the project site. Photograph taken facing northeast.

Photograph 16: Photograph looking east down Rolling Oaks Drive towards the driveway entrance in to the development site (red arrow) and the existing Medical Office facility and parking area located directly north of the project site.

Photograph 17: Photograph looking south/southwest at the existing driveway entrance into the property, which will be brought up to emergency vehicle code.

Photograph 18: Photograph looking east into the existing parking lot area of the existing Medical Office facility that is located directly north of the proposed project site.

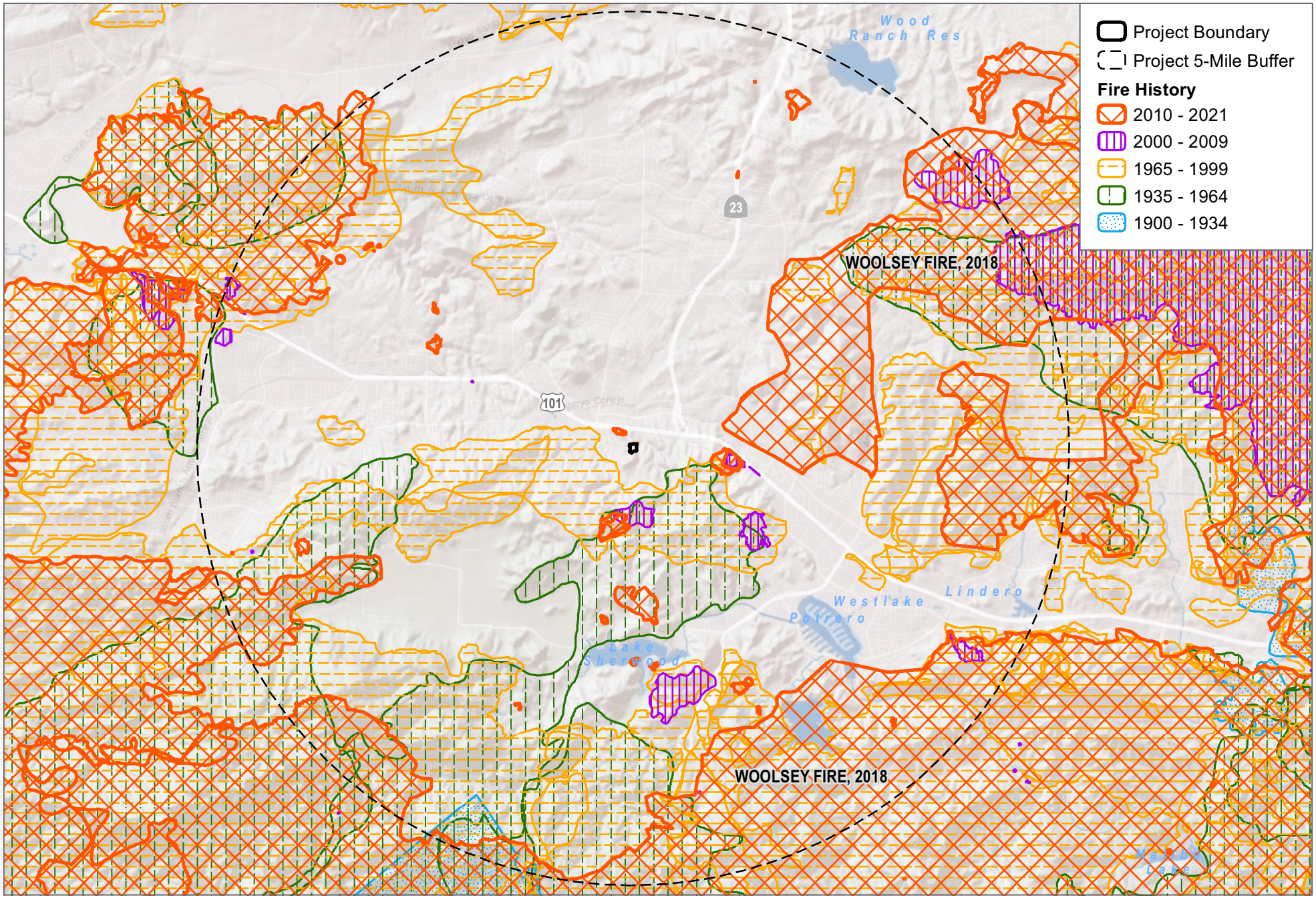
Photograph 19: Photograph of the existing Medical Office facility located directly north of the project site. Photograph taken facing north.

Photograph 20: Photograph looking south up Los Padres Drive standing at the intersection of Los Padres Drive and Rolling Oaks Drive. Note the existing multi-family residential community directly across Los Padres Drive.

Photograph 21: Photograph looking north down Los Padres Drive towards the intersection of Los Padres Drive and Rolling Oaks Drive and the northwest corner of the project site on the right side of Los Padres Drive. Note the existing multi-family residential community directly across Los Padres Drive.

Appendix B

Project Vicinity Fire History Map



SOURCE: CalFire 2020

APPENDIX B

Fire History Map

Los Robles Comprehensive Cancer Center Project

DUDEK

Appendix C

BehavePlus Fire Behavior Analysis Summary

FIRE BEHAVIOR MODELING SUMMARY
LOS ROBLES MEDICAL OFFICE PROJECT,
THOUSAND OAKS, VENTURA COUNTY, CALIFORNIA

1 BehavePlus Fire Behavior Modeling History

Fire behavior modeling has been used by researchers for approximately 50+ years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used as the industry standard for predicting fire behavior on a given landscape. That model, known as "BEHAVE", was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus 6.0, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of Behave and refinements to the fuel models incorporated, retested, and so on.

Fire behavior modeling conducted on this site includes a relatively high-level of detail and analysis which results in reasonably accurate representations of how wildfire may move through available fuels on and adjacent the property. Fire behavior calculations are based on site-specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. To objectively predict flame lengths, spread rates, and fireline intensities, this analysis incorporated predominant fuel characteristics, slope percentages, and representative fuel models observed on site. The BehavePlus fire behavior modeling system was used to analyze anticipated fire behavior within and adjacent to key areas just outside of the proposed lots. Predicting wildland fire behavior is not an exact science. As such, the movement of a fire will likely never be fully predictable, especially considering the variations in weather and the limits of weather forecasting. Nevertheless, practiced and experienced judgment, coupled with a validated fire behavior modeling system, results in useful and accurate fire prevention planning information. To be used effectively, the basic assumptions and limitations of BehavePlus must be understood.

- First, it must be realized that the fire model describes fire behavior only in the flaming front. The primary driving force in the predictive calculations is dead fuels less than one-quarter inch in diameter. These are the fine fuels that carry fire. Fuels greater than one inch have little effect while fuels greater than three inches have no effect on fire behavior.
- Second, the model bases calculations and descriptions on a wildfire spreading through surface fuels that are within six feet of the ground and contiguous to the ground. Surface fuels are often classified as grass, brush, litter, or slash.
- Third, the software assumes that weather and topography are uniform. However, because wildfires almost always burn under non-uniform conditions, length of projection period and choice of fuel model must be carefully considered to obtain useful predictions.

- Fourth, the BehavePlus fire behavior computer modeling system was not intended for determining sufficient fuel modification zone/defensible space widths. However, it does provide the average length of the flames, which is a key element for determining "defensible space" distances for minimizing structure ignition.

Although BehavePlus has some limitations, it can still provide valuable fire behavior predictions which can be used as a tool in the decision-making process. In order to make reliable estimates of fire behavior, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels. Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. The type and quantity will depend upon the soil, climate, geographic features, and the fire history of the site. The major fuel groups of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content, and chemical properties.

The seven fuel characteristics help define the 13 standard fire behavior fuel models[1] and the five custom fuel models developed for Southern California[2]. According to the model classifications, fuel models used in BehavePlus have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface to volume ratio. Observation of the fuels in the field (on site) determines which fuel models should be applied in BehavePlus. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models:

- Grasses Fuel Models 1 through 3
- Brush Fuel Models 4 through 7, SCAL 14 through 18
- Timber Fuel Models 8 through 10
- Logging Slash Fuel Models 11 through 13

In addition, the aforementioned fuel characteristics were utilized in the recent development of 40 new fire behavior fuel models[3] developed for use in BehavePlus modeling efforts. These new models attempt to improve the accuracy of the standard 13 fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the new 40 fuel models:

- Non-burnable Models NB1, NB2, NB3, NB8, NB9
- Grass Models GR1 through GR9
- Grass-shrub Models GS1 through GS4

1 Anderson, Hal E. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service Gen. Tech. Report INT-122. Intermountain Forest and Range Experiment Station, Ogden, UT.

2 Weise, D.R. and J. Regelbrugge. 1997. Recent chaparral fuel modeling efforts. Prescribed Fire and Effects Research Unit, Riverside Fire Laboratory, Pacific Southwest Research Station. 5p.

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

- Shrub Models SH1 through SH9
- Timber-understory Models TU1 through TU5
- Timber litter Models TL1 through TL9
- Slash blowdown Models SB1 through SB4

BehavePlus software was used in the development of the Los Robles Medical Office Project (Proposed Project) Fire Protection Plan (FPP) Report in order to evaluate potential fire behavior for the Project site. Existing site conditions were evaluated, and local weather data was incorporated into the BehavePlus modeling runs.

2 Fuel Models

Dudek utilized the BehavePlus software package to analyze fire behavior potential for the proposed project site in the Thousand Oak, Ventura County, California. Refer to Figure 5, *Fire Behavior Modeling Map* for fire modeling scenario locations. As is customary for this type of analysis, three fire scenarios were evaluated, including one summer, onshore weather condition (south/southwest from the project site) and two extreme fall, offshore weather condition (northeast and east of the project site), with assumptions made for the pre- and post-project slope and fuel conditions. The project site is currently vacant after a daycare facility was recently demolished. As a prior children's day care operation (Young Set Club), the facility included a main building, a swimming pool, basketball court, playground, and other recreational facilities. The property is vegetated with numerous ornamental trees, protected status trees (oaks and a California bay laurel) and shrubs. Disturbed coastal sage scrub is found on the southern part of the site blending to open space on the adjacent vacant parcel. With that said, fuels and terrain adjacent to the project development area could possibly produce flying embers that may affect the Medical Office structure. The BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The output variables used in this analysis include flame length (feet), rate of spread (feet/minute), fireline intensity (BTU/feet/second), and spotting distance (miles). The following provides a description of the input variables used in processing the BehavePlus models for the proposed project site. In addition, data sources are cited, and any assumptions made during the modeling process are described.

2.1 Vegetation (Fuels)

To support the fire behavior modeling efforts conducted for the Project's Fuel Modification Plan, a Dudek Fire Protection Planner analyzed the different vegetation types observed on and adjacent to the site and were classified into the aforementioned numeric fuel models. As is customary for this type of analysis, the terrain and fuels directly adjacent to the Project site and fuel modification zones (FMZ) are used for determining flame lengths and fire spread. Vegetation types, which were derived from the field assessment for the project site, were classified into a fuel model. Fuel models are selected by their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that are both on and adjacent to the proposed development. Fuel models were also assigned to illustrate post-project fire behavior changes. Fuel models were selected from Standard Fire Behavior Fuel Models: a Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan 2005).

Based on the anticipated pre- and post- project vegetation conditions, five different fuel models were used in the current conditions of the fire behavior modeling effort and one additional fuel model was used to depict a fire post

construction, as presented herein. Modeled areas including the low-load grass fuels (Gr2) intermixed with moderate- to- high-load shrub and grass-shrub fuels (Fuel Models Gs2, Sh2, Sh4, and Sh5) found surrounding the perimeter areas of the project site on the east and south sides; the interior portion of the project site include low lying grass fuels and disturbed land uses from the previous day care facility, all of which will be constructed to include a new medical facility and hardscape/irrigated landscape. These fuel types can produce flying embers that may affect the project, but defenses have been built into the structure to prevent ember penetration. Table 1 provides a description of the fuel models observed that were subsequently used in the analysis for the project. For modeling the post-development condition, fuel model assignments were re-classified to Gr1 representing an irrigated landscape up to 100 feet from the structure.

Table 1. Existing Fuel Model Characteristics

Fuel Model	Description	Location of Fuel Models	Fuel Bed Depth (Feet)
Existing Conditions			
Gr2	Low-load, Dry climate grass	Represents the grass fuels located in the adjacent unmaintained open space areas to the northeast.	<1.0 ft.
Gs2	Moderate-load, Dry climate grass-shrubs	Represents the grass-shrub fuels located in the adjacent unmaintained open space areas to the south and east.	<2.0 ft.
Sh2	Moderate-load, Dry Climate Shrubs	Represents the shrub fuels located in the adjacent unmaintained open space areas to the south and east.	<2.0 ft.
Sh4	Riparian and coast live oak understory fuels	Represents the willow and coast live oak habitat directly northeast of the project site.	3.0 ft.
Sh5	High-load, Dry Climate Shrubs	Represents the shrub fuels located in the adjacent unmaintained open space areas to the south.	>4.0 ft.
Post-Development Conditions			
Gr1	Short, sparse, dry climate grasses	Fuel Modification Zones 0 and 1: irrigated landscape throughout the Project site	<1.0 ft.

2.2 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower spread down-slope in the absence of wind. Terrain that forms a funneling effect, such as chimneys, chutes, or saddles on the landscape can result in especially intense fire behavior. Conversely, flat terrain tends to have little effect on fire spread, resulting in fires that are driven by vegetation and wind.

Due to previous development on site, the site's topography is relatively flat on the north and west portions of the site but has foothill slopes on the southern side of the property. Elevations range between approximately 770 feet amsl in the northeast portion of the property to 870 feet amsl along in the southwest portion of the property.

2.3 Weather Analysis

Historical weather data for the Thousand Oaks region was utilized in determining appropriate fire behavior modeling inputs for the project area. 50th and 97th percentile moisture values were derived from Remote Automated Weather Station (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. Weather data sets from the Chesseboro Station RAWS[4] were utilized in the fire modeling runs.

RAWS fuel moisture and wind speed data were processed utilizing the Fire Family Plus software package to determine atypical (97th percentile) and typical (50th percentile) weather conditions. Data from the RAWS was evaluated from August 1 through November 30 for each year between 1995 to 2021 (extent of available data record) for 97th percentile weather conditions and from June 1 through September 30 for each year between 1995 and 2021 for 50th percentile weather conditions.

Following analysis in Fire Family Plus, fuel moisture information was incorporated into the Initial Fuel Moisture file used as an input in BehavePlus. Wind speed data resulting from the Fire Family Plus analysis was also determined. Initial wind direction and wind speed values for the four BehavePlus runs were manually entered during the data input phase. The input wind speed and direction is roughly an average surface wind at 20 feet above the vegetation over the analysis area. Table 2 summarizes the wind and weather input variables used in the Fire BehavePlus modeling efforts.

Table 2: Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Fuel Models	Gr1 (Post); Gs2, Sh2, and Sh5 (Pre)	Gr1 (Post); Gr2, Gs2, Sh2, Sh4, and Sh5 (Pre)
1 h fuel moisture	8%	2%
10 h fuel moisture	9%	3%
100 h fuel moisture	14%	8%
Live herbaceous moisture	55%	30%
Live woody moisture	111%	60%
20 ft. wind speed	18 mph (sustained winds)	16 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	180	45 and 95
Wind adjustment factor	0.4	0.4
Slope (uphill)	27%	2% to 26%

3 Fire Behavior Modeling Efforts

As mentioned, the BehavePlus fire behavior modeling software package was utilized in evaluating anticipated fire behavior adjacent to the proposed project site. Three focused analyses were completed for both the existing project

[4] https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCCHB
Latitude: 34.1105 Longitude: -118.4302; Elevation: 1,650 ft.)

site conditions and the post project conditions, each assuming worst-case fire weather conditions for a fire approaching the project site from the northeast, east, and south/southwest. The results of the modeling effort included anticipated values for surface fires flame length (feet), rate of spread (mph), fireline intensity (Btu/ft/s), and spotting distance (miles). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2008). Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts (Rothermel and Rinehart 1983). Spotting distance is the distance a firebrand or ember can travel down wind and ignite receptive fuel beds. Three fire modeling scenario locations were selected to better understand the different fire behavior that may be experienced on or adjacent the site based on slope and fuel conditions; these fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

- **Scenario 1:** A fall, extreme off-shore fire (97th percentile weather condition) burning through low- to moderate-load grass and grass-shrub dominated vegetation northeast of the property. The terrain is flat (approximately 2% slope) with potential ignition sources from fire spotting in the small open space area or possibly from a car fire along U.S. 101 or within the existing medical facility parking lot, and/or structure fire originating within the existing residential community east/northeast of the project site. This type of fire would typically spread through the grass and grass-shrub dominated vegetation relatively slow towards the northern portions of the project site, pre-development.
- **Scenario 2:** A fall, extreme off-shore fire (97th percentile weather condition) burning through moderate-load grass-shrub dominated vegetation east of the property. The terrain is moderately sloped (up to approximately 26% slope) with potential ignition sources from fire spotting in the small open space area or possibly from a car and/or structure fire originating within the existing residential community east of the project site. This type of fire would typically spread through the grass-shrub dominated vegetation relatively slow towards the eastern portion of the project site, pre-development.
- **Scenario 3:** A summer, on-shore fire (50th percentile weather condition) burning through moderate- to high-load grass-shrub dominated vegetation south of the property. The terrain is moderately sloped (up to approximately 27% slope) with potential ignition sources from a fire spotting or transitioning into the small open space hillside that is separating the proposed medical facility from an existing residential community farther to the south. This type of fire would typically spread relatively slow downhill towards the southern portions of the project site, pre-development.

4 Fire Behavior Modeling Results

The results presented in Tables 3 and 4 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

As presented in Table 3, wildfire behavior through the non-maintained grass and grass-shrub dominated fuels south of the project site being fanned by 18 mph sustained winds, from the south/southwest and pushed by on-shore ocean breezes typically exhibit less severe fire behavior due to lower wind speeds and higher humidity. Under typical onshore weather conditions, a surface vegetation fire could have flame lengths approaching 15 feet in height and spread rates of approximately 0.8 mph. Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, can originate approximately 0.6 miles away.

A worst-case fire behavior under peak weather conditions (represented by Fall Weather, Scenario 1) is anticipated to be a wind-driven fire from the east/northeast during the fall. Under such conditions, expected surface flame length are expected to reach approximately 23 feet with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 11,564 BTU/feet/second with moderate spread rates of 4.1 mph and could have a spotting distance up to 1.5 miles away.

Table 3: RAWS BehavePlus Fire Behavior Model Results – Existing Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 2% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (NE of project site)				
Low-load grass dominated fuels (Gr2)	8.4 (14.1)[3]	577 (1,791)	1.4 (4.2)[3]	0.3 (1.1)[3]
Low-load timber-shrubs (Sh4)	11.3 (23.2)	1,103 (5,261)	0.9 (4.1)	0.4 (1.5)
Scenario 2: 26% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (SE/E of project site)				
Moderate-load grass-shrub fuels (Gs2)	9.2 (19.0)[3]	702 (3,405)	0.8 (3.9)[3]	0.4 (1.3)[3]
Moderate-load shrubs fuels (Sh2)	7.7 (15.2)	483 (2,110)	0.2 (0.9)	0.3 (1.1)
Scenario 3: 27% slope; Summer on–shore winds (50th percentile) – Pre-FMZ (S of project site)				
Moderate-load grass-shrub fuels (Gs2)	5.0	187	0.3	0.3
High-load grass-shrub fuels (Gs4)	15.1	2,063	0.4	0.6
Moderate-load shrub fuels (Sh2)	1.7	18	0.0	0.1
High-load shrub fuels (Sh5)	14.3	1,831	0.8	0.5

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.
3. Flame length, spread rate, and spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

As previously mentioned, Dudek conducted modeling of the site for post-fuel modification zones. Typical fuel modification includes establishment of minimum 100-foot wide fully-irrigated fuel modification zone (Zones 0

and 1) beginning at the structure. For modeling the post-FMZ treatment condition, the fuel model assignment was determined based on the specific fuels management (e.g., irrigated, fire resistive landscaping) treatment that will be used throughout the medical office project area.

Based on the BehavePlus analysis, post development fire behavior expected in the irrigated and replanted with plants that are acceptable with the VCFD (FMZ Zones 0 and 1 – Gr1) under peak weather conditions experience a reduction in flame length and intensity. Fuel modification would result in a reduction to approximately 3.1 feet by the time the interior irrigated landscapes of the FMZ (Zones 0 and 1) are reached. During on-shore weather conditions, a fire approaching from the west/southwest towards the development footprint would have low fire intensity and spotting distances due to the higher live and dead fuel moisture contents. These reduction of flame lengths and intensities are assumed to occur within the 100 feet of fuel modification that is achieved for the entire site. Therefore, the FMZs proposed for the Project are approximately 5-times the flame length of the worst-case fire scenario under peak weather conditions in the small open space area and riparian/coast live oak area northeast of the project site.

Table 4: RAWS BehavePlus Fire Behavior Model Results – Post Project Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 2% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (NE of project site)				
Fuel Model NB1	N/A	N/A	N/A	N/A
Fuel modification zones 0 and 1 (Gr1)	3.1 (3.1)[3]	67 (67)[3]	0.5 (0.5)[3]	0.2 (0.3)[3]
Scenario 2: 26% slope; Fall, extreme off–shore winds (97th percentile) – Pre-FMZ (SE/E of project site)				
Fuel Model NB1	N/A	N/A	N/A	N/A
Fuel modification zones 0 and 1 (Gr1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.2 (0.4)
Scenario 3: 27% slope; Summer on–shore winds (50th percentile) – Pre-FMZ (S of project site)				
Fuel Model NB1	N/A	N/A	N/A	N/A
Fuel modification zones 0 and 1 (Gr1)	1.8	19	0.2	0.1

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.
3. Flame length, spread rate, and spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph

The following describes the fire behavior variables (Heisch and Andrews 2010) as presented in Tables 4 and 5:

Surface Fire:

- Flame Length (feet): The flame length of a spreading surface fire within the flaming front is measured from midway in the active flaming combustion zone to the average tip of the flames.
- Fireline Intensity (Btu/ft/s): Fireline intensity is the heat energy release per unit time from a one-foot wide section of the fuel bed extending from the front to the rear of the flaming zone. Fireline intensity is a function of rate of spread and heat per unit area, and is directly related to flame length. Fireline intensity and the flame length are related to the heat felt by a person standing next to the flames.

- Surface Rate of Spread (mph): Surface rate of spread is the "speed" the fire travels through the surface fuels. Surface fuels include the litter, grass, brush and other dead and live vegetation within about 6 feet of the ground.

The information in Table 5 presents an interpretation of the outputs for five fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Tables 3 and 4. Identification of modeling run locations is presented graphically in Figure 5 of the FPP Report.

Table 5: Fire Suppression Interpretation

Flame Length (ft)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4 feet	Under 100 BTU/ft/s	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 to 8 feet	100-500 BTU/ft/s	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 to 11 feet	500-1000 BTU/ft/s	Fires may present serious control problems -- torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11 feet	Over 1000 BTU/ft/s	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Appendix D

Signed Fire Flow Report

VENTURA COUNTY FIRE PROTECTION DISTRICT
FIRE PREVENTION BUREAU
165 DURLEY AVENUE
CAMARILLO, CA 93010
www.vcfd.org
Office: 805-389-9738 Fax: 805-388-4356

FIRE PREVENTION FORM 625
FIRE-FLOW VERIFICATION

SECTION I – PROJECT INFORMATION
(To Be Completed by Applicant)

Project Name:	Los Robles Medical Office Building	APN:	681-018-0265
Project Address:	400 Rolling Oaks Drive	City:	Thousand Oaks

SECTION II – INFORMATION ON FIRE-FLOW AVAILABILITY
(To Be Completed by Water Purveyor)

System Information:

Water Purveyor: California American Water

Size & Location of Main: 10-inch in Rolling Oaks Drive — Distance to Parcel: 40 feet South

Size of Reservoir Serving Test Hydrants: Los Robles Tanks 1 and 2 - Combined 0.6 MG

Hydrant Information:

Location of Residual Hydrant: 34° 10' 25.80" N 118° 52' 12.14" W — Distance to Parcel: * 50 feet East

Location of Flow Hydrant: 34° 10' 27.47" N 118° 52' 09.02" W — Distance to Parcel: * (On Parcel)

Type: WET Size: 6-inch # of Outlets: 1 4" 2 2 ½"

* Distance to parcel shall be measured along the vehicular access

Test Result Information:

Method Used to Obtain Results: Hydraulic Model [X] Flow Test [ ]

Date of Test: 05/05/2022 Time of Test: N/A [ ] AM [ ] PM

Static PSI: 131 psi Residual PSI: 87 psi Orifice: 2.5-inch Pitot: 74 psi

Observed GPM: 1,450 gpm Calculated GPM @ 20 psi: 2,500 gpm Capacity Duration: N/A hrs

I have witnessed and/or reviewed this water flow information and by personal knowledge and/or on-site observation certify that the above information is correct.

Name: Jacob R. Quick

Signature: Jacob R. Quick Date: 5/10/2022

Title: Senior Project Engineer Company: California-American Water

Phone: (805) 231-0730

[ ] Private on-site water system proposed. Separate plan submittal required.

[ ] Water purveyor approves use of private water system. (Purveyor signature required above)

Fire District Record Number: _____

Appendix E

VCFD Suggested Plant Reference Guide

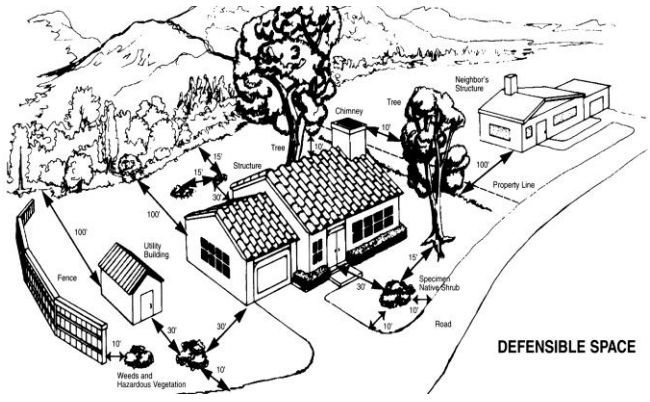
VENTURA COUNTY FIRE DEPARTMENT

FIRE HAZARD REDUCTION PROGRAM

PLANT REFERENCE GUIDE

Fire Hazard Reduction Unit

Fire Prevention Bureau



Updated April 2019

VENTURA COUNTY FIRE DEPARTMENT
FIRE HAZARD REDUCTION UNIT

FIRE PREVENTION BUREAU
165 Durley Ave.
Camarillo, ca 93010
805-389-9759 vcfd.org VCFHRP.org

This Plant Reference Guide is intended as a reference guide for commonly used native and ornamental plants. This is not an approved plant list. This guide will give the user certain characteristics of each plant listed. Plants and trees on the VCFD Prohibited Plant List shall not be installed within any new defensible space or fuel modification zone.

Defensible space and fuel modification zone provisions are intended to mitigate the risk to life and structures from intrusion of fire from wildland fire exposures, fire exposures from adjacent structures and to mitigate fires from spreading to wildland fuels that may threaten to destroy life, overwhelm fire suppression capabilities, or result in large property loss. Proper selection, installation, spacing and maintenance of plants and landscape is one of the key elements in the survivability of a structure during a wildfire.

Please see **VCFD Standard 515 – Defensible Space and Fuel Modification Zones** for Zone designations, plant and tree spacing, and maintenance requirements.

Fire-resistant does not mean fireproof! Even fire-resistant plants will burn if not well maintained. Keep your plants healthy with appropriate water, proper pruning and removal of dead material.

LEGEND

TYPE:	GC – Ground Cover SHRUB TREE	**WATER:**	VL – Very Low L – Low M – Medium H- High

SPACING: See VCFD Standard 515 -Defensible Space and Fuel Modification Zones

N: Native E/D: Evergreen/Deciduous

Ground Cover- Shrubs- Trees-

TARGET (Undesirable Plants) SPECIES ARE DESIGNATED WITH AN *. They are NOT ALLOWED within 30' of structures. Some may not be allowed within 50 -100' of structures - designated with (50 /100) after name. **It is highly recommended that these plants be removed from any existing defensible space zone.**

Plants highlighted in Green are known to be invasive species and have been known to degrade, change and/or displace native habitats.

Vines and climbing plants are not allowed on combustible structures and are therefore not included in the plant reference guide.

FIRE HAZARD REDUCTION PROGRAM

Plant Reference Guide

BOTANICAL NAME	COMMON NAME	TYPE	WATER	HEIGHT	SPREAD	N	E/D
Abelia grandiflora "Prostrata'	Prostrate Glossy Abelia	GC	M	1-2"	3-4"		E
Acacia redolens *	Desert Carpet Acacia*	GC	VL	18'	6'		E
Achillia tomentosa	Woolly Yarrow	GC	L	6-10"	6-12"		E
Ajuga reptans	Carpet Bulge	GC	H	4-6"	2-4"		E
Aptenia cordifolia	Red Apple Ice Plant	GC	M, L	-12"	Varies		E
Arctostaphylos "Pacific Mist" *(100)	NCN	GC	L	1-2'	5-6'		E
Arctostaphylos e. "Emerald Carpet" *(100)	Emerald Carpet Manzanita*	GC	L, VL	1'	4-6'		E
Arctostaphylos edmundsii *(100)	Little Sur Manzanita*	GC	L, VL	1-2'	4-6'		E
Arctostaphylos hookeri *(100)	Monterey Manzanita*	GC	L	1-2'	4-6'		E
Arctostaphylos uva-ursi *	Bearberry*	GC	L	6-12"	5-6'		E
Arctotheca calendula	Cape Weed	GC	M, L	-12"	-18"		E
Artemesia caucasica *(100)	Silver Spreader*	GC	L, VL	3-6"	2'		E
Artemesia californica 'cultivars' *(100)	Sagebrush – Prostrate forms*	GC	L, VL	Varies	Varies		E
Asarum caudatum	Wild Ginger	GC	M, H	7-10"	2'		D
Atriplex semibaccata *(100)	Creeping Saltbrush*	GC	L, VL	1'	1-5'	X	E
Baccharis p. 'Pigeon Point' *(100)	Dwarf Coyote Brush*	GC	L, VL	12-24"	6'		E
Baccharis p 'Twin Peaks' *(100)	Dwarf Coyote Brush*	GC	L, VL	12-24"	6'		E
Baccharis pilularis *(100)	Coyote Brush*	GC	L, VL			X	
C. s. 'Repens' *	Pro. Willowleaf Contoneater*	GC	M, L	-6"	6'		E
C. Salicifolius 'Emerald Carpet' *	Pro. Willowleaf Contoneater*	GC	M, L	12-15"	8'		E
Carpobrotus species	Sea Fig	GC	L	6-12"	24-30"		E
Ceanothus gloriosus *	Point Reyes Ceanothus*	GC	L	1-2'	4-5'	X	E
Ceanothus griseus varieties *	Prostrate carmel creaper*	GC	L	2-3'	8-10'	X	E
Ceanothus maritimus *	Maritime Ceanothus*	GC	L	1-3'	4-5'	X	E
Cerastium tomentosum	Snow-in-summer	GC	M, L	6-8"	2-3'		E
Chamaemelum nobile	Chamonile	GC	M	6-8"	-12"		E
Cistus 'Sunset'	Rockrose	GC	L, VL	1-2'	6-8'		E
Cistus 'Warley rose'	Rockrose	GC	L, VL	1'	4'		E
Cistus salviifolius	Sage leaf Rockrose	GC	L, VL	1-2'	6'		E
Coprosma kirkii *	No common name*	GC	M, L	2'	6-8'		E
Coreopsis auriculata 'Nana'	No common name	GC	L, VL	5-8"	2'	X	E
Cotoneaster adpressus praecox *	Cotoneaster*	GC	M, L	-18"	6'		D
Dalea Greggii *	Trailing Indigo Bush*	GC	L, VL	12-18"	5-10"		E
Delosperma alba* (100)	White Trailing Ice Plant*	GC	L	-12"	2'		E
Dichondra micrantha	Dichondra	GC	H, M	-6"	2'		E
Drosanthemum hispidum	Ice Plant	GC	L	-12	1-2'		E
Duchesnea indica	Indian Mock Strawberry	GC	L	-8"	4'		E
Dymondia margaretae	No common name	GC	M, L	-3"	12-24"		E
Erigeron glaucus	Seaside Daisy	GC	M, L	10-12"	2'	X	E
Erigeron karvinskianus	Santa Barbara Daisy	GC	M, L	10-20"	3'		E
Euonymus fortunei 'Colorata'	Purple-Leaf Winter Creeper	GC	M	1-2'	6'		E
Festuca cinerea (ovin glauca)	Blue Fescue	GC	M, L	-12"	2'		E
Festuca rubra	Red Fescue	GC	M, L	-16"	-30"		E
Fragaria chiloensis	Wild Strawberry	GC	L, VL	6-12"	-24"		E
Gazania rigens var Leucolaena	Trailing Gazania	GC	L	6-10"	-24"		E
Geranium incanum	Cranesbill	GC	M, L	-12"	12"		E

FIRE HAZARD REDUCTION PROGRAM

Plant Reference Guide

BOTANICAL NAME	COMMON NAME	TYPE	WATER	HEIGHT	SPREAD	N	E/D
Glechoma hederacea	Ground Ivy	GC	M	3-6”	-18”		E/D
Hedera helix & varieties *(100)	English Ivy*	GC	M, L	6-18”	4’		E
Heliaanthemum nummularium	Sunrose	GC	L	6-8”	3’		E
Herniaria glabra	Green Carpet	GC	M	2-3”	-16”		E
Hypericum calycinum	Aaron’s Beard	GC	M, L	6-12”	3’		E
Hypericum coris	No common name	GC	M, L	6-12”	2’		E
Iberis sempervirens	Evergreen Candytuft	GC	M	6-12”	6-12”		E
Iva hayesiana * (100)	Poverty Weed*	GC	L, VL	2-3’	4-5’	X	E
Juniperus confeerta* (100)	Shore Juniper*	GC	L	8-12”	4-5’		E
Lampranthus spectabilis* (100)	Trailing Ice Plant*	GC	L	-12”	12-24”		E
Laurentia fluviatilis	Blue Star Creeper	GC	M	2-4”	6-12”		E
Liriope spicata	Big Blue Lilly Turf	GC	M	18”	12”		E
Lonicera japonica* (100)	Japanese Honeysuckle*	GC	M	1-2’	6-10’		E
Lysimachia nummularia	Moneywort	GC	H, M	2-6”	2’		E
Mahonia aquifolium ‘Compacta’	Compact Oregon Grape	GC	M, L	1-2’	2-3’		E
Mahonia repens	Creeping Mahonia	GC	M, L	2-3’	2-3’	X	E
Myoporum ‘Pacificum’	Pacific Myoporum	GC	M, L	2-3’	2-3’		E
Myoporum parvifolium	NCN	GC	L	-3”	9’		E
Nandina domectica ‘Harbour Dwarf’	Dwarf Heavenly Bamboo	GC	M, L	1.5-2’	2-3’		E
Oenothera berlandieri	Mexican Evening Primrose	GC	L, VL	10-12”	4’		E
Oenothera stubbei	Baja Evening Primrose	GC	L, VL	-5”	2’		E
Ophiopogon japonicus	Mondo Grass	GC	M	8-12”	12-24”		E
Osteosperumum fruticosum	Trailing African Daisy	GC	M	-18”	4’		E
Pelargonium peltatum	Ivy Geranium	GC	M	2’	4’		E
Pelargonium tomentosum	Geranium	GC	M	-18”	2-4’		E
Phyla nodiflora (Lippia repens)	Lippia	GC	M, L	2-15”	3’		E/D
Polygonium capitatum	Pink Clover	GC	M, L	-18”	2’		E
Potentilla tabernaemontanii	Spring Cinquefoil	GC	M, L	2-6”	-12”		E
Ribes viburnifolium	Catalina Perfume	GC	L, VL	3’	3’	X	E
Rosmarinus officinalis ‘Huntington Blue’*	No common name*	GC	L	-18”	4’		E
Rosmarinus officinalis ‘Prostratus’*	Prostrate Rosemary*	GC	L	-24”	6’		E
Salvia sonomensis * (50)	Creeping Sage*	GC	L	8-12”	3-4’	X	E
Santolina chamaecyparissus	Lavender Cotton	GC	L	-24”	3’		E
Santolina rosmarinifolius (virens)	Green Lavender Cotton	GC	L	-24”	3’		E
Scaevola ‘Mauve Clusters’	No common name	GC	M, L	4-6”	3-4’		E
Sedum species	Stonecrops	GC	L, VL	Varies	Varies		E
Senecio mandraliscae	Blue Chalk Sticks	GC	M, L	-18”	5’		E
Senecio serpens	Blue Chalk Sticks	GC	M, L	-12”	3’		E
Soleirolia solerirolii	Baby;s Tears	GC	H, M	3-6”	-18”		E
Teucrium T. cossonii	Germander	GC	L	4-6”	2’		E
Teucrium chamaedrys ‘Prostratum’	Prostrate Gemander	GC	M, L	4-6”	3’		E
Thymus praecox arcticus	Mother of Thyme	GC	M, L	2-6”	-18”		E
Thymus pseudolanuginosus	Woolly Thyme	GC	M, L	2-3”	-12”		E
Trachelospermum jasminoides	Star Jasmine	GC	M, L	2’	4-5’		E
Trifolium fragiferum “o’conner’s” *	O’Connor’s Leegume*	GC	M, L	6-15”	6’		E
Verbena hybrida	Garden Verbena	GC	L, VL	6-12”	1.5-3’		E

FIRE HAZARD REDUCTION PROGRAM

Plant Reference Guide

BOTANICAL NAME	COMMON NAME	TYPE	WATER	HEIGHT	SPREAD	N	E/D
Verbena peruviana	No common name	GC	L, VL	-8”	2’		E
Verbena pulchella gracilior	Moss Verbena	GC	L, VL	12-15”	2-3’		E
Verbena tenuisecta	Moss Verbena	GC	L, VL	12-15”	2-3’		E
Vinca Major *(100)	Periwinkle	GC	M	12-24”	4-6’		E
Wedelia trilobata *	Wedelia*	GC	M, L	-12”	4-6’		E
Zauschneria californica *	California Fuchsia*	GC	L, VL	1-2’	3-5’	X	E
Zoysia tenuifolia	Korean Grass	GC	M, L	-6”	-18”		E

FIRE HAZARD REDUCTION PROGRAM

Plant Reference Guide

BOTANICAL NAME	COMMON NAME	TYPE	WATER	HEIGHT	SPREAD	N	E/D
Abutilon hybridum	Chinese Lantern	Shrub	M	10’	10’		E
Acanthus mollis	Bear’s Breech	Shrub	H, M	4’	4-6’		E/D
Achillea filipendulina *	Fernleaf Yarrow*	Shrub	L, VL	4-5’	2’		E
Achmea species	Bromeliaceae	Shrub	L	2’	2’		E
Adenostema fasciculatum * (100)	Chamise *	Shrub	L	5-12’	5-8’	X	E
Aeonium species	Crassulaceae	Shrub	M, L	3’	2’		E
Agapanthus species	Lily Of The Nile	Shrub	M	Varies	Varies		E/D
Agave species	Agave	Shrub	L, VL	Varies	Varies		E
Alocasia macrorrhiza	Elephant’s Ear	Shrub	H	5’	4’		E
Aloe species	Aloe	Shrub	L, VL	Varies	Varies		E
Alyogyne huegelii *	Blue Hibiscus *	Shrub	M, L	5-8’	8’		E
Anigozanthos flavidus	Kangaroo Paw	Shrub	M, L	3-5’	3’		E
Anigozanthos manglesii	No common name	Shrub	M, L	3’	3’		E
Arbutus unedo ‘Compacta’ *	Dwarf Strawberry Tree *	Shrub	M, L	6-8’	8’		E
Arbutus unedo ‘Elfin King’ *	Elfin King *	Shrub	M, L	3-5’	6’		E
Arbutus unedo ‘Octoberfest’ *	No common name *	Shrub	M, L	6-8’	8’		E
Arctostaphylos species *	Manzanita *	Shrub	L, VL	Varies	Varies	X	E
Artemisia ‘Powis Castle’ *	Powis Castle *	Shrub	L, VL	3’	6’		E
Artimisia californica * (100)	California Sagebrush *	Shrub	L	3-5’	3-5’	X	E
Artimisia stellerapa * (100)	Beach Worm Wood *	Shrub	L, VL	3’	3’		E
Aspidistra elatior	Cast Iron Plant	Shrub	M, L	-30”	3’		E
Asplenium bulbiferum	Mother Fern	Shrub	H, M	4’	4’		E
Aucuba japonica	Japanese Aucuba	Shrub	M, L	6’	6’		E
Baccharis p.ssp. Consanguinea * (100)	Coyote Brush *	Shrub	L, VL	Varies	Varies		E
Begonia species	Begonia	Shrub	H, M	Varies	Varies		E
Berberis thunbergii	Japanese Barberry	Shrub	M, L	4-6’	4-6’		D
Berberis thunbergii ‘cultivars’	Barberry	Shrub	M, L	Varies	Varies		D
Bergenia crassifolia	Winter Blooming Bergenia	Shrub	M, L	-20”	-20”		E
Bougainvillea species * (100)	Bougainvillea *	Shrub	L	10-25’	10-25’		
Buddleia davidii *	Butterfly Bush *	Shrub	M, L	10’	12’		E/D
Buxus microphylla japonica *	Japanese Boxwood *	Shrub	M, L	4-6’	4-6’		E
Buxux microphylla koreana Korean *	Korean Boxwood *	Shrub	M, L	4-6’	4-6’		E
Caesalpinia gilliesii *	Bird Of Paradise Bush *	Shrub	L, VL	10’	10’		E/D
Caesalpinia mexicana *	Mexican Bird Of Paradise *	Shrub	L, VL	10-12’	15’		E/D
Caesalpinia pulcherrima *	Red Bird Of Paradise *	Shrub	L, VL	10’	10’		E/D
Calliandra californica *	Baja Fairy Duster *	Shrub	L, VL	3’	4-5’	X	E/D
Calliandra eriophylla *	Fairy Duster *	Shrub	L, VL	3’	4-5’		E/D
Callistemon citrinus ‘Compacta’ *	Bottlebrush *	Shrub	L, VL	5’	5’		E
Calycanthus occidentalis *	Spice Bush *	Shrub	M, L	4-12’	5’		D
Carissa macrocarpa (grandiflora)	Natal Plum	Shrub	M, L	7’	7’		E
Carpenteria californica *	Bush Anemone *	Shrub	L	6-8’	6-8’	X	E
Cassia artemisiojdes *	Feathery Cassia *	Shrub	L, VL	3-6’	6’		E
Ceanothus species *	Wild Lilac *	Shrub	L, VL	Varies	Varies	X	E/D
Cercocarpus betuloides *	Mountain Mahogany *	Shrub	L, VL	5-12’	10’	X	E
Choisya ternate *	Mexican Orange *	Shrub	M	6-8’	8’		E
Cistus species	Rockrose	Shrub	L, VL	Varies	Varies	X	E

FIRE HAZARD REDUCTION PROGRAM

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BOTANICAL NAME	COMMON NAME	TYPE	WATER	HEIGHT	SPREAD	N	E/D
Cleome spinosa *	Spider Flower *	Shrub	L, VL	4-6’	4-6’		E
Clivia miniata	Clivia	Shrub	H, M	2’	2’		E
Coleonema pulchrum	Pink Breath of Heaven	Shrub	M, L	5-10’	6’		E
Colocasia esculenta (caladium)	Elephant’s Ear	Shrub	H	6’	6’		E/D
Comarostaphylis diversifolia *	Summer Holly *	Shrub	L, VL	6-10’+	6-8’+		E
Convolvulus cneorum *	Bush Morning Glory *	Shrub	L	2-4’	2-4’		E
Coprosma pumila * (100)	No common name *	Shrub	M	3’	8’		E
Coprosma repens *(100)	Mirror Plant *	Shrub	M	10’	6’		E
Cortaderia selloana * (100)	Pampas Grass *	Shrub	L	10-12’	10-12’		E
Cotoneaster species *	Cotoneaster *	Shrub	M, L	2-18’	3-15’		E/D
Cotyledon species	No common name	Shrub	L	1-3’	1-3’		E
Crassula species	Jade Plant	Shrub	L	1-9’	1-9’		E
Cuphea hyssopifolia	False Heather	Shrub	H, M	1-2’	2’		E
Cycas revolute	Sago Palm	Shrub	M	2-10’	3-6’		E
Cyrtomium falcatum	Holly Fern	Shrub	H, M	2-3’	3-4’		E
Dasylirion longissima *	Mexican Grass Tree *	Shrub	L, VL	10’	8’		E
Dasylirion wheeleri *	Sotol *	Shrub	L, VL	6’	6’		E
Dendromecon harfordii *	Island Bush Poppy *	Shrub	L	20’	20’	X	E
Dietes bicolor	Fortnight Lily, African Iris	Shrub	M, L	2-3’	2-3’		E
Dodonaea viscose * (100)	Hopseed Bush *	Shrub	L	12-18’	10-12’		E
Echium fastuosum *	Pride of Madeira *	Shrub	L, VL	4-6’	4-6’		E
Elaeagnus pungens & cultivars *	Silverberry *	Shrub	M, L	6-15’	6-15’		E
Encelia californica *	Coast Sunflower *	Shrub	L, VL	3-5’	3-5’	X	E/D
Encelia farinose *	Brittle Bush *	Shrub	L, VL	3-5’	3-5’	X	E/D
Eriogonum fasciculatum *	Common Buckwheat *	Shrub	L	2-3’	2-3’	X	E
Eriogonum giganteum *	St. Catherine’s Lace *	Shrub	L, VL	8’	8’	X	E
Escallonia species	Escallonia	Shrub	M, L	2-15’	2-10’		E
Euonymus japonica & cultivars	Evergreen Euonymus	Shrub	M	2-10’	6’		E
Euphorbia species	Euphorbia	Shrub	L	Varies	Varies	X	
Euryops pectinatus	NCN	Shrub	L	6’	5’		E
Fatsia japonica	Japanese Aralia	Shrub	M	5-12’	6-10’		E
Fouquieria splendens *	Ocotillo *	Shrub	VL	8-25’	8-15’	X	E
Fremontodendron species & cultivars *(100)	Flannel Bush *	Shrub	L, VL	5-20’	15’	X	E
Gardenia jasminoides	Gardenia	Shrub	H	3-6’	3-5’		E
Garrya elliptica *	Coastal Silktassel *	Shrub	M, L	4-8’	4-8’	X	E
Grevillea ‘Noellii’	NCN	Shrub	M, L	4’	4-5’		E
Grewia caffra *	Lavender Star Flower *	Shrub	H, M	6-10’	6-10’		E
Hakea suaveolens *	Sweet Hakea *	Shrub	L	10-20’	15’		E
Hebe species & cultivars	Hebe	Shrub	M	3-6’	3-6’		E
Helictotrichon sempervirens *	Blue Oat Grass *	Shrub	L	2-3’	2-3’		E
Hemerocallis hybrids	Daylilly	Shrub	M, L	1-6’	2-6’		E/D
Hesperaloe parviflora	No common name	Shrub	VL	3-4’	4-6’		E
Heuchera	Coral Bella	Shrub	M	1-2’	1-2’	X	P
Hibiscus rosa – sinensis *	Chinese Hibiscus *	Shrub	M	15’	12’		E
Iiex species	Holly	Shrub	M, L	Varies	Varies		E
Iris douglasiana	Douglas Iris	Shrub	M, L	2’	2’		E

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BOTANICAL NAME	COMMON NAME	TYPE	WATER	HEIGHT	SPREAD	N	E/D
Iris species	Bearded Iris	Shrub	M	-30”	2’		E
Isomeris arborea *	Bladderpod *	Shrub	L	3-10’	3-10’	X	E
Juniperus species *(100)	Juniper *	Shrub	L	Varies	Varies	X	E
Justicia brandegeana	Shrimp Plant	Shrub	M	3’	4’		E
Justicia californica *	Chuparosa *	Shrub	L, VL	2-5’	4’	X	D
Keckiella cordifolia	Heart-Leaved Penstemon	Shrub	L, VL	5-6’	8-10’	X	E/D
Kniphofia uvaria	Red-Hot Poker	Shrub	L	2-3’	3-4’		E
Larrea tridentate *(100)	Creosote Bush *	Shrub	VL	4-8’	4-8’	X	E
Lavandula angustifolia	English Lavender	Shrub	L	3-4’	3-4’		E
Lavandula dentate	French Lavender	Shrub	L	3’	3’		E
Lavandula Intermedia	Lavender	Shrub	L	1-2’	2-3’		E
Lavandula stoechas	Spanish Lavender	Shrub	L	2-3’	3’		E
Lavatera assurgentifloria *	California Tree Mallow	Shrub	L	8-12’	8-12’	X	E
Leonotis Ieonurus *	Lion’s Tail *	Shrub	L	3-6’	4-6’		E
Leucophyllum candidum *	Violet Silverleaf *	Shrub	L, VL	4-5’	4-5’		E
Leucophyllum frutescens *	Texas Ranger *	Shrub	L, VL	6-8’	6-8’		E
Leucophyllum laevigatum *(100)	Chihuahuan Sage *	Shrub	L, VL	3-4’	4-5’		E
Ligustrum japonicum	Privet	Shrub	H	10-12’	10-12’		E
Limonium perezii	Sea Lavender	Shrub	L	2’	2’		E
Liriope muscari	Big Blue Lily Turf	Shrub	M	1-2’	1-2’		E
Lobelia lanflora	Mexican Bush Lobelia	Shrub	L	2-3’	4-6’		E
Lupinus species	Lupine	Shrub	L, VL	Varies	Varies	X	E
Mahonia ‘Golden Abundance’ *(100)	No common name *	Shrub	M, L	5-6’	6’		E
Mahonia aquifolium *(100)	Oregon Grape *	Shrub	M, L	6-8’	6-8’	X	E
Mahonia fremontii *(100)	Desert Mahonia *	Shrub	L	3-12’	4-8’		E
Mahonia Iomarifolia *(100)	Venetian Blind Mahonia *	Shrub	M, L	6-10’	6-10’		E
Mahonia nevinii *(100)	Nevin Mahonia *	Shrub	L	3-10’	6-12’	X	E
Mahonia pinnata *(100)	California Holly Grape *	Shrub	M, L	4-5’	4-6’		E
Malosma laurina *(100)	Laurel Sumac *	Shrub	L	12-20’	12-20’	X	E
Malva species *	Mallow *	Shrub	L	Varies	Varies	X	E
Melaleuca nesophila *(100)	Pink Melaleuca *	Shrub	L	15-20’	15-20’		E
Mimulus species (Diplacus)	Monkey Flower	Shrub	L	1-4’	1-4’		E
Muhlenbergia rigins *	Dear Grass *	Shrub	L	5’	4’	X	
Myrica californica *	Pacific Wax Myrtle *	Shrub	L	10-15’	10-15’	X	E
Myrsine Africana	African Boxwood	Shrub	L	3-8’	3-8’		E
Myrtus communis ‘Compacta’ *	Dwarf Myrtle *	Shrub	M	5-8’	5-8’		E
Nandina domestica*(100)	Heavenly Bamboo*	Shrub	M	6-8’	4-5’		E
Nandina domestica ;Compacta’*(100)	No Common Name*	Shrub	M	4-5’	3-4’		E
Nephrolepis cordifolia	Southern Sword Fern	Shrub	M, L	2-3’	3-6’		E
Nerium oleander ‘Petite Salmon’	Petite Salmon	Shrub	L	3-4’	3-4’		E
Nerium species *(100)	Oleander *	Shrub	M, L	8-20’	10-20’		E
Opuntia species	Pricky Pear, cholla etc.	Shrub	L, VL	Varies	Varies	X	E
Pelargonium species	Geranium	Shrub	M, L	Varies	Varies		E
Pennisetum setaceum *(100)	Fountain Grass *	Shrub	L	-18”	1-2’		
Penstemon species	Beard Tongue	Shrub	L	Varies	Varies		E/D
Phlomis Fruticosa *(100)	Jerusalem Sage *	Shrub	M, L	3-4’	3-4’		E
Phoenix roebelenii	Pigmy Date Palm	Shrub	L	6’	6’		E

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Phormium tenax *	New Zealand Flax *	Shrub	M	5-9’	6’		E
Phormium tenax ‘cultivars’	No common name	Shrub	M	Varies	Varies		E
Photinia Fraseri *	Photinia *	Shrub	M, L	10-15’	10-20’		E
Pittosporum tobira	Tobira	Shrub	M, L	6-15’+	8-15’		E
Pittosporum tobira ‘Variegata’	No common name	Shrub	M	5-8’	6-8’		E
Pittosporum tobira ‘Wheeler’s Dwarf’	Dwarf Pittosporum	Shrub	M	1-3’	2-4’		E
Plumbago auriculata *(100)	Cape Plumbago *	Shrub	L	6-8’	8-12’		E
Polystichum munitum	Sword Fern	Shrub	M	2-4’	2-4’		E
Portulacaria afra	Elephant’s Food	Shrub	L	5-12’	6-12’		E
Punica granatum ‘Nana’	Dwarf Pomegranate	Shrub	L	3’	4’		D
Pyracantha species *	Firethorn *	Shrub	M	Varies	Varies		E/D
Rhamnus California *	Coffeeberry *	Shrub	M, L	3-15’	4-15’	X	E/D
Rhamnus crocea *	Redberry *	Shrub	M, L	2-3’	3’		E
Rhamnus crocea ilicifolia *	Hollyleaf Redberry *	Shrub	M, L	3-15’	3-15’		E
Rhaphiolepis indica	India Hawthorn	Shrub	M, L	4-8’	4-8’		E
Rhaphiolepis indica ‘Cultivars’	No common name	Shrub	M, L	Varies	Varies		E
Rhus integrifolia *(50)	Lemonade Berry *	Shrub	L	3-10’+	6-20’	X	E
Rhus ovata *	Sugar Bush *	Shrub	L	3-15’	6-15’	X	E
Ribes aureum *	Golden Currant *	Shrub	L	3-6’	3-6’		D
Ribes malvaceum *	Chaparral Currant *	Shrub	L	6-8’	5’	X	D
Ribes sanguineum & cultivars *	Red Flowering Currant *	Shrub	M, L	4-12’	4-8’		D
Ribes speciosum	Fuchsia-Flow.Gooseberry	Shrub	L	3-6’	3-6’	X	D
Ribes viburnifolium	Catalina Perfume	Shrub	L	3’	12’	X	E
Romneya coulteri *	Matilija Poppy *	Shrub	L	8’	4’	X	D
Rosa species	Rose	Shrub	M	Varies	Varies		E/D
Rosmarinus ‘Tuscan Blue’*	Tuscan Blue*	Shrub	L	6’	6’		
Salvia greggii *(100)	NCN*	Shrub	L	3-4’	3-4’		E
Salvia leucantha *(100)	Mexican Bush Sage *	Shrub	L	3-4’	3-4’		E
Salvia leucophylla *(100)	Purple Sage *	Shrub	L	2-6’	2-6’	X	E
Salvia species * (100) (White & Black)	Sage *	Shrub	L	Varies	Varies	X	E/D
Simmondsia chinensis *	Jojoba*	Shrub	L, VL	3-8’+	4-8’	X	E
Strelitzia reginae	Bird of Paradise	Shrub	M	5’	4’		E
Tecomaria capensis *(100)	Cape Honeysuckle *	Shrub	L	6-8’	12-15’		E
Tetrapanax papyriferus	Rice Paper Plant	Shrub	M	10-15’	15’		E
Tibouchina urvilleana *	Princess Flower *	Shrub	M	5-18’	5-18’		E
Trichostema lanatum	Wooly Blue Curls	Shrub	L, VL	3-5’	5’	X	E
Tulbaghia violacea	Society Garlic	Shrub	M	18’	2’		E/D
Viburnum species	Viburnum	Shrub	M	Varies	Varies		E/D
Westringia fruticosa *	Coast Rosemary *	Shrub	M, L	5-7’	6-12’	X	E
Woodwardia fimbriata	Giant Chain Fern	Shrub	L	9’	5’	X	E
Xylosma congestum *	Shiny Xylosma*	Shrub	M, L	15’+	15’+		E
Xylosma congestum ‘Compacta’ *	Compact Xylosma*	Shrub	M, L	8-12’	8-12’		E
Yucca species *	Yucca*	Shrub	L, VL	Varies	Varies		E
Zantedeschia aethiopica	Calla Lilly	Shrub	M	1-3’	3’		

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Acacia farnesiana *	Sweet Acacia *	Tree	L	15-20’	15-20’		D
Acacia greggii *	Catclaw Acacia *	Tree	L, VL	15-25’	15-25’		E
Acer macrophyllum *	Bigleaf Maple *	Tree	M	30-95’	30-95’	X	D
Acer negundo *	Box Elder *	Tree	M, L	60’	50’		D
Acer palmatum	Japanese Maple	Tree	M	20’	20’		D
Acer saccharinum *	Silver Maple *	Tree	M	40-100’	40-100’		D
Adenostema sparsifolium *(100)	Red Shanks *	Tree	L	12-15’	12-15’	X	E
Aesculus californica *	California Buckeye *	Tree	M, L	20’+	30’		D
Agathis robusta *	Queensland Kauri *	Tree	H	75’	25’		E
Agonis flexuosa *	Peppermint Tree *	Tree	M, L	25-35’	25-35’		E
Albizia julibrissin *	Silk Tree *	Tree	M	40’	40’		D
Alnus cordata *	Italian Alder *	Tree	M	40’	25’		D
Alnus rhombifloria	White Alder	Tree	H, M	50-90’	40’	X	D
Araucaria heterophylla *	Norfolk Island Pine *	Tree	H, M	100’	25’		E
Arbutus’Marina’	No common name	Tree	M, L	40’	40’		E
Arbutus unedo *	Strawberry Tree *	Tree	M, L	12-35’	20-35’		E
Archontophoenix cunninghamiana	King Palm	Tree	M	50’	10-15’		E
Bauhinia variegate *	Purple Orchid Tree *	Tree	M	20-35’	35’		E/D
Beaucarnea recuvata *	Bottle Palm *	Tree	L	25’	15’		E
Betula pendula	European White Birch	Tree	M	30-40’	30’		D
Brachychiton acerifolius *	Flame Tree *	Tree	L	60’	45-50’		D
Brachychiton populneus	Kurrajong Bottle Tree	Tree	L	30-50’	30’		E
Brahea armata *	Blue Hesper Palm *	Tree	L, VL	40’	10’		E
Brahea edulis *	Guadalupe Palm *	Tree	L, VL	30’	10’		E
Butia capitata *	Pindo Palm *	Tree	L	10-20’	15-20’		
Callistemon citrinus *	Lemon Bottlebrush *	Tree	M, L	25’	15’		E
Callistenom viminalis *	Weeping Bottlebrush *	Tree	M, L	20-30’	15’		E
Calocedrus decurrens *	Incense Cedar	Tree	L	40-80’	10-20’		E
Calodendrum capense *	Cape Chestnut *	Tree	M	30’	25-40’		D
Carya illinoensis *	River She-Oak *	Tree	M, L	70’	70’		D
Casuarina cunninghamiana *	River She-Oak *	Tree1	L	50-70’	20-30’		E
Catalpa speciosa *	Western Catalpa *	Tree	M	40-70’	40-70’		D
Cedrus Species *	Cedar *	Tree	L	Varies	Varies		E
Ceratonia siliqua *	Carob Tree *	Tree	L	30-40’	30-40’		E
Cercidium floridum *	Blue Palo Verde *	Tree	L, VL	30’	30’	X	D
Cercidium microphyllum *	Littleleaf Palo Verde *	Tree	L, VL	25’	25’	X	D
Cercis occidentalis	Western Redbud	Tree	M, L	20’	20’	X	D
Chamaerops humilis *	Mediterranean Fan Palm *	Tree	M	20’	20’		E
Chilopsis linearis *	Desert Willow *	Tree	L	35’	35’	X	D
Chionanthus retusus *	Chinese Fringe Tree *	Tree	M	20’	20’	X	D
Chitalpa tashkentensis *	Chitalpa *	Tree	M, L	20-30’	20-30’		D
Chorisia speciosa	Floss Silk Tree	Tree	M	30-60’	30-40’		D
Cinnamomum camphora *	Camphor Tree *	Tree	M, L	50’+	60’+		E
Citrus species	Citrus Trees	Tree	H, M	Varies	Varies		E

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Cocculus Laurifolius *	Laurel Leaf Snail Seed *	Tree	M	25’	30’+		E
Cordyline australis *	Giant Dracanea *	Tree	M	30’	15’		E
Cornus kousa *	Kousa Dogwood *	Tree	H	20’	15’		D
Cupaniopsis anacardioides	Carrot Wood	Tree	M	40’	40’		E
Cupressus sempervirens *	Italian Cypress	Tree	L	60’	10’		E
Cupressus species *	Cypress *	Tree	L	30-90’	30-40’		E
Cyathea cooperi	Australian Tree Fern	Tree	M, L	20’	6-12’		E
Discksonia Antarctica	Tasmanian Tree Fern	Tree	L	6-15’	6’		E
Dracaena draco *	Dragon Tree *	Tree	M, L	20’	20’		E
Eriobotrya deflexa	Bronze Loquat	Tree	M, L	20’	20’		E
Erythrina species	Coral Tree	Tree	M, L	Varies	Varies		D
Eucalyptus citriodora *	Lemon-Scented Gum *	Tree	M, L	75-100’	40’		E
Eucalyptus maculate *	Spotted Gum *	Tree	M, L	60-80’	40’		E
Eucalyptus nicholii *	Willow Peppermint *	Tree	M, L	40’	50’		E
Eucalyptus sideroxylon *	Red Ironbark *	Tree	M, L	35-80’	35’		E
Eucalyptus species *	Eucalyptus *	Tree	L	Varies	Varies		E/D
Eucalyptus torquata *	Coral Gum	Tree	M, L	25’	20’		E
Feijoa sellowiana	Pineaplle Guava	Tree	M, L	18-25’	25’		E
Ficus Species	Fig	Tree	M, L	Varies	Varies		E/D
Fraxinus augustifolia *	Raywood Ash *	Tree	M	25-35’	30’		D
Fraxinus dipetala	Foothill Ash	Tree	L, VL	18-20’	20-30’		D
Fraxinus velutina *	Arizona Ash *	Tree	M, L	20-50’	30-50’		D
Fraxinus velutina coriacea *	Montebello Ash *	Tree	M, L	20-40’	20-40’		D
Geijera parviflora	Australian Willow	Tree	M, L	25-30’	20-30’		E
Ginkgo biloba	Maidenhair Tree	Tree	M, L	35-80’	30-80’		D
Gleditsia triacanthos *	Honey Locust *	Tree	M, L	35-70’	30’		D
Grevillea robusta *	Silk Oak *	Tree	M	50-60’	30’		E/D
Heteromeles arbutifolia *	Toyon *	Tree	L, VL	15-30’	15-30’	X	E
Hymenosporum flavum	Sweetshade Tree	Tree	M, L	20-40’	15-20’		E
Jacaranda mimosifolia	Jacaranda	Tree	M, L	25-40’	30’		D
Juglans californica *	S, California Black Walnut *	Tree	L	20-35’	30-45’	X	D
Koelreuteria bipinnata *	Chinese Flame Tree *	Tree	M	20-40’	45’		D
Koelreuteria paniculata *	Golden Rain Tree *	Tree	M, L	20-35’	40’		D
Lagerstroemia indica	Crape Myrtle	Tree	M, L	30’	20’		D
Laurus nobilis *	Sweet Bay *	Tree	L	12-40’	15’		E
Leptospermum laevigatum *	Australian Tea Tree	Tree	L	15-25’	15-25’		E
Leptospermum scoparium	New Zealand Tea Tree	Tree	L	10-12’	8-10’		E
Liquidambar formosana *	Chinese Sweet Gum *	Tree	M	40-60’	25’		D
Liquidamber styraciflua	American Sweet Gum	Tree	M	60’	25’		D
Liriodendron tulipifera	Tulip Tree	Tree	M	60-80’	40’		D
Lithocarpus densiflorus *	Tanbark Oak *	Tree	L	60’	40’		E
Lyonothamnus floribundus *	Catalina Ironwood *	Tree	L	30-60’	20-40’	X	E
Magnolia soulangiana	Saucer Magnolia	Tree	M	25’	25’		D
Magnolia species *	Magnolia *	Tree	M	Varies	Varies		E/D

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Maytenus boaria	Mayten Tree	Tree	M, L	30-50’	30’		E
Melaleuca leucadendra *(100)	Cajeput Tree *	Tree	L	20-40’	25’		E
Melia azedarach *	Chinaberry *	Tree	L	30’	30’		D
Metasequoia glyptostroboides *	Dawn Redwood *	Tree	H, M	80’	40’		D
Metrosideros exelsus *	New Zealand Christams *	Tree	L, VL	30’	30’		E
Morus Alba	White Mulberry	Tree	M, L	20-60’	30-50’		D
Musa species	Banana Palm	Tree	H	Varies	Varies		E
Olea euopea *	Olive	Tree	L, VL	35’	20-30’		E
Parkinsonia aculeate *	Jerusalem Thorn *	Tree	L, VL	15-30’	15-30’		D
Phoenix canariensis *	Canary Island Date Palm *	Tree	L	60’	50’		E
Phoenix dactylifera *	Date Palm	Tree	L	80’	15’		E
Pinus brutia *(100)	Calabrian Pine *	Tree	L	30-60’	30’		E
Pinus canariensis *(100)	Canary Island Pine *	Tree	L	40-100’	30’		E
Pinus coulteri *(100)	Coulter Pine *	Tree	L	30-60’	25-40’		E
Pinus eldarica *(100)	Afghan Pine *	Tree	L	30-60’	25-40’		E
Pinus halepensis *(100)	Aleppo Pine *	Tree	L	30-60’	25-40’		E
Pinus pinea *(100)	Italian Stone Pine *	Tree	L	40-80’	30-50’		E
Pinus radiate *(100)	Monterey Pine *	Tree	L	60-80’	20-35’	X	E
Pinus species *(100)	Pine Tree *	Tree	L	Varies	Varies		E
Pistacia chinensis *	Chinese Pistache	Tree	M, L	60’	50’		D
Pittosporum phillyraeoides *	Willow Pittosporum	Tree	L	15-25’	10-15’		E
Pittosporum rhombifolium *	Queensland Pittosporum	Tree	M	15-35’	25’		E
Pittosporum undulatum *	Victorian Box *	Tree	M	25’	25’		E
Platanus acerifolia	London Plane Tree	Tree	L	40-80’	30-40’		D
Platanus racemosa	California Sycamore	Tree	L	50-100’	50-100’	X	D
Podocarpus gracilior*(100)	Fern Pine*	Tree	M	60’	60’		E
Podocarpus macrophyllus *(100)	Yew Pine*	Tree	M	50’	45’		E
Populus fremontii *	Fremont Cottonwood *	Tree	M	40-60’	40-60’		D
Prosopis glandulosa	Honey Mesquite	Tree	L, VL	25-30’	25-30’		D
Prosopis juliflora	Mesquite	Tree	L, VL	40-50’	40-50’	X	D
Prunus ilicifolia *	Hollyleaf Cherry *	Tree	L, VL	15-30’	15-30’	X	E
Prunus lyonii *	Catalina Cherry *	Tree	L, VL	20-45’	30’+	X	E
Prunus species & cultivars	Cherry	Tree	Varies	Varies	Varies		E/D
Punica granatum	Pomegranate	Tree	L	12-18’	20’		D
Pyrus calleryana *	Callery Pear *	Tree	L	25-50’	25-50’		D
Pyrus kawakamii	Evergreen Pear	Tree	L	20-25’	20-25’		E
Quercus agrifolia*	Coast Live Oak*	Tree	L, VL	30-70’	70’+	X	E
Quercus chrysolepis*	Canyon Live Oak*	Tree	M, L	30-60’	20-60’	X	D
Quercus douglasii*	Blue Oak*	Tree	M	50’	50’	X	D
Quercus engelmanii*	Engelmann Oak*	Tree	L	60’	60’	X	E
Quercus ilex*	Holly Oak*	Tree	M	40-70’	40-70’		E
Quercus kellogii*	California Black Oak*	Tree	M	30-80’	60’	X	D
Quecus lobate*	Valley Oak*	Tree	L, VL	70’+	70’+	X	D
Quercus palustris*	Pin Oak*	Tree	H, M	50-80’	5-70’		D

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Quercus rubra*	Red Oak*	Tree	H, M	90’	90’		D
Quercus suber*	Cork Oak*	Tree	M	70-100’	100’		E
Quercus virginiana*	Southern Live Oak*	Tree	M, H	60’	100’		E/D
Quercus wislizinii*	Interior Live Oak*	Tree	M, L	30-75’	75’+		E
Rhus Lancea*	African Sumac*	Tree	L	20-30’	20-30’		E
Robinia ambigua *	Locust *	Tree	M, L	30-50’	30’		D
Robinia pseudoacacia *	Black Locust *	Tree	L	75’	30-40’		D
Sambucus mexicana *	Mexican Elderberry *	Tree	L	10-50’	10-25’	X	D
Sapium sebiferum	Chinese Tallow Tree	Tree	M	35’	35’		D
Schefflera actinophylla	Queensland Umbrella Tree	Tree	H, M	20’+	20’+		E
Schefflera pueckleri	Tupidanthus	Tree	H, M	20’+	20’+		E
Schinus molle *	California Pepper	Tree	L	25-40’	25-40’		E
Schinus terebithifolius *	Brazillian Pepper *	Tree	L	30’	30’		E
Sequoia sempervirens *	Coast Redwood *	Tree	H, M	70-16’	40’+	X	E
Sophora japonica *	Japanese Pagoda Tree	Tree	M, L	40’	40’		D
Stenocarpus sinatus	Firewheel Tree	Tree	M, L	30’	15’		D
Strelitzia nicolai	Giant Bird of Paradise	Tree	L	30’	15’		E
Syagrus romanzoffianum*	Queen Palm*	Tree	M	60’	20’		E
Tabebuia chrysotriha	Golden Trumpet Tree	Tree	M	25-30’	30’		E
Tabebuia impetiginosa	Pink Trumpet Tree	Tree	M	35’	30’		E
Taxodium mucronatum *	Montezuma Cypress *	Tree	H, VL	75’	35’		E/D
Tipuana tipu	Tipu Tree	Tree	M	50’	50’		D
Trachycarpus fortunei *(100)	Windmill Palm *	Tree	M	30’	6’		E
Tristania conferta	Brisbane Box	Tree	L, VL	30-60’	40’		E
Tupidanthus calyptratus	Tupidanthus	Tree	M	20’	15’		E
Ulmus parvifolia *	Chinese Elm *	Tree	M, L	40-60’	50-70’		E
Umbellularia californica *	California Bay *	Tree	L, VL	30-75’	30-75’	X	E
Washingtonia filifera *(100)	California Fan Palm *	Tree	L	60’	15’	X	E
Washingtonia robusta *(100)	Mexican Fan Palm *	Tree	L	100’	15’		E
Zelkoza serrata *	Sawleaf Zelkova *	Tree	M	60’	60’		D
Ziziphus jujuba *	Chinese Jujube *	Tree	M, L	20-30’	20-30’		D

Appendix F

VCFD Prohibited Plant List

VENTURA COUNTY FIRE PROTECTION DISTRICT
FIRE PREVENTION BUREAU
165 DURLEY AVENUE
CAMARILLO, CA 93010
www.vcfd.org
Office: 805-389-9738 Fax: 805-388-4356

410 – PROHIBITED PLANT LIST

This list was first published by the VCFD in 2014. It has been updated as of April 2019. It is intended to provide a list of plants and trees that are not allowed within a new required defensible space (DS) or fuel modification zone (FMZ). It is highly recommended that these plants and trees be thinned and or removed from existing DS and FMZs. In certain instances, the Fire Department may require the thinning and or removal.

This list was prepared by Hunt Research Corporation and Dudek & Associates, and reviewed by Scott Franklin Consulting Co, VCFD has added some plants and has removed plants only listed due to freezing hazard. Please see notes after the list of plants.

For questions regarding this list, please contact the Fire Hazard reduction Program (FHRP) Unit at 085-389-9759 or FHRP@ventura.org

Prohibited plant list:Botanical Name	Common Name	Comment*
Trees		
Abies species	Fir	F
Acacia species (numerous)	Acacia	F, I
Agonis juniperina	Juniper Myrtle	F
Araucaria species (A. heterophylla, A. araucana, A. bidwillii)	Araucaria (Norfolk Island Pine, Monkey Puzzle Tree, Bunya Bunya)	F
Callistemon species (C. citrinus, C. rosea, C. viminalis)	Bottlebrush (Lemon, Rose, Weeping)	F
Calocedrus decurrens	Incense Cedar	F
Casuarina cunninghamiana	River She-Oak	F
Cedrus species (C. atlantica, C. deodara)	Cedar (Atlas, Deodar)	F
Chamaecyparis species (numerous)	False Cypress	F
Cinnamomum camphora	Camphor	F
Cryptomeria japonica	Japanese Cryptomeria	F
Cupressocyparis leylandii	Leyland Cypress	F
Cupressus species (C. fobesii, C. glabra, C. sempervirens,)	Cypress (Tecate, Arizona, Italian, others)	F
Eucalyptus species (numerous)	Eucalyptus	F, I
Juniperus species (numerous)	Juniper	F
Larix species (L. decidua, L. occidentalis, L. kaempferi)	Larch (European, Japanese, Western)	F
Leptospermum species (L. laevigatum, L. petersonii)	Tea Tree (Australian, Tea)	F
Lithocarpus densiflorus	Tan Oak	F

Prohibited plant list:Botanical Name	Common Name	Comment*
Melaleuca species (M. linariifolia, M. nesophila, M. quinquenervia)	Melaleuca (Flaxleaf, Pink, Cajeput Tree)	F, I
Olea europea	Olive	I
Picea (numerous)	Spruce	F
Palm species (numerous)	Palm	F, I,
Pinus species (P. brutia, P. canariensis, P. b. eldarica, P. halepensis, P. pinea, P. radiata, numerous others)	Pine (Calabrian, Canary Island, Mondell, Aleppo, Italian Stone, Monterey)	F
Platycladus orientalis	Oriental arborvitae	F
Podocarpus species (P. gracilior, P. macrophyllus, P. latifolius)	Fern Pine (Fern, Yew, Podocarpus)	F
Pseudotsuga menziesii	Douglas Fir	F
Schinus species (S. molle, S. terebenthifolius)	Pepper (California and Brazilian)	F, I
Tamarix species (T. africana, T. aphylla, T. chinensis, T. parviflora)	Tamarix (Tamarisk, Athel Tree, Salt Cedar, Tamarisk)	F, I
Taxodium species (T. ascendens, T. distichum, T. mucronatum)	Cypress (Pond, Bald, Monarch, Montezuma)	F
Taxus species (T. baccata, T. brevifolia, T. cuspidata)	Yew (English, Western, Japanese)	F
Thuja species (T. occidentalis, T. plicata)	Arborvitae/Red Cedar	F
Tsuga species (T. heterophylla, T. mertensiana)	Hemlock (Western, Mountain)	F
Groundcovers, Shrubs & Vines		
Acacia species	Acacia (except dwarf/prostrate variety)	F
Adenostoma fasciculatum	Chamise	F
Adenostoma sparsifolium	Red Shanks	F
Agropyron repens	Quackgrass	F, I
Anthemis cotula	Mayweed	F, I
Arbutus menziesii	Madrone	F
Arctostaphylos species	Manzanita. Also note that Eastwood Manzanita grows to 8'	F
Arundo donax	Giant Reed	F, I
Artemisia species (A. abrotanium, A. absinthium, A. californica, A. caucasica, A. dracunculus, A. tridentata, A. pynocephala)	Sagebrush (Southernwood, Wormwood, California, Silver, True tarragon, Big, Sandhill)	F
*Atriplex species (numerous)***	Saltbush	F, I**
Avena fatua	Wild Oat	F
Baccharis pilularis	Coyote Bush	F
Bambusa species	Bamboo	F, I
Bougainvillea species	Bougainvillea	F, I, FR
Brassica species (B. campestris, B. nigra, B. rapa)	Mustard (Field, Black, Yellow) Wild Turnip	F, I

Prohibited plant list:Botanical Name	Common Name	Comment*
Bromus rubens	Foxtail, Red brome	F, I
Bromus carinatus	California brome	Grows to 5', Dies if cut
Castanopsis chrysophylla	Giant Chinquapin	F
Cardaria draba	Hoary Cress	I
Carpobrotus species	Ice Plant, Hottentot Fig	I
*Ceonothus griseus " Louis Edmunds***	Louis Edmunds Ceanothus	Grow higher than 18"*
*Ceonothus griseus var. horizontalis***	Carmel Creeper Ceonothus	Grows higher than 18"**
*Ceonothus griseus var. horizontalis "yankee point"**	Yankee Point Ceonothus	Grows higher than 18"**
*Ceonothus megacarpus***	Big pod ceonothus	Grows higher than 18"**
Cirsium vulgare	Wild Artichoke	F,I
Codariocalyx motorius	Telegraph Plant	F
Conyza bonariensis	Horseweed	F
Coprosma pumila	Prostrate Coprosma	F
Cortaderia selloana	Pampas Grass	F, I
Cytisus scoparius	Scotch Broom	F, I
Delosperma "alba"	White trailing Ice Plant	F
Dodonaea viscosa	Hopseed Bush	F
Drosanthemum Floribundum	Rosea Ice plant	F
Eriodictyon californicum	Yerba Santa	F
Eriogonum species (E. fasciculatum)	Buckwheat (California)	F
Fremontodendron species	Flannel Bush	F
Hedera species (H. canariensis, H. helix)	Ivy (Algerian, English)	I
Helix Canariensis	English Ivy	F
Heterotheca grandiflora	Telegraph Plant	F
Hordeum leporinum	Wild barley	F, I
Jasminum humile	Italian Jasmine	F
Juniperus species	Juniper	F
Lactuca serriola	Prickly Lettuce	I
Lamprathus aurantiacus	Bush Ice Plant	F
Lamprathus spectabilis	Trailing Ice Plant	F
Larix species (numerous)	Larch	F
Larrea tridentata	Creosote bush	F
Lepidium virginicum	Peppergrass	F
Leymus condensatus	Giant Wild Rye	Grows to 9' tall
Lolium multiflorum	Ryegrass	F, I
Lonicera japonica	Japanese Honeysuckle	F
Mahonia species	Mahonia	F
Miscanthus species	Eulalie Grass	F
Muhlenbergia species	Deer Grass	F

Prohibited plant list:Botanical Name	Common Name	Comment*
Nassella (stipa)leprida	Foothill needlegrass	Gets to 18" high. Cant cut to 4".
Nassella (stipa) pulchra	Purple needlegrass	Same comment as above
Nerium Oleander	Oleander	Toxic
Nicotiana species (N. bigelovii, N. glauca)	Tobacco (Indian, Tree)	F, I
Pennisetum setaceum	Fountain Grass	F, I
Perovskia atroplicifolia	Russian Sage	F
Phoradendron species	Mistletoe	F
Pickeringia montana	Chaparral Pea	F
Plumbago auriculate	Cape Plumbago	F
*Rhus (R. diversiloba, R. laurina, R. lentii)***	Sumac (Poison oak, Laurel, Pink Flowering)	F**. Poison oak presents a health hazard
Ricinus communis	Castor Bean	F, I
Rhus Lentii	Pink Flowering Sumac	F
Rosmarinus species	Rosemary (except dwarf/prostrate variety)	F
Salvia species (numerous)	Sage	F, I
Salsola australis	Russian Thistle	F, I
Senecio serpens	No common name	FR
Solanum Xantii	Purple Nightshade (toxic)	I, Toxic
Solanum Douglasii	Douglas Nightshade	Toxic
Silybum marianum	Milk Thistle	F, I
Tecoma capensis	Cape Honeysuckle	F
Thuja species	Arborvitae	F
Urtica urens	Burning Nettle	F
Vinca major	Periwnkle	I

*F = flammable, I = Invasive,

NOTES:

1. Plants on this list that are considered invasive are a partial list of commonly found plants. There are many other plants considered invasive that shall not be planted in a fuel modification zone and they can be found on The California Invasive Plant Council's Website www.cal-ipc.org/ip/inventory/index.php. Other plants not considered invasive at this time may be determined to be invasive after further study.
2. The absence of a particular plant, shrub, groundcover, or tree, from this list does not necessarily mean it is fire resistive.
3. Native, drought tolerant, plants are encouraged unless they are on this Prohibited Plant list or otherwise known as flammable or Invasive.
4. **: certain species of Ceonothus, Saltbush and Sumac need to be maintained free of dead materials, which builds up in the plant. Remove any poison oak (Sumac).