Appendix S Fire Protection Plan

Appendices

This page intentionally left blank.

Fire Protection Plan

Freeway Corridor Specific Plan

JULY 2023

Prepared for:

CITY OF YUCAIPA
34272 Yucaipa Boulevard
Yucaipa, California 92399
Contact: Benjamin Matlock

Prepared by:

DUDEK

605 Third Street
Encinitas, California 92024

Michael Huff
Discipline Director, Urban Forestry + Fire Protection

Printed on 30% post-consumer recycled material.

Table of Contents

SECTION **PAGE NO.**

TABLES

FIGURES

APPENDICES

INTENTIONALLY LEFT BLANK

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AMSL	Above Mean Sea Level
APN	Assessor's Parcel Number
BTU	British Thermal Unit
CAL FIRE	California Department of Forestry and Fire Protection
CBC	California Building Code
CFC	California Fire Code
CFPP	Construction Fire Prevention Plan
FAHJ	Fire Authority Having Jurisdiction
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
FRA	Federal Responsibility Area
FRAP	Fire and Resource Assessment Program
GIS	Geographic Information Systems
ISO	Insurance Service Office
YFD	Yucaipa Fire Department
MARB	March Air Reserve Base
MPH	miles per hour
NFPA	National Fire Protection Association
Project	Freeway Corridor Specific Plan Project
SRA	State Responsibility Area
USGS	United States Geological Survey
VHFHSZ	Very High Fire Hazard Severity Zone
WRCC	Western Regional Climate Center
WUI	Wildland Urban Interface
YVWD	Yucaipa Valley Water District

INTENTIONALLY LEFT BLANK

Executive Summary

This Fire Protection Plan (FPP) has been prepared for the Freeway Corridor Specific Plan Project (Project), which proposes to subdivide the Specific Plan area into a mixture of residential, commercial, business, public, agricultural tourism, and open space land uses.

The approximately 1,238-acre Project site is located in the City of Yucaipa (City), which is located in southwestern San Bernardino County. The Project area is bisected by Interstate 10 (I-10) and abuts the Riverside County boundary to the south. Regional access is provided by I-10 from the east and west. Local access is provided by Live Oak Canyon Road, County Line Road, Oak Glen Road, Wildwood Canyon Road, and Calimesa Boulevard. The proposed development will be situated on 49 parcels and will have multiple primary access points, including Live Oak Canyon Road and West County Line Road, Oak Glen Road, Wildwood Canyon Road, and Calimesa Boulevard.

A portion of the Project site is designated as a Very High Fire Hazard Severity Zone (VHFHSZ) within a Local Responsibility Area (LRA) by the California Department of Forestry and Fire Protection (CAL FIRE) (CAL FIRE 2007). Fire Hazard Severity Zone (FHSZ) designations are based on topography, vegetation, and weather, amongst other factors. Additionally, per the City's General Plan Safety Element, the Project site is within the City's Fire Safety Review Area. The Project site is primarily undeveloped[1], and predominantly comprised of non-native grasslands and chaparral. Project site elevations range from approximately 1,950 and 2,380 feet above mean sea level (amsl), with the lowest portion in the southwest portion of the Specific Plan area and the highest in the southeast portion. The Project area, like all of Southern California and San Bernardino County, is subject to seasonal weather conditions that can heighten the likelihood of fire ignition and spread, and, considering the site's current, pre-development terrain and vegetation, may result in a fast-moving and intense wildfire.

The FPP evaluates and identifies the potential fire risk associated with the Project's land uses and identifies requirements and recommendations 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 FPP is to generate and memorialize the fire safety requirements and standards of the Yucaipa Fire Department (YFD) along with Project-specific measures based on the Project site, its intended use, and its fire environment.

Fire service would be provided by the YFD, which has a staffing agreement with CAL FIRE. As the Project has a 15–20-year buildout horizon, only the Project's Phase 1 and Phase 2 populations and number of calculated emergency calls were evaluated for their potential to impact YFD's response capabilities from its nearest existing stations. The addition of approximately 1,417 calls per year to YFD Station 3's 3,567 annual call volume may impact the existing fire station's capabilities to respond in a timely manner. Although the closest existing fire station's response time would not conform to internal response time standards for all structures within the Specific Plan area, given the Project's fire safety features, including full NFPA 13 fire sprinklers applicable to each building type, per code and the flexibility allowed by the response time 90 percent achievement rate, the response time is considered to substantially conform with the internal response standards, subject to Fire Department review.

As determined during the analysis of the Project site and its fire environment, in its current condition, the Project site may include characteristics that, under favorable weather conditions, could have the potential to facilitate fire

[1] Approximately 252.4 acres or 20% of the existing land cover is classified as disturbed or developed.

spread. Under extreme conditions, wind-driven wildfires from the east/northeast may cast burning embers onto the property. Once the Project is built, the onsite fire potential will be lower than its current condition due to the conversion of ignitable fuels to ignition resistant landscapes and fire safety requirements that will be implemented. The proposed structures would be built using applicable ignition-resistant materials and construction methods pursuant to the current code requirements at the time of construction, which are currently the locally amended 2022 California Fire Code and 2022 California Building Code. This would be complemented by:

- Ignition resistant landscapes,
- Perimeter fuel modification zone,
- Improved water availability, capacity, and delivery system,
- Project area firefighting resources,
- Fire department access throughout the developed areas,
- Monitored defensible space/fuel modification,
- Interior, automatic fire sprinkler systems in all structures,
- Monitored interior sprinklers in applicable structures,
- Fire response travel times based on County response guidelines, and
- Other components that would provide properly equipped and maintained structures with a high level of fire ignition resistance.

Post-wildfire assessments of saves and losses have revealed specifics of how structures and landscapes can be constructed and maintained to minimize their vulnerability to wildfire. Among the findings were:

- How construction materials and methods protect homes;
- How fire and embers contributed to ignition of structures;
- What effects fuel modification had on structure ignition;
- The benefits of fast firefighter response; and
- How much (and how reliable) water is available

These and other site-specific features were critically important to structure survivability. Following these findings over the last 20 years and continuing on an ongoing basis, the Fire and Building codes are revised, appropriately. The City of Yucaipa has adopted codes that focus on preventing structure ignition from heat, flame, and burning embers.

Fire risk analysis conducted for the Project resulted in the determination that wildfire has occurred and will likely occur near the Project area again, but the Project would provide ignition-resistant landscapes (drought-tolerant and low-fuel-volume plants) and ignition-resistant structures, along with defensible space as defined in this FPP. Based on modeling and analysis of the Project area to assess its unique fire risk and fire behavior, it was determined that the standard 100-foot-wide fuel modification zones (FMZs) would help considerably to set the Project's structures back from adjacent fuels. Where the Project is unable to meet the full 100-foot FMZ, there will be enhanced construction features, as describe in detail in this FPP. The Project's FMZs would be maintained in perpetuity by the owners of each lot, the respective community HOA, or a similarly responsible, funded entity.

This FPP provides a detailed analysis of the Project, the potential wildfire risk, and potential impacts on the YFD, as well as analysis on meeting or exceeding City requirements. Further, this FPP provides requirements, recommendations, and measures to reduce the risk and potential impacts to acceptable levels.

1 Introduction

The Fire Protection Plan (FPP) has been prepared for the Freeway Corridor Specific Plan Project (Project) in City of Yucaipa, San Bernardino County, California. The purpose of the FPP is to evaluate the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those risks to a level consistent with City of Yucaipa (City) thresholds. Additionally, this FPP establishes and memorialize the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which is the City of Yucaipa Fire Department (YFD). 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 FAHJ.

As part of the assessment, the FPP has considered the fire risk presented by the Project 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, ignition resistive building features, fire protection systems, equipment, impacts to existing emergency services, defensible space, and vegetation management. The FPP also identifies fuel modification zones and recommends the types and methods of treatment that, when implemented and maintained, are designed to protect the Project's built assets and population. The FPP also recommends measures that the developer/builders will take to reduce the probability of structural and vegetation ignition.

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

The following tasks were performed during completion of this FPP:

- Gather site-specific climate, terrain, and fuel data;
- Collect site photographs[2];
- Process and analyze the 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 with the Project site;
- Evaluate nearby firefighting and emergency medical response resources; and
- Prepare the 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 FPP demonstrates that the Freeway Corridor Specific Plan Project will comply with applicable portions of Yucaipa Municipal Code, Section 15.04.115 and Ordinance 417, as amended, and adopted by reference the 2022 edition of the California Fire Code (CFC) (or current edition at the time of Project approval). Section 15.04.115 is hereafter referred to as the Yucaipa Fire Code. The Project will also be consistent with the 2022 California Building Code (CBC), Chapter 7A; 2022 edition of the California Fire Code (CFC), Chapter 49; and the 2018 edition of the International Fire Code (IFC), as amended. Further, the Project will comply with the 2019 California Residential Code, Section 327, and would also be subject to the provisions of Section 4291 of the Public Resources Code; Chapter 12-7A of the CA Reference Standards Code, Title 14, Division 1.5, Chapter 7, Subsection 2, Articles 1-5 and Title 14, Division 1.5, Chapter 7, Subsection 3, Section 1299 of the CA Code of Regulations; Title 19, Division 1, Chapter 7, Subchapter 1, Section 3.07 of the CA Code of Regulations; and Sections 51175-511829 of the CA Government Code. Additionally, based on the mitigation measures in the Freeway Corridor Specific Plan Project EIR and Project design features, including this FPP, the Project is consistent with the October 2022 California Office of the Attorney General's "Best Practices for Analyzing and Mitigating Wildfire Impacts of Development Projects Under the California Environmental Quality Act.

Chapter 7A of the CBC addresses structural ignition resistance and reducing ember penetration into homes, a leading cause of structure loss from wildfires (California Building Standards Commission 2019). Thus, code compliance is an important component of the requirements of this FPP, given the Project's location within the wildland-urban interface (WUI) and that portions of the Project site are 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 2007), as depicted in Figure 1. The City's General Plan also includes the Project site as part of the Fire Safety Overlay Districts, as depicted in Figure 2.

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 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 the FPP, the Project would meet applicable code requirements for building in these higher fire hazard areas. These codes have been developed through decades of wildfire structure save and loss evaluations to determine the causes of building losses and saves 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 7-A, Section 701A Scope, Purpose, and Application) (California Building Standards Commission 2022).

1.2 Project Summary

1.2.1 Location

The approximately 1,238-acre Specific Plan area is located in the southwestern portion of the City of Yucaipa (City), which is located in southwestern San Bernardino County (Figure 3, Project Location). The Project site is located northwest of the City of Calimesa and north of San Timoteo Canyon Road. The Project site is intersected by Interstate 10 (I-10) running from east to west in the northern portion of the Project site, Live Oak Canyon Road running north to south in the western portion of the Project site, and a small portion of West County Line Road running east to

west in the southern portion of the Project site. The Project site consists of 49 Assessor's Parcel Numbers, as listed in Table 1. Specifically, the Project site is located in Sections 3, 4, 8, 9, 10, and 11, Township 2 South, Range 2 West, as depicted on the U.S. Geological Survey Yucaipa 7.5-minute topographic quadrangle map. Regional access to the project is provided by I-10 from the east and west. Local access to the Project site is provided via Live Oak Canyon Road and West County Line Road, Oak Glen Road, Wildwood Canyon Road, and Calimesa Boulevard.

Table 1. Project Site Assessor's Parcel Numbers

Accessor's Parcel Number				
030116305	030120123	030120142	031811101	031821308
030116307	030120126	030121102	031811102	031821309
030118104	030120127	030121108	031811108	031821310
030119114	030120128	030121110	031811109	031821311
030119115	030120133	030121111	031811110	031821314
030119121	030120135	030121112	031811114	—
030120103	030120136	030122101	031811115	—
030120108	030120138	030122109	031821303	—
030120112	030120139	030122110	031821305	—
030120113	030120140	031807107	031821306	—
030120120	030120141	031807112	031821307	—

As illustrated in Figure 1, CAL FIRE Fire Hazard Severity Zones and Figure 2, Fire Safety Zone, portions of the Specific Plan area are designated VHFHSZ in a LRA (CAL FIRE 2007) and FR-1[3] (City of Yucaipa 2016) and the remaining portions of the Specific Plan area are designated FR-2, which are lands classified in the City's Safety Element as lands vulnerable to fire due to proximity to FR-1 areas. Lands within the Specific Plan area that are designated as VHFHSZ are within all or portions of Phase 1, Phase 1&2, Phase 2, Phase 3 and Phase 7.

1.2.2 Project Description

The proposed Freeway Corridor Specific Plan would subdivide the Plan Area into a mixture of residential, commercial, business, public, agricultural tourism, and open space land uses. Approximately half of the site (607.3 acres) is proposed to be left as open space, 225.8 acres are designated for residential use, 223.1 acres are designated for business park development, 72.2 acres are designated for regional commerce, 45.3 acres are designated for public facilities, 15.1 acres are designated for circulation/right of way, and 48.8 acres are designated for agricultural tourism areas (Figure 4A, Land Use Plan). The Project will be built in seven phases, as shown in Figure 4B, Conceptual Phasing Plan.

Residential Use

The Project would allow for a maximum of 2,472 residential units. There are 5 different residential classifications, with varying densities and product types. Densities vary from 2 to 24 dwelling units per acre (du/acre), depending on product type and location, with lower density housing in areas closest to existing low-density housing adjacent to the Project site. Residential products/housing types, from low to high du/acre include: detached single-family

[3] FR-1 areas are consistent with lands designated VHFHSZ within an LRA by CAL FIRE.

units, attached single family units including duplexes and walk-up townhomes, small lot single family units, cluster housing, and multifamily residential units including courtyard housing and stacked flats.

The majority of the residences would be located in the northeastern and the southwestern portions of the Project site. Residences would be connected by trails and small sections of open space areas.

Business Park Use

The land designated for business park use would provide for light industrial and office uses. These would include high cube warehousing, manufacturing, wholesale/warehouse uses, logistics/distribution centers, contract/ construction services, transportation, and agriculture services. Additionally, pursuant to the Open Space Standards of the Specific Plan, business park lands would include open space areas in the form of plazas, landscaped courtyards, and/or squares.

Regional Commerce Use

The land designated for regional commerce use would provide for retail and services, lodgings, office uses, recreation and entertainment, and other compatible uses that support the local and regional economy. Additionally, pursuant to the Open Space Standards of the Specific Plan, regional commerce lands would include open space areas in the form of plazas, landscaped courtyards, and/or squares.

Public Facilities

The land designated for public facilities would provide for electrical substations, wastewater treatment facilities, schools, and civic uses.

Agriculture Tourism Use

The land designated for agriculture tourism would provide for agriculture-based commercial use, including the sale of produce, pumpkins, agriculture related goods, and supporting businesses such as restaurants and overnight accommodations that cater to the agriculture tourism industry.

Avoided Open Space

The Project includes 607.3-acres (49% of the plan area) to be dedicated to open space. This includes ridgelines, hillsides, natural drainage courses, and natural vegetation. The Open Space designation provides protection for these areas. Additionally, areas designated for open space will include some agriculture related activities where appropriate.

Circulation Plan

The Project's circulation plan would consist of a circuitous road system south of I-10, including a connection between Live Oak Canyon Road and County Line Road. New connections from all existing streets would create a complete roadway network supporting residential, commercial, and public land areas. Traffic-calming measures will be implemented, including narrower streets, roundabouts, intersection curb bump-outs, medians, shorter blocks, and tree canopies. The goal is to encourage slower vehicular speeds, improve safety, and facilitate a stronger sense of community.

Additionally, bicycle and pedestrian trail networks will provide connectivity within and between neighborhoods in the Project area. The project proposes both multi-use trails and equestrian trails and this trail system would expand the existing trail network and recreational activity in the City and improve connectivity between Specific Plan neighborhoods.

Grading

The Project is characterized by relatively flat areas on plateaus and east-west running valleys, surrounded by often steep hillsides. Elevation within the Project area has an overall elevation change of 450 feet from the lowest to the highest point. The goal of the grading plan is to respect the natural topography of the area while utilizing grading techniques that provide suitable pads for buildings and minimize abrupt elevation and slope transitions. Guiding principles include preserving plan areas designated as Open Space, situating building pads so that they complement adjacent natural topography, creating roads that follow the contours of existing topography, and minimizing grading to the extent possible while meeting the City's design guidelines. Grading applied to the area will achieve a 2:1 ratio (height over distance), and structures will be placed as far from slopes as practicable to prevent structural damage caused by erosion, run-off, or slope instability.

Landscaping

Landscaping is a critical component of developing an appealing community and can enhance curb appeal by introducing variations of color and texture to lawn areas, conserve water, provide shade to help cool down the ambient temperature, and reduce noise and improve the overall safety of roadways by providing tree-lined streets.

Design considerations include creating a consistent landscape environment that compliments the surrounding open space, providing screening, buffering and shade where needed, and incorporating water conservation techniques and drought tolerant plant species.

Utilities and Infrastructure

The Project will include the expansion of existing wastewater, water, and stormwater infrastructure.

Construction and Project Phasing

A 15 to 20-year development schedule is proposed for the Project, to proceed in approximately 7 phases which may overlap. Phases 1a-1c consist of development of 160 acres of Business Park use areas south of I-10. Phases 2–7 consist of development of commercial and residential use areas. Phasing is conceptual only, and is dependent on factors such as ownership patterns, market demand for specific commercial and residential products, and the timing of Caltrans's improvements to regional access roads Live Oak Canyon Road and Wildwood Canyon Road. For development in phases 5 and 6, secondary freeway access would be provided to connect to I-10, in accordance with City public safety and emergency response personnel.

Projects

Figure 4C, Projects, shows the approved, proposed, or contemplated projects within the Freeway Corridor Specific Plan.

2022 County Line Road Warehouse On July 21, 2022, the City of Yucaipa approved an Addendum to the 2008 Certified EIR for development of the Countyline Road Warehouse project—an approximately 363,650-square-foot industrial warehouse totaling 19.3 acres at the northwest corner of 7th Place and County Line Lane in the eastern portion of Phase 1 (Figure 4B). This approved project is considered Business Park in the Land Use Plan (Figure 4A).

Wildwood Canyon Road Interchange As of 2022, the City, working with Caltrans who is serving as the Lead Agency, is in the project approval and environmental document phase for the proposed interchange at Wildwood Canyon Road, which would be the third interchange providing access to the project site and would provide additional connectivity for the later phases of the Project.

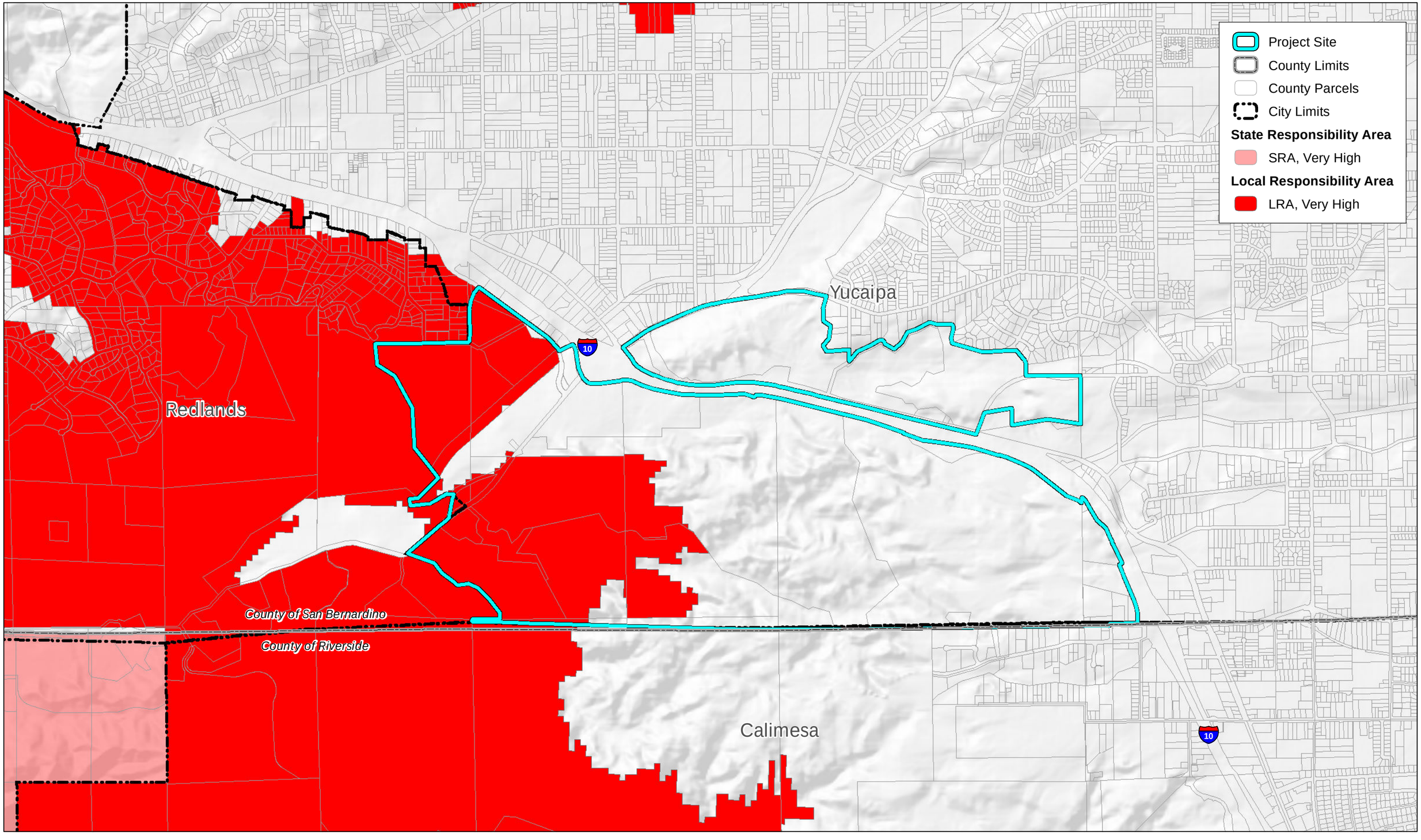
Pacific Oaks Commerce Center The Project includes a project-level analysis for buildout of the Pacific Oaks Commerce Center. The Pacific Oaks Commerce Center would result in development of two buildings that total up to 2,054,000 square feet. Building 1 would have 1,032,500 square feet of warehouse and 20,000 square feet of office use, for a total of 1,052,500 square feet of building space. Building 2 would have 981,500 square feet of warehouse and 20,000 square feet of office use, for a total of 1,001,500 square feet of building space.

Barnett Transportation Temporary Use Permit (TUP) The property owner, Scott Barnett, being represented by Premium Land Development, is applying for a Temporary Use Permit (TUP) in order to use the undeveloped portion of the parcel for storing/parking construction equipment. An 87,199 square foot pad will be graded to make parking trucks possible (Kidd Biological 2022).

1.2.3 Current Land Use

The Project area encompasses undeveloped open space that is intersected by Yucaipa Creek and Glen Oak Creek, as well as active agricultural and developed areas. The southern portion of the study area contains developed areas with facilities and dirt roads, while the central northern portion of the study area contains graded disturbed areas used for vehicle storage, ornamental plantings, and active agricultural operations run by Live Oak Canyon Farm.

The study area is located in the southwestern corner of the City. The northern and eastern portions of the Project area abut residential and commercial development. To the west is the Herngt 'Aki' Preserve and to the south is San Timoteo Canyon Park.



SOURCE: PARCELS- RIVERSIDE COUNTY GIS; FIRE DATA- CALFIRE

DUDEK

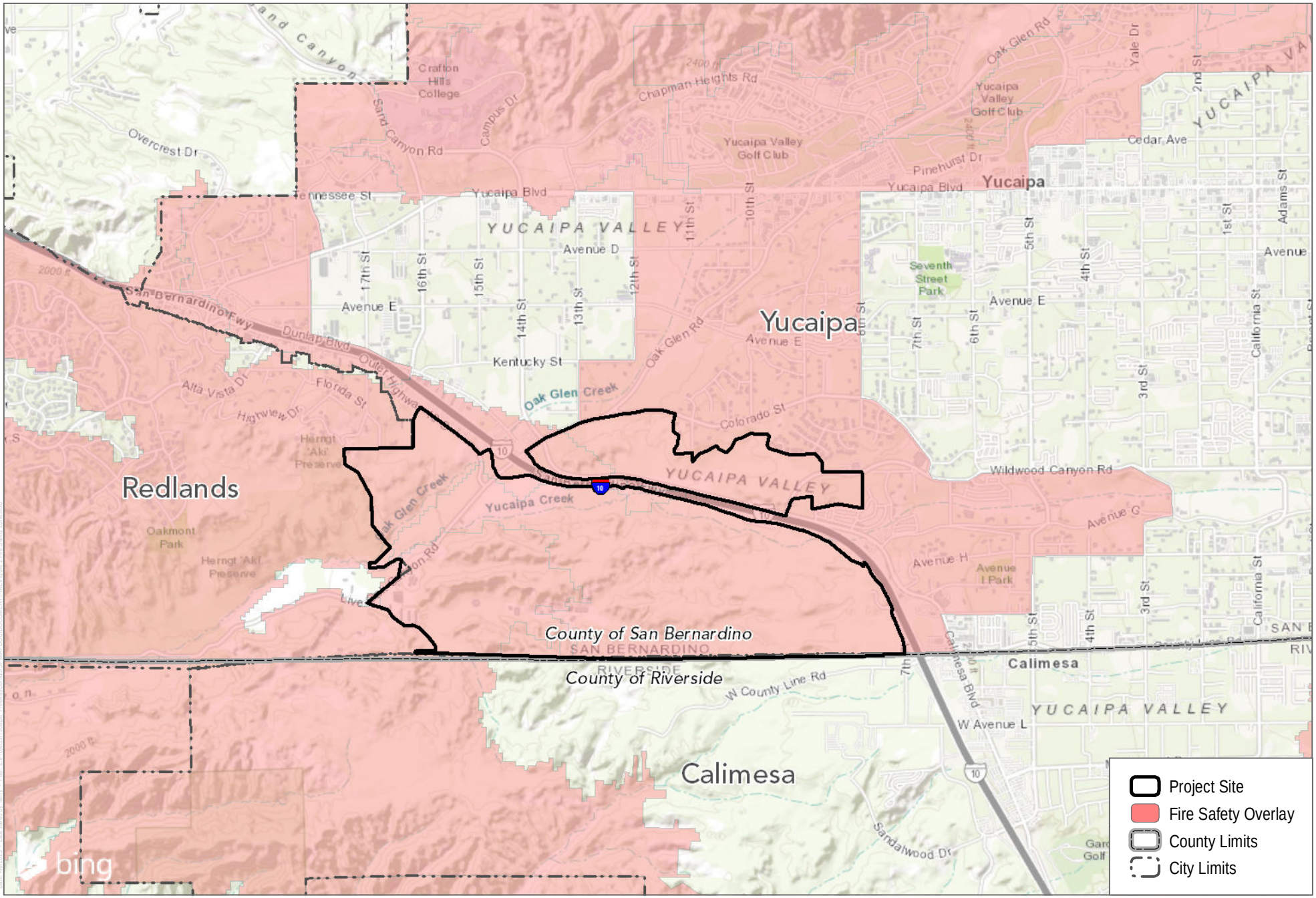
0 2,000 4,000 Feet

FIGURE 1

Fire Hazard Severity Zones - CAL FIRE

Yucaipa Valley Wine Country Specific Plan - Fire Protection Plan

INTENTIONALLY LEFT BLANK



SOURCE: ESRI; County of San Bernardino; City of Yucaipa

FIGURE 2

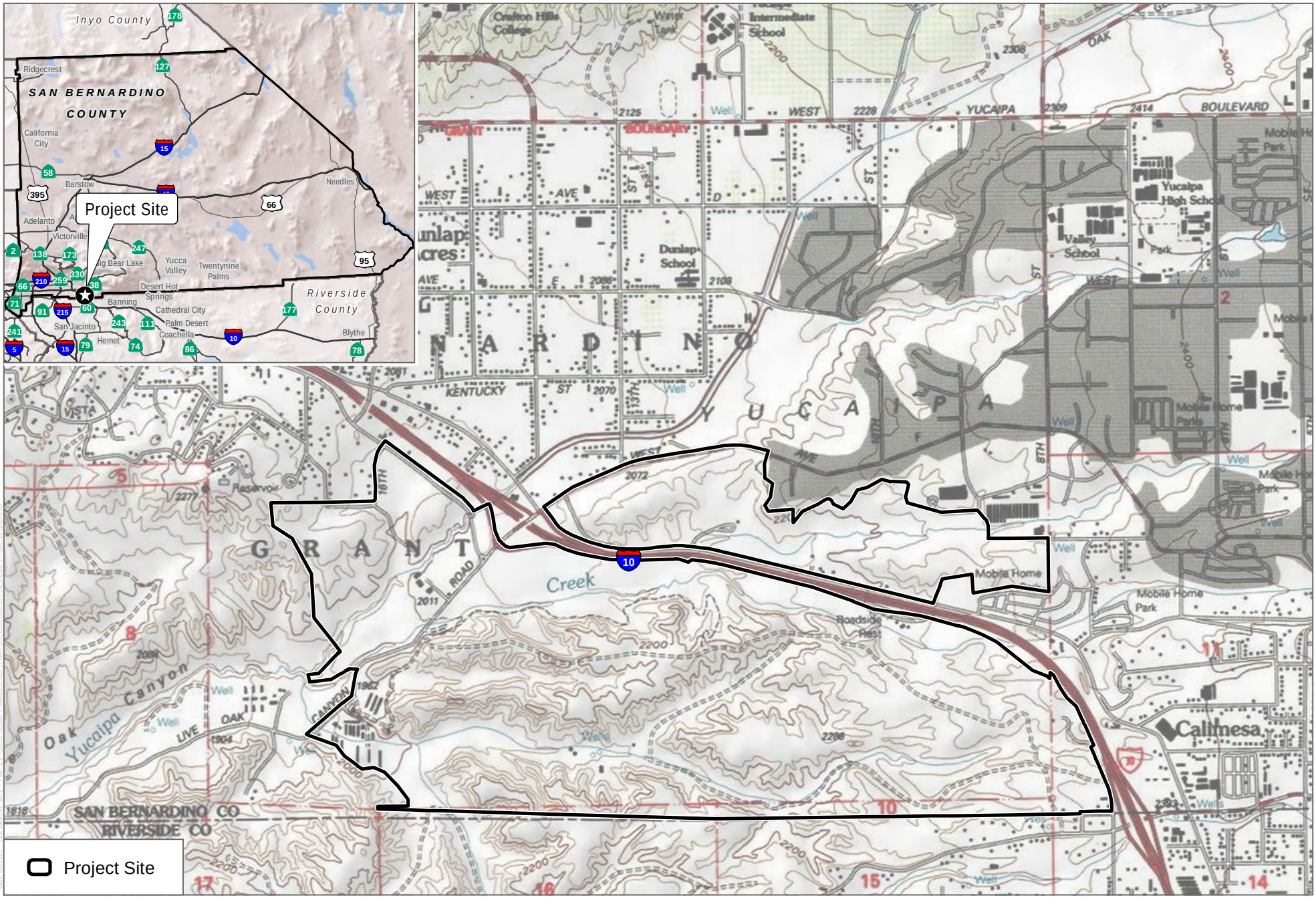
Fire Safety Overlay

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

DUDEK

0 0.5 1 Miles

INTENTIONALLY LEFT BLANK



SOURCE: USA Topo Maps 7.5 Minute Series Yucaipa Quadrangle
Township 2S; Range 2W; Section 3-4, 8-11

DUDEK

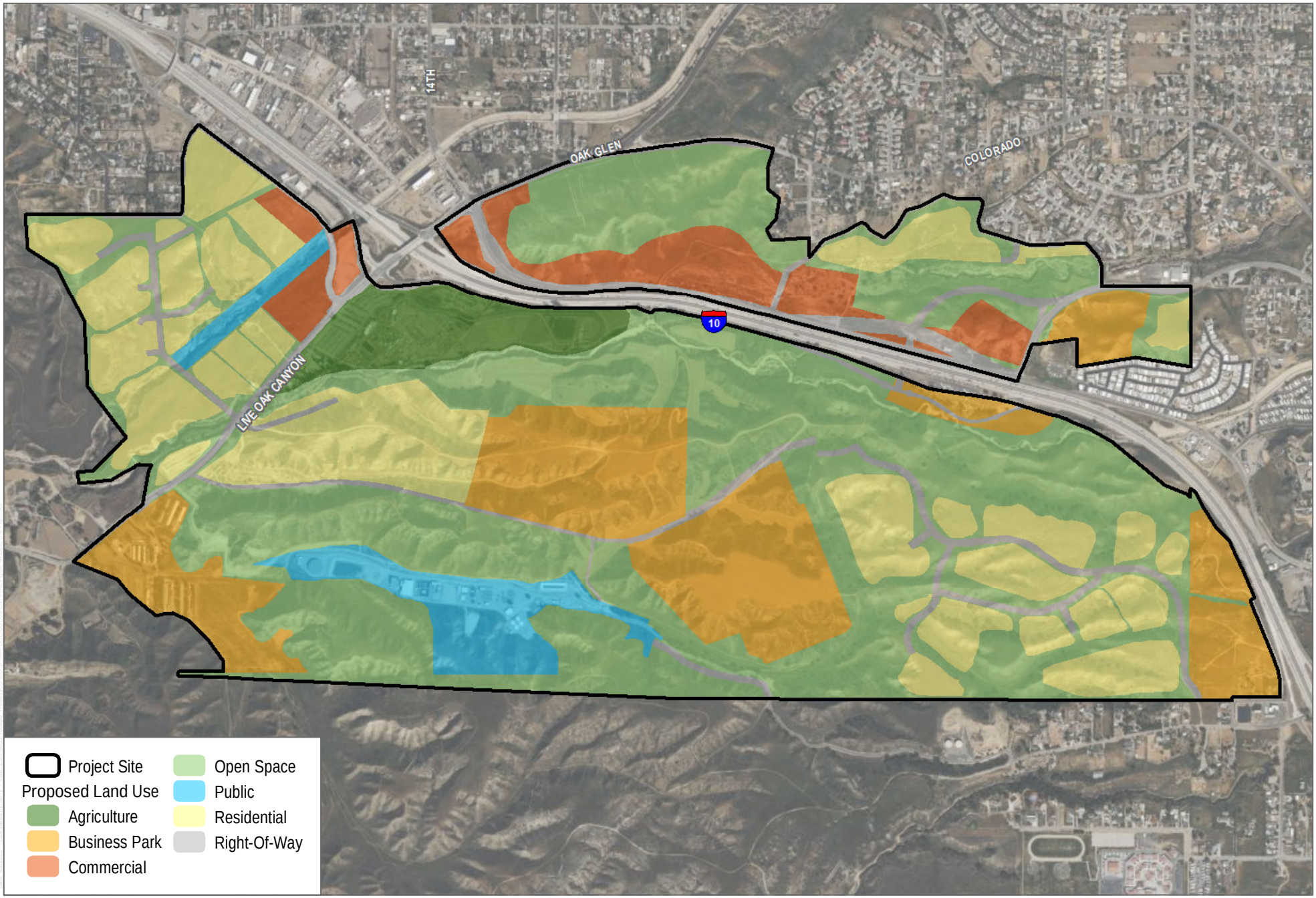
0 1,000 2,000 Feet

FIGURE 3

Project Location

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

INTENTIONALLY LEFT BLANK



SOURCE: BING MAPPING SERVICE 2022

DUDEK

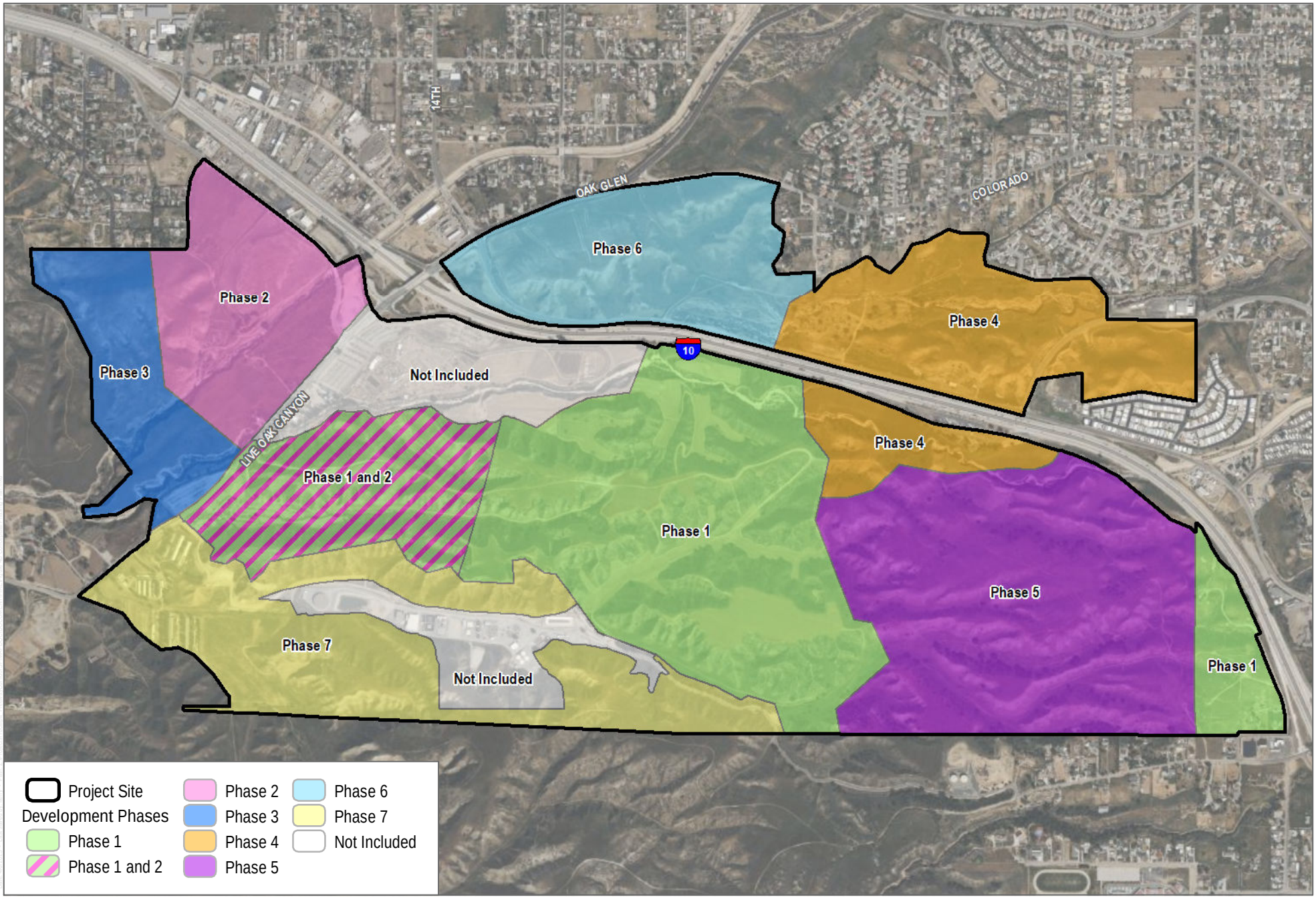
0 650 1,300 Feet

FIGURE 4A

Land Use Plan

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

INTENTIONALLY LEFT BLANK



SOURCE: BING MAPPING SERVICE 2022

DUDEK

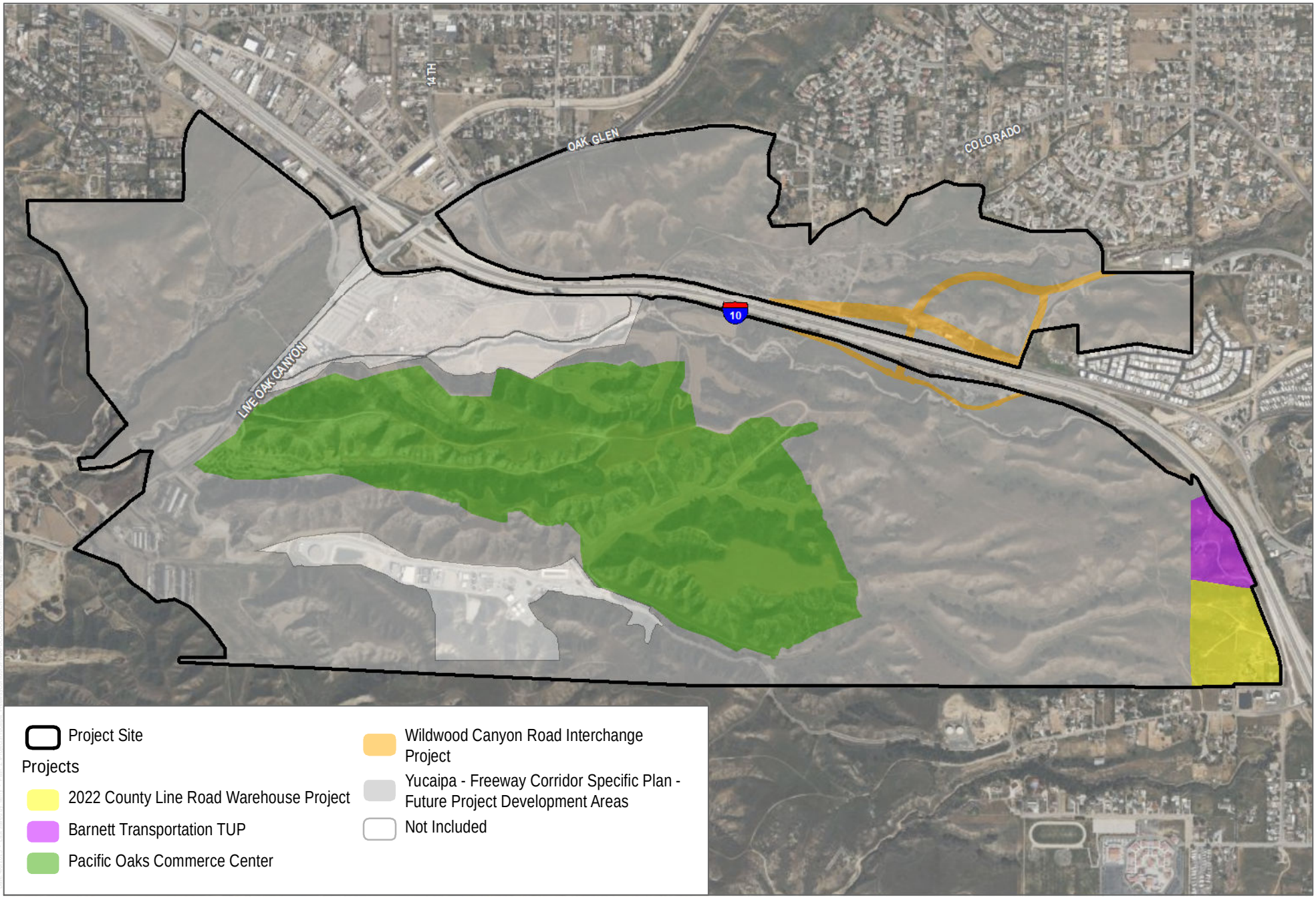
0 650 1,300 Feet

FIGURE 4B

Conceptual Site Plan

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

INTENTIONALLY LEFT BLANK



SOURCE: BING MAPPING SERVICE 2022

DUDEK

0 650 1,300 Feet

FIGURE 4C

Projects

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

INTENTIONALLY LEFT BLANK

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 Project site evaluation on August 19, 2022, in order to confirm/acquire Project site information, document existing site conditions, and to determine potential actions for addressing the protection of the Project's structures. 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 Images*), 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 building 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. 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. 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.

The City and the foothills of the San Bernardino National Forest lie to the north and east of the Project area. South of the Project area is San Timoteo Canyon. The Project area's surface elevation ranges between approximately 1,950 and 2,380 feet above mean sea level (amsl), with the lowest point located in the southwest portion of the Project area and the highest point in the southeast portion.

Topographic features that may facilitate fire spread are the slope and canyon alignments, which may serve to funnel or channel winds, thus increasing their velocity and potential for influencing wildfire behavior. From a regional perspective, the alignment of tributary canyons and dominant ridges is conducive to channeling and funneling wind, thereby increasing the potential for more extreme wildfire behavior in the region.

2.2.2 Climate

The Project area, 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 average high temperature for the Project area is approximately 75.6°F, with an average temperature in the summer and early fall months (June-September) of 86°F. July and August are typically considered the hottest months of the year. The area is considered to be a semi-arid climate. Annual precipitation typically averages approximately 8 inches annually with the wettest months being January and February (Weather Spark, 2022).

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 occurring during 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 occur during 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. Typically, the highest fire danger in southern California coincides with Santa Ana winds. The Santa Ana wind conditions are a reversal of the prevailing southwesterly winds that usually occur on a region-wide basis near the end of fire season during late summer and early fall. They are dry, warm winds that flow from the higher desert elevations in the east through the mountain passes and canyons. As they converge through the canyons, their velocities increase. Localized wind patterns on the Project site are strongly affected by both regional and local topography.

2.2.3 Vegetation

The Project site is largely undeveloped, and grass- and herb-dominated vegetation communities are predominate across the Project site. The remaining vegetation includes scrub, chaparral, riparian and woodland and special-

status vegetation communities. The vegetation cover types were assigned a corresponding fuel model for use during site fire behavior modeling. Section 3.0 describes the fire modeling conducted for the Project area.

Extensive vegetation type mapping is useful for fire planning because it enables each vegetation community to be assigned a fuel model, which is used to predict fire behavior characteristics, as discussed in Section 3.1, Fire Behavior Modeling. The Project site surface conditions generally consist of unimproved earthen terrain, with mostly low-load native grasses and grass-shrub vegetation communities. The areas proposed for development and within the Specific Plan area will be converted to ignition resistant landscapes, roads, structures, and landscaped vegetation following Project completion. Vegetative fuels within proposed fuel modification zones will be removed or structurally modified as a result of development, altering their current structure and species composition, irrigation and maintenance levels, resulting in a perimeter wildfire buffer.

Post-development vegetation composition proximate to the Project footprint is expected to be significantly different than current conditions. Following build-out, irrigated and thinned landscape vegetation associated with fuel modification zones (FMZ) A, B and C would be provided as part of all future development within the Specific Plan area, extending up to 100 horizontal feet from structures. Typical FMZ is 100 feet wide; however, it is possible that some of the proposed future developments within the Specific Plan area may not meet the full 100-foot FMZ, and structures in these areas will receive code-exceeding, structural ignition resistive enhancements. Native and naturalized vegetation occurring within FMZ Zone C is not expected to be irrigated, although overall fuel volumes will be reduced by removing dead and dying plants, non-natives, and highly flammable species, along with thinning the remaining plants so they would not readily facilitate fire spread. To comply with YFD requirements, Property Owner, Property Manager, HOA or similar entity for each future development within the Specific Plan area will be responsible for all on-going maintenance of the designated FMZ and landscaped areas within each development.

2.2.3.1 Vegetative Fuel 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 express 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.

As described, vegetation plays a significant role in fire behavior, and is an important component of fire behavior models discussed in the 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 re-initiates its succession process. 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. FMZs within the Specific Plan area will consist of irrigated and maintained landscapes as well as thinned native fuel zones 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 to the Project's footprint (outside the fuel modification zones), where the wildfire threat will exist post-development, are classified as low to moderate fuel loads. Vegetation distribution throughout the Specific Plan area varies by location and topography.

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 FMZs for the Specific Plan area. The FMZs will consist of 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.

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. FRAP summarizes fire perimeter data dating to the late 1800s, but which is incomplete due to the fact that it typically 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, one hundred and forty-two (142) fires have burned within 5 miles of the Project site since the beginning of the historical fire data record (CAL FIRE 2021). Recorded wildfires within 5 miles range from less than one acre to approximately 28,136 acres (1998 Edna Fire) and the average fire size is approximately 1,250 acres. The 2020 Mentone Fire (approximately 79 acres), 2020 Bruder Fire (approximately 170 acres) and 2020 El Dorado Fire (approximately 22,504 acres) are the most recent fires within a 5 -mile radius of the Project site. Four fires have burned on the Project site, which include the 1970 Casco #2 Fire, 2013 Live Oak, 2017 Palmer Fire, and 2019 Sandalwood Fire. Yucaipa Fire Department or San Bernardino County Fire Department may have data regarding additional smaller 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 one year with intervals ranging between 0 (multiple fires in the same year) to 14 years. Based on the analysis, it is expected that there will be wildland fires within 5 miles of the Project site at least every 14 years, and on average every one years, as observed in the fire history record. Based on fire history, wildfire risk for the Project site is associated primarily with a Santa Ana wind-driven wildfire burning or spotting on-site from the north or east, although a fire approaching from the south during more typical on-shore weather patterns is possible.

2.2.5 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 results. These features also have a similar positive impact on the minimization of the potential for wildfire ignitions caused by the Project and its employees, residents and visitors to spread off-site into preserved areas by providing:

1. Ignition resistant, planned and maintained landscape – within the Specific Plan area all 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. Fuel Modification Zones – All development within the Specific Plan area will provide a FMZ, which would be 100 feet and includes specifically selected plant species, very low fuel densities (only 30% retention of native plants in outer zones and irrigated inner zones), and ongoing maintenance, resulting in a wide buffer between the developed areas and the off-site native fuels.
3. Annual FMZ inspections – for all developments within the Specific Plan area, each developer shall have a contracted, 3rd party, YFD-approved FMZ inspector perform two inspections per year to ensure that FMZs are maintained in a condition that is consistent to the County's and FPP's requirements and would provide a benefit of a wide barrier separating wildland fuels from on-site ignitions.
4. Ignition resistant structures – all structures within the Specific Plan area 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 wide FMZs would not result in wildfire directly next to these structures. Structures can be built in the HFHSZs 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 HFHSZ 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 on-site structures would result in a low incidence of structural fires, further minimizing potential for Project-related wildfires.
5. Interior fire sprinklers – all future developments within the Specific Plan area will include interior fire sprinklers, which are designed to provide additional time for occupants to escape the structures. Sprinklers are also 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 an 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 structures in the area that do not include interior sprinklers.
6. Fire access roads – roads provide access for firefighting apparatus. All roads within the Specific Plan area will provide code-consistent access throughout each development, including at least two points of ingress/egress. Better access to wildland areas may result in faster wildfire response and continuation of the fire agencies' successful control of wildfires at small sizes.

7. **Water –** all future development within the Specific Plan area will provide water for firefighting throughout the Project, including fire hydrants accessible by fire engines, which is a critical component of suppressing both structural and vegetation fires. All development within the Specific Plan are will provide firefighting water volume, availability, and sustained pressures to the satisfaction of YFD. Water accessibility helps firefighters control structural fires and helps protect structures from and extinguish wildfires.

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 fires that would be expected 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[4].

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 four fire scenarios were evaluated, including two summer, onshore weather condition (west and south/southwest of the Project site) and two extreme fall, offshore weather condition (northeast and east of the Project site). These fire scenarios incorporated observed fuel types representing the dominant vegetation on the site and adjacent land along with site 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 Project site.

Vegetation types, which were derived from the site field assessment, were classified into fuel models. Fuel models are selected by their vegetation characteristics, 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 as these are the fuels that would potentially be available to fire. Fuel models were also assigned to illustrate post-Project landscape 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 site visit and the anticipated pre- and post- Project vegetation conditions, four different fuel models were used in the fire behavior modeling effort to represent the current and post-construction vegetation conditions throughout the Project site, as presented herein. Fuel model attributes for existing conditions and post-construction conditions are summarized in Table 2. Existing fuel beds found throughout the Project site area include low- to- moderate load dry-climate grass fuels (Fuel Model Gr2 and Gr4), moderate load shrubs and chaparral fuels (Fuel Model Sh2), and low- to- moderate load grass-shrub fuels (Fuel Models Gs1 and Gs2). For modeling of post-development conditions, fuel model assignments were re-classified to FMZs 0 and 1 (Fuel Model FM8/Gr1) and FMZ 2 (Gs1/Gs2), which account for the establishment of irrigated and thinned zones on the periphery of the new structures.

4 A discussion of fire behavior modeling is presented in Appendix C, Fire Behavior Modeling.

Table 2. 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 Grasses	Represents areas of grasses within the Project area without maintenance.	<2.0 ft.
Gr4	Moderate-load Dry Climate Grasses	Represents areas of grasses within the Project area without maintenance.	<3.0 ft.
Gs1	Low-load, Dry Climate Grass-Shrub	Represents areas of grass-shrub vegetation within the Project area without maintenance.	<2.0 ft.
Gs2	Moderate-load, Dry Climate Grass-Shrub	Represents areas of grass-shrub vegetation within the Project area without maintenance.	<3.0 ft.
Sh2	Moderate-load, Dry Climate Shrubs	Represents the shrub and chaparral vegetation located within the open space areas south of the Project without maintenance.	<3.0 ft.
Post-Development Conditions			
Gs1	Short, sparse, dry climate grasses	Fuel Modification Zones 0 and 1: irrigated landscape on the perimeter of the structures within the development	<1.0 ft.
Gs2	Low-load Dry Climate Grasses	Fuel Modification Zone 2: 50% thinning of vegetation on the perimeter of Zone 1 within the development	<2.0 ft.

Table 3 summarizes the weather and wind input variables used in the BehavePlus modeling process.

Table 3. Fuel Moisture and Wind Inputs

Model Variable	Summer Weather Condition (50th Percentile)	Peak Fall Weather Condition (97th Percentile)
Fuel Models	Gr2, Gr4, Gs1, Gs2, and Sh2	Gr2 and Gs1
1 hr. Moisture	4%	1%
10 hr. Moisture	6%	2%
100 hr. Moisture	10%	5%
Live Herbaceous Moisture	39%	30%
Live Woody Moisture	78%	60%
20-foot Wind Speed (mph)	15 mph (sustained winds)	16 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	190 and 270	45 and 95
Wind adjustment factor	0.4	0.4
Slope %	6 to 20%	3 to 4%

3.3 Fire Behavior Modeling Results

The results of fire behavior modeling analysis for pre- and post-Project conditions are presented in Tables 4 and 5, respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 5, BehavePlus Fire Behavior Analysis.

As presented, in the Fire Behavior Analysis (Appendix C), wildfire behavior on the Project site is expected to be primarily of moderate to high intensity throughout the non-maintained surface grass-shrub/shrub-chaparral dominated fuels. Four focused analyses were completed for both the existing and the post-Project conditions, each assuming worst-case fire weather conditions for a fire approaching the Project site from the north/northeast, east, south, and west/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 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 three fire scenarios are explained in more detail below:

- Scenario 1: A fall, off-shore fire (97th percentile weather condition) burning through low-load grass dominated vegetation within the northern portion of the Proposed Project site. The terrain is flat (approximately 3% slope) with potential ignition sources from a car fire originating along Oak Glen Road or a structure fire originating in the nearby rural residential communities to the west/north/northwest of the Project site. This type of fire would typically spread through the mainly grass vegetation moderately fast towards the northern portion of the development.
- Scenario 2: A fall, off-shore fire (97th percentile weather condition) burning through low-load grass dominated vegetation within the northern portion of the Proposed Project site. The terrain is flat (approximately 4% slope) with potential ignition sources from a car fire originating along one of the many road east of the development or a structure fire originating in the nearby rural residential communities to the east/northeast of the Project site. This type of fire would typically spread through the mainly grass vegetation moderately fast towards the eastern portion of the development.
- Scenario 3: A summer, on-shore fire (50th percentile weather condition) burning through low- to- moderate load grass-shrub dominated vegetation within the hillsides south of the Proposed Project site and I-10. The terrain is moderately sloped (approximately 20% slope) with potential ignition sources from a car fire originating along Interstate 10 or within the naturally vegetated open space areas to the south. This type of fire would typically spread through the grass-shrub dominated vegetation moderately fast towards the south portion of the development site.

- **Scenario 4:** A summer, on-shore fire (50th percentile weather condition) burning through low-load grass dominated vegetation west/southwest of the Proposed Project site. The terrain is flat (approximately 6% slope) with potential ignition sources from a car fire or structure fire from the rural residential properties west of the Project site, or within the naturally vegetated open space areas to the west. This type of fire would typically spread through the grass dominated vegetation moderately fast towards the west/southwestern portion of the development.

The results presented in Tables 4 and 5 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 (Table 4), wildfire behavior adjacent to the Project site is expected to be primarily of moderate intensity through the non-maintained surface grass dominated fuels within and adjacent to the perimeter of the Project development. Worst-case fire behavior under peak weather conditions (represented by Fall Weather, Scenario 2) 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 18 feet with wind speeds of 50+ mph; fireline intensities reach approximately 3,037 BTU/feet/second, with moderate spread rates of 6.2 mph, and spotting distances up to 1.3 miles away.

Table 4. RAWS BehavePlus Fire Behavior Modeling 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: 3% slope; Fall off-shore wind (97th percentile) - (north of Project site – Preconstruction)				
Low-load grasses (Gr2)	9.7 (18.0)[3]	1.6 (6.2)	799 (3,037)	0.4 (1.3)
Low-load grass-shrub (Gs1)	6.7 (14.0)[3]	0.6 (3.0)	353 (1,763)	0.3 (1.1)
Scenario 2: 4% slope; Fall off-shore wind (97th percentile) - (east of Project site – Preconstruction)				
Low-load grasses (Gr2)	9.7 (18.0)[3]	1.6 (6.2)	798 (3,037)	0.4 (1.4)
Scenario 3: 20% slope; Summer on-shore wind (50th percentile) - (south of Project site - Preconstruction)				
Moderate-load grasses (Gr4)	11.8	1.7	1,215	0.4
Moderate-load Grass/Shrub (Gs2)	6.5	0.5	333	0.3
Moderate-load shrubs (Sh2)	5.7	0.1	245	0.3
Scenario 4: 6% slope; Summer on-shore wind (50th percentile) - (west/southwest of Project site)				
Low-load grasses (Gr2)	5.4	0.3	221	0.2
Low-load grass-shrub (Gs1)	1.6	0.0	17	0.2

Notes:
1 Wind-driven surface fire.
2 MPH=miles per hour.
3 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 Project site for post-fuel modification zones. Fuel modification zones for the Project include a 5-foot noncombustible zone (Zone A), 45-foot irrigated zone (Zone B) and a 50-foot thinning zone (Zone C) beginning at the structure and moving outward toward open space. For modeling the post-FMZ treatment condition, the fuel model assignment for non-native grasslands was re-classified according to the specific fuels management (e.g., irrigated, fire resistive landscaping and 50% thinning) treatment.

Based on the BehavePlus analysis (Table 5), post development fire behavior expected in the irrigated and replanted with plants that are acceptable with the Yucaipa Fire Department/Cal Fire (FMZ Zones 0 and 1 – Gr1) under peak weather conditions experience a significant reduction in flame length and intensity. The approximately 18-foot flame lengths predicted for non-maintained grass dominated vegetation during pre-treatment modeling for fire scenario 2 are reduced to approximately 14 feet at the outer edges of the FMZ (Zone 2) and to 4 feet by the time the inner portions of the FMZ (Zone 1) are reached. During on-shore weather conditions, a fire approaching from the north/northwest towards the development footprint would be reduced from approximately 12-foot flames to approximately 2 feet tall for Zone 1, with 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 most of the site (a combination of Zones 0, 1 and 2). Therefore, the FMZs proposed for the Freeway Corridor Project are approximately 5-times the flame length of the worst-case fire scenario under peak weather conditions and would provide adequate defensible space to augment a wildfire approaching the perimeter of the Project site.

Table 5. RAWS BehavePlus Fire Behavior Modeling 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: 3% slope; Fall off-shore wind (97th percentile) - (north of Project site – Preconstruction)				
Fuel modification zones 0 and 1 (Gr1)	4.0 (4.0)[3]	115 (115)	0.7 (0.7)	0.2 (0.5)
Fuel modification zone 2 (Gr2)	9.7 (18.0)[3]	799 (3,037)	1.6 (6.2)	0.4 (1.3)
Scenario 2: 34% slope; Fall off-shore extreme wind (97th percentile) - (east/northeast of Project site)				
Fuel modification zones 0 and 1 (Gr1)	4.0 (4.0)[3]	115 (115)	0.7 (0.7)	0.2 (0.5)
Fuel modification zone 2 (Gr2)	9.7 (18.0)[3]	798 (3,037)	1.6 (6.2)	0.4 (1.3)
Scenario 3: 43% slope; Fall off-shore extreme wind (97th percentile) - (east/southeast of Project site)				
Fuel modification zones 0 and 1 (Gr1)	2.3	33	0.3	0.1
Fuel modification zone 2 (Gr2)	6.3	312	0.8	0.3
Scenario 4: 5% slope; Summer on-shore wind (50th percentile) - (west/southwest of Project site)				
Fuel modification zones 0 and 1 (Gr1)	2.3	33	0.3	0.1
Fuel modification zone 2 (Gr2)	6.4	326	0.9	0.3

Notes:
1 Wind-driven surface fire.
2 MPH=miles per hour
3 Spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph

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 6 presents an interpretation of the outputs for five fire behavior variables as related to fire suppression efforts.

Table 6. 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.

BehavePlus Fire Behavior Modeling 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: 3% slope; Fall off-shore wind (97th percentile) - (north of Project site – Preconstruction)				
Low-load grasses (Gr2)	9.7 (18.0)[3]	1.6 (6.2)	799 (3,037)	0.4 (1.3)
Low-load grass-shrub (Gs1)	6.7 (14.0)[3]	0.6 (3.0)	353 (1,763)	0.3 (1.1)
Scenario 2: 4% slope; Fall off-shore wind (97th percentile) - (east of Project site – Preconstruction)				
Low-load grasses (Gr2)	9.7 (18.0)[3]	1.6 (6.2)	798 (3,037)	0.4 (1.4)
Scenario 3: 20% slope; Summer on-shore wind (50th percentile) - (south of Project site - Preconstruction)				
Moderate-load grasses (Gr4)	11.8	1.7	1,215	0.4
Moderate-load Grass/Shrub (Gs2)	6.5	0.5	333	0.3
Moderate-load shrubs (Sh2)	5.7	0.1	245	0.3
Scenario 4: 6% slope; Summer on-shore wind (50th percentile) - (west/southwest of Project site)				
Low-load grasses (Gr2)	5.4	0.3	221	0.2
Low-load grass-shrub (Gs1)	1.6	0.0	17	0.2

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

RAWS BehavePlus Fire Behavior Modeling 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: 3% slope; Fall off-shore wind (97th percentile) - (north of Project site – Preconstruction)				
Fuel modification zones 0 and 1 (Gr1)	4.0 (4.0)[3]	115 (115)	0.7 (0.7)	0.2 (0.5)
Fuel modification zone 2 (Gr2)	9.7 (18.0)[3]	799 (3,037)	1.6 (6.2)	0.4 (1.3)
Scenario 2: 34% slope; Fall off-shore extreme wind (97th percentile) - (east/northeast of Project site)				
Fuel modification zones 0 and 1 (Gr1)	4.0 (4.0)[3]	115 (115)	0.7 (0.7)	0.2 (0.5)
Fuel modification zone 2 (Gr2)	9.7 (18.0)[3]	798 (3,037)	1.6 (6.2)	0.4 (1.3)
Scenario 3: 43% slope; Fall off-shore extreme wind (97th percentile) - (east/southeast of Project site)				
Fuel modification zones 0 and 1 (Gr1)	2.3	33	0.3	0.1
Fuel modification zone 2 (Gr2)	6.3	312	0.8	0.3
Scenario 4: 5% slope; Summer on-shore wind (50th percentile) - (west/southwest of Project site)				
Fuel modification zones 0 and 1 (Gr1)	2.3	33	0.3	0.1
Fuel modification zone 2 (Gr2)	6.4	326	0.9	0.3

Notes:
1 Wind-driven surface fire.
2 MPH=miles per hour
3 Spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph

SOURCE: AERIAL-BING MAPPING SERVICE

DUDEK 0 1,000 2,000 Feet

FIGURE 5
BehavePlus Analysis Map
City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

Path: Z:\Projects\Yucaipa_FreewayCorridor\SPMAP\DOCS\DOCUMENT\FIRE\Figure 5 BehavePlusAnalysisMap.mxd

INTENTIONALLY LEFT BLANK

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 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 start on, burn onto or spot onto the Project site. The most common type of fire anticipated in the vicinity of the Project area is a wind-driven fire from the east/northeast, moving through the grasslands on the and around the Project site.

With the conversion of the landscape to ignition-resistant development, wildfires may still encroach upon and drop embers on the Project 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 by the 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 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 Project site's structures, especially given the ignition resistance of the structures and the planned ongoing maintenance of the entire site landscape and FMZs. The Project will implement the latest fire protection measures, including fuel modification along the perimeter edges of developments within the Specific Plan area. In addition, the 100-foot FMZ proposed for projects within the Specific Plan area are approximately 5-times the flame length of the worst-case fire scenario under peak weather conditions within the development footprint and would provide adequate defensible space to augment a wildfire approaching the perimeter of developments within the Specific Plan area.

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

The Project will include a robust fire protection system, which provides protections from on-site fire spreading to off-site vegetation. Accidental fires within the Project's landscapes or structures will have limited ability to spread.

The landscape throughout the Project and on the perimeter of developments within the Specific Plan area will be highly maintained and much of it irrigated, which further reduces its ignition potential. Structures within the Specific Plan area will be highly ignition resistant on the exterior and the interiors will be protected with automatic sprinkler systems, which have a very high success rate for containing fires, if not extinguishing them.

3.4.1 Analysis of Wildfire Risk from Adding New Residents

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) (Romero-Calcerrada et al 2008)). In Southern California, 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; Santa Barbara County Fire Department 2019).

Research indicates that the type of dense, clustered and full landscape conversion projects, like the Freeway Corridor Specific Plan, are not associated with increased vegetation ignitions. Syphard and Keeley (2015) summarize all wildfire ignitions included in the CAL FIRE Fire and Resource Assessment Program (FRAP) database – dating back over 100 years. For example, they found that in San Diego County, which is similar to most of southern California, equipment-caused fires were by far the most numerous, and these also accounted for most of the area burned, followed closely by the area burned by power line fires. Ignitions classified as equipment caused frequently resulted from exhaust or sparks from power saws or other equipment with gas or electrical motors, such as lawn mowers, trimmers or tractors and associated with lower density housing. Ignitions were more likely to occur close to roads and structures, and at intermediate structure densities.

As Figures 6 through 8 illustrate, building density directly influences susceptibility to fire because in higher density developments, there is one interface (the community perimeter) with the wildlands whereas lower density development creates more structural exposure to wildlands, less or no ongoing landscape maintenance (an intermix rather than interface), and consequently more difficulty for limited fire resources to protect well-spaced structures. The intermix includes housing amongst the unmaintained fuels whereas the proposed Project converts all fuels within the footprint and provides a wide, managed fuel modification zone separating homes and structures from unmaintained fuel and creating a condition that makes defense easier. Syphard and Keeley go on to state that, “the WUI, where housing density is low to intermediate is an apparent influence in most ignition maps ”further enforcing the conclusion that lower density development poses a higher ignition risk than higher density development.” They also state that “Development of low-density, exurban housing may also lead to more homes being destroyed by fire” (Syphard et al. 2013). A wildland urban interface already exists in the area adjacent to the Project, dominated by older, more fire-vulnerable structures, constructed before stringent fire code requirements were imposed on residential development, with varying levels of maintained fuel modification buffers. As discussed in detail throughout this FPP, the Project would construct ignition resistant structures designed to include professionally managed and maintained fire protection components, modern fire code compliant safety features and specific measures provided where ignitions are most likely to occur (such as roadways). Therefore, the development of the Project would not be expected to materially increase the risk of vegetation ignitions.

Figure 6. Example higher density development that is ignition resistant and excludes readily ignitable vegetative fuels throughout and provides a perimeter fuel modification zone. This type of new development requires fewer fire resources to defend and can minimize the likelihood of on-site fires spreading off-site.

Figure 7. Example of moderate density development. Structures are located on larger properties and include varying levels of ignition resistance and landscape / fuel modification provision and maintenance. This type of development results in a higher wildland exposure level for all homes and does not provide the same buffers from wildfire encroaching onto the site, or starting at a structure and moving into the wildlands as a higher density project.

Figure 8. Example of "lower density" development where structures are interspersed amongst wildland fuels, are of varying ages, and include varying levels of fuel modification zone setbacks. Homes are exposed on most or all sides by flammable vegetation and properties rely solely on owners for maintenance, are often far distances from the nearest fire station, and have minimal buffer from on-site fire spreading to wildlands.

Moreover, frequent fires and lower density housing growth may lead to the expansion of highly flammable exotic grasses that can further increase the probability of ignitions (Keeley et al. 2012). This is not the case with the Project, as the landscapes will be managed and maintained to remove exotic fuels that may establish over time.

As discussed above, research indicates that it is less likely for higher density developments to be impacted by wildfires than lower density developments. The same protections that starve wildfire of fuels and minimize or prevent wildfire from transitioning into a higher density development like the Project's also serve to minimize or prevent on-site fires from transitioning into the wildlands. Further, the requirement that all structures will include interior fire sprinklers that are structure protection rated, significantly reduces the likelihood that a building fire spreads to the point of flashover, where a structure will burn beyond control and produce embers. Interior sprinklers are very efficient, keeping fires to the room of origin, or extinguishing the fire before the responding firefighters arrive. Similarly, the irrigated fuel modification zones are positioned throughout the development areas as well as the first zones on the perimeter of developments within the Specific Plan area and/or masonry walls adjacent the open space. Irrigated zones include plants with high internal moisture and spacing between plants and plant groups that 1) make it difficult to ignite and 2) make it difficult for fire to spread plant to plant.

INTENTIONALLY LEFT BLANK

4 Emergency Response Service

4.1 Emergency Response Fire Facilities

The Project site is located within Yucaipa Fire Department (YFD) response area. Fire protection and paramedic services are provided by the Yucaipa Fire Department through a staffing agreement with CAL FIRE. The closest fire station to the Project site is YFD Station 3, as depicted in Figure 9. Table 7, Closest Responding Fire Stations Summary, presents a summary of the location, equipment, staffing levels, maximum travel distance, and travel time for the three closest, existing fire stations responding to the Project site. Travel distances are derived from Google Road data while travel times are calculated applying the nationally recognized Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard formula (T=0.65 + 1.7 D, where T= time and D = distance). The ISO response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout time. Additionally, there are mutual aid agreements in place with neighboring fire agencies so that the closest available unit is dispatched, regardless of jurisdiction. These interdependencies often exist among fire protection agencies for structural and medical responses associated with the peripheral "edges" of each agency's boundary. The following sections analyze the Project in terms of current YFD fire service capabilities and resources to provide Fire Protection and Emergency Services.

Table 7. Closest Responding Stations Summary

Station	Location	Equipment	Staffing*	Maximum Travel Distance**	Travel time**
YFD Station 3	34259 Wildwood Canyon Rd, Yucaipa, CA	Medic Engine 552 Brush Engine 552 Reserve Engine 552A	One captain, one engineer, and one firefighter/paramedic	3.5 miles	6 minutes, 36 seconds
YFD Station 2	32664 Yucaipa Blvd, Yucaipa, CA	Battalion 3513 Medic Engine 553 Reserve Engine 553A Utility 553	One captain, one engineer, and one firefighter/paramedic	4 miles	7 minutes, 27 seconds
YFD Station 1	11416 Bryant St, Yucaipa, CA	Medic Engine 551 CAL FIRE Engine 3553 CAL FIRE Engine 3569	One captain, one engineer, and one firefighter/paramedic	5.5 miles	10 minutes

Notes:
* Staffing levels from 2019 Yucaipa Fire Department Annual Report
** Travel distance estimated using approximate distances from each station to furthest point within the Specific Plan Area, as Specific Plan area is built out, different roadways will become available and distance and/or time could be impacted.

YFD Station 3, which would provide initial response, is located at 34259 Wildwood Canyon Rd in Yucaipa and staffed 24/7 with career firefighters. YFD Station 3 has one Medic Engine staffed with three firefighter personnel. YFD Station 3 will be capable of responding within 8 minutes and 36 seconds, which equates to roughly a 6 minute 36 second travel time to the furthest development within the Project site. Secondary response would be provided from YFD Station 2, which is located at 32664 Yucaipa Boulevard in Yucaipa and can respond within 9 minutes and 27

seconds, which equates to roughly a 7 minute 27 second travel time. YFD Station 2 has one Medic Engine staffed with three firefighter personnel. YFD Station 1 has a 3-person Medic Engine and would also be able to respond to the Project site in 12 minutes, which equates to roughly a 10-minute travel time to the furthest development within the Project site.

Within the area's emergency services system, fire and emergency medical services are also provided by other fire departments. Generally, each agency is responsible for structural fire protection and wildland fire protection within their area of responsibility. However, mutual aid agreements enable non-lead fire agencies to respond to fire emergencies outside their district boundaries. In the Project area, fire agencies cooperate under a statewide master mutual aid agreement for wildland fires.

Per the City's General Plan, the Yucaipa Fire Department strives to meet the NFPA standards for responding to fire and other emergencies. The NFPA recommends that first responders arrive at the fire scene in under five minutes or less at least 90% of the time. As of 2019, the YFD average response time was 6 minutes and 10 seconds, which increased approximately 42 seconds from the previous year. As previously mentioned, response to the Project site from the closest existing Fire Station (YFD Station 3) would achieve a 6 minute and 36 second travel time to the furthest area of the Project site in the northeast, with a 8 minute 36 second response time. Although this response time is beyond the five-minute response standard, given the Project's fire safety features and the flexibility allowed by the response time 90 percent achievement rate, the response time is considered to substantially conform with the Fire Department's internal standards, subject to Fire Department review. Fair share funding for fire department resources to offset the potential increase in calls may be appropriate. .

4.2 Estimated Calls and Demand for Service

The following estimated annual emergency call volume generated by the Project is based upon per capita data for 2019 from YFD calls within their jurisdiction[5].

- Total population served by: 54,483 (as of 2019, YFD Annual Report)
- Total annual calls: 8,297. Per capita call generation: 0.15
- Total annual fire calls, including structure, vegetation, vehicle fires, and other fire calls (6% of total calls): 500. Per capita call generation: 0.009
- Total annual Emergency Medical Services (71% of total calls): 5,865. Per capita call generation: 0.11
- Total other calls (Rescue, Traffic Collisions, Hazardous Materials, Public Service, etc.; 23.2% of total calls): 1,927. Per capita call generation: 0.035

Using the data above, the estimated annual emergency call volume for Phase 1 and Phase 2 of the Project was calculated. Phase 1 proposes the development of up to 2,631,253 square feet of Business Park situated on approximately 160 acres and Phase 2 proposes the development of up to 1,123 residential units as well as up to 230,215 square feet of commercial uses. Phase 1 would generate approximately up to 7,518 new employees[6] and Phase 2 would generate approximately 3,324 new residents[7] within proposed residential uses and would generate approximately up to 658 new employees within the proposed commercial uses. The total maximum estimated total population of Phase 1 and Phase 2 is projected to be 11,500 persons. However, to account for individuals who will live

5 2019 Yucaipa Fire Department Annual Report
6 Employees were estimated using 350 sq/ft per employee within the Business Park and commercial uses.
7 According to the US Census Bureau the average persons per household for the City of Yucaipa is 2.96 (1,123 units x 2.96 = 3,324)

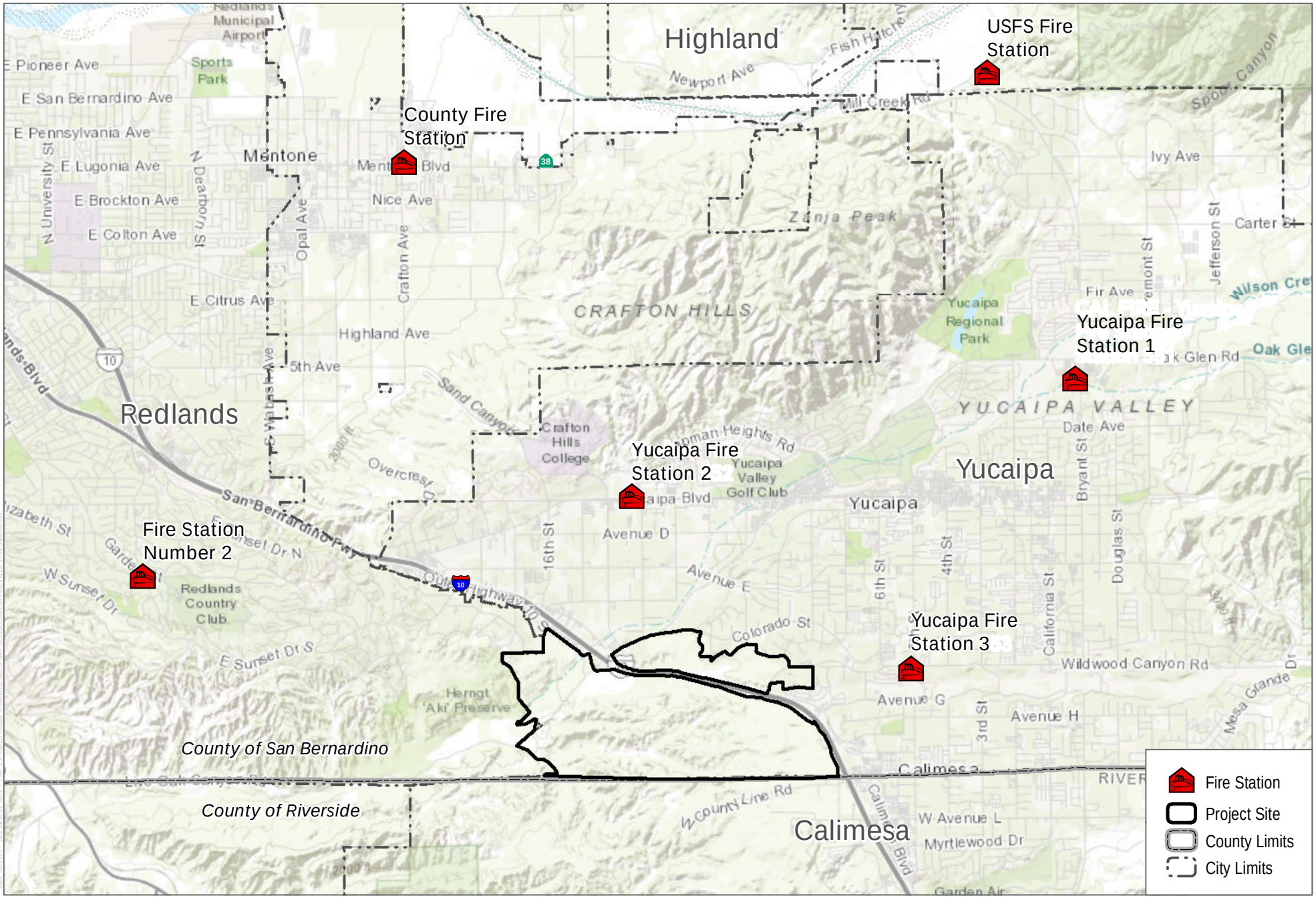
and work within the Specific Plan area and because the non-residential uses within the Specific Plan area will only need services during operating hours, the total estimated population has been reduced by 20% and is projected to be 9,200 persons. Based on this population estimate, the calculated call volumes by type of call are provided in Table 8.

Table 8. Calculated Call Volume (Conceptual Based on 9,200 Persons)

Type of Call	Per Capita Call Generation Factor	Number of Estimated Annual Calls
Total Other Calls	0.035	322
Total Fires	0.009	83
Total EMS Calls	0.11	1,012
Total Calls	0.154	1,417

As mentioned, the Project will increase the call volume at a rate of a conservatively calculated (the actual number of calls may be lower than this estimate) up to 1,417 calls per year (118 calls per month or 3.9 calls per day). YFD Fire Station 3 emergency response in 2019 totaled 3,567 calls per year, or 9.77 calls per day. YFD Station 2 emergency responses in 2019 totaled 1,916 calls per year, or 5.25 calls per day. The level of service demand for the Project raises overall call volume for YFD Station 3 but is not anticipated to impact the existing fire stations to a point that they cannot meet the demand for Phase 1 and Phase 2. For perspective, five calls per day are typical in an urban or suburban area. A busy fire station company would be one with 10 to 15 or more calls per day. When Phase 1 and Phase 2 are built out, Fire YFD Station 3 could potentially respond to an additional 3.9 calls per day on average, although the number will likely be lower than that based on the conservative nature of the population and calls per capita data used in this estimate.

INTENTIONALLY LEFT BLANK



SOURCE: ESRI; County of San Bernardino

FIGURE 9

Fire Station Locations

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

INTENTIONALLY LEFT BLANK

5 Buildings, Infrastructure and Defensible Space

The City of Yucaipa Fire Code and 2022 CFC and 2022 CBC adopted by reference (with several modifications) governs the building, infrastructure, and defensible space requirements detailed in this FPP. As the Project is located within areas designated as High and Very High FHSZ, the Project is required to comply with codes governing development within areas (e.g. Chapter 7A) at the time the Project is submitted to the building and fire department for review and approval, or will provide alternative materials and/or methods, if warranted. The following summaries highlight important fire protection features.

A response map update, including roads and fire hydrant locations, in a format compatible with current YFD mapping shall be provided to YFD.

5.1 Fire Apparatus Access

5.1.1 Access Roads

The Project would involve the construction of new structures, roadways, and would generate new trips to and from the Project site. Project site access, including road widths and connectivity, will comply with the requirements of the City. Additionally, an adequate water supply and approved paved access roadways shall be installed prior to any combustibles being brought onsite during each phase and will include:

- Primary access to the Project site is provided via Live Oak Canyon Road and West County Line Road, Oak Glen Road, Wildwood Canyon Road, and Calimesa Boulevard; new connections from all existing streets would create a complete roadway network supporting land uses throughout the Specific Plan area.
- All roads comply with access road standards of not less than 20 feet, unobstructed width and are capable of supporting an imposed load of at least 75,000 pounds.
- Typical, interior Project roads, including collector and local roads, will be constructed to minimum 20-foot, unobstructed widths and shall be improved with aggregate cement or asphalt paving materials.
- The gradient for a fire apparatus access road grade shall not exceed the maximum 12% unless approved by the Chief.
- Private and public streets for each phase shall meet all Project approved fire code requirements, paving, and fuel management prior to combustible materials being brought to the Project site.
- Vertical clearance of vegetation (lowest-hanging tree limbs), along roadways will be maintained at clearances of 13 feet, 6 inches to allow fire apparatus passage.
- Cul-de-sacs and fire apparatus turnarounds will meet requirements and YFD Fire Department Standards.
- Any roads that have traffic lights shall have approved traffic pre-emption devices (Opticom) compatible with devices on the Fire Apparatus.
- 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 each 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.
- Access roads shall be usable by fire apparatus to the approval of YFD prior to lumber drop onsite. Developer will provide information illustrating the new roads, in a format acceptable to the YFD for updating of Fire Department response maps.

5.1.2 Dead-End Roads

- Each planning area varies in the number of ingress/egress roads or streets. Dead end streets in excess of 150 feet in length shall have approved provisions for fire apparatus turnaround.

5.1.3 Gates

Gates on private roads are permitted, but subject to Fire Code requirements and standards, including:

- Gates shall be equipped with conforming sensors for detecting emergency vehicle “Opticom” strobe lights from any direction of approach, if required.
- All entrance gates will be equipped with a key switch, which overrides all command functions and opens the gate.
- Gate activation devices will be equipped with a battery backup or manual mechanical disconnect in case of power failure.
- Further, gates will be:
  - Minimum 20 feet wide of clearance for one-way traffic when fully open at entrance.
  - Minimum of two feet wider than road width at exit.
  - Constructed from non-combustible or exterior fire-rated treated wood materials.
  - Inclusive of provisions for manual operation from both sides, if power fails. Gates will have the capability of manual activation from the development side or a vehicle (including a vehicle detection loop).

5.1.4 Premise Identification

Identification of roads and structures will comply with City of Yucaipa Fire Code, as follows:

- Approved numbers or addresses shall be placed on all new and existing buildings in such a position as to be plainly visible and legible from the street or road fronting the property. Said numbers shall contrast with their background.
- All residential addresses shall be posted with a minimum of 4-inch numbers, visible from the street, and during the hours of darkness the numbers shall be low voltage, internally electrically illuminated. Posted numbers shall contrast with their background and be legible from the street. Where building setbacks exceed 100 feet from the roadway or where the addresses are not visible from the roadway, additional non-illuminated contrasting 4-inch numbers shall be displayed at the property entrance
- All non-residential structures shall be posted with a minimum of 8-inch numbers, visible from the street, and during the hours of darkness shall be electrically illuminated. Where the building setback exceeds 200

feet from the roadway or where the addresses are not visible from the roadway, additional non-illuminated contrasting 6-inch numbers shall be displayed at the property entrance. Commercial occupancies with multiple tenants shall be posted with a minimum of 3-inch contrasting numbers displayed on the rear doors of the tenant spaces.

- Proposed private and public streets within the development will be named, with the proper signage installed at intersections to satisfaction of the Department of Public Works.
- Streets and roads shall be identified with approved signs, Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by vehicle. Signs shall be of an approved size, weather resistant and maintained until replace by permanent signs.
- Temporary street signs shall be installed on all street corners within the Project prior to the placing of combustible materials on-site. Permanent signs shall be installed prior to occupancy of buildings.

5.1.5 On-going Infrastructure Maintenance

For each development within the Specific Plan area, the Owner, Property Manager, HOA or similar entity shall be responsible for long term funding and maintenance of internal private roads.

5.1.6 Pre-Construction Requirements

It is the recommendation of this FPP, for each development within the Specific Plan area, prior to bringing lumber or combustible materials onto a project site, improvements within the active development area shall be in place, including utilities, operable fire hydrants, an approved, temporary roadway surface, and construction phase fuel modification zones established. These features will be approved by the fire department or their designee prior to combustibles being brought on-site.

5.2 Ignition Resistant Construction and Fire Protection

All new structures within the Specific Plan area will be constructed to Fire Code standards. Each of the proposed buildings 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 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.

5.3 Infrastructure and Fire Protection Systems Requirements

5.3.1 Water Supply

Water service for Specific Plan Area will be provided by Yucaipa Valley Water District (YVWD). All water storage and hydrant locations, mains, and water pressures would be designed to fully comply with Yucaipa Fire Code Fire Flow Requirements.

All developments within the Specific Plan area will be consistent Yucaipa Fire Code and California Fire Code Section 903 for fire flow and fire hydrant requirements within a HFHSZ. These internal waterlines will also supply sufficient fire flows and pressure to meet the demands for required onsite fire hydrants and interior fire sprinkler systems for all structures. Water utilities will be connected prior to any construction.

5.3.2 Fire Hydrants

All fire hydrants within the Specific Plan area shall be located along all fire access roadways on the street side of buildings or facing approved fire apparatus access roads, as determined by the Yucaipa Fire Marshal and current fire code requirements to meet operational needs. Fire Hydrants will be consistent with applicable Design Standards.

5.3.3 Automatic Fire Sprinkler Systems

All structures, of any occupancy type, within the Specific Plan area will be protected by an automatic, internal fire sprinkler system. Fire sprinklers systems shall be in accordance with YFD, and National Fire Protection Association (NFPA) Standards 13. Fire sprinkler plans for each structure will be submitted and reviewed by YFD for compliance with the applicable fire and life safety regulations, codes, and ordinances.

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 the Project is the provision for fire-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 exposed structures outward toward areas of open space.

For each development within the Specific Plan area, perimeter structures will be located adjacent to FMZ areas, which creates separation from naturally vegetated open space areas. Based on the modeled extreme weather flame lengths for the Project site, wildfire flame lengths are projected to be approximately between 2.0 to 18 feet high in areas of the Project site adjacent grassland fuels. The fire behavior modeling system used to predict these flame lengths was not intended to determine sufficient FMZ widths, but it does provide the average predicted length of the flames, which is a key element for determining “defensible space” distances for providing firefighters with room to work and minimizing structure ignition. For the Project site the FMZ widths between the naturally vegetated open space areas and structures are proposed to be 100 feet (where achievable), up to 5 times the modeled flame lengths based on the fuel type represented adjacent to the proposed development. The FMZs will be constructed from the structure outwards towards undeveloped areas.

The Freeway Corridor Specific Plan will be constructed in seven phases over 15 to 20-years, each proposed development within the Specific Plan area should prepare a subsequent streamlined FPP to ensure compliance with the most current fire and building code requirements. Figure 10 illustrates a typical FMZ proposed for developments

within the Specific Plan area. The FMZ includes a minimum 5-foot-wide non-combustible Zone A, a 45-foot-wide irrigated Zone B, and a 50-foot wide thinning Zone C. Additionally, a fire access road zone shall provide 10-feet of horizontal clearance on each side and 20-feet of vertical clearance along all fire access roads. In areas that are unable to achieve 100 feet of FMZ, the incorporation of enhanced construction features, such as a 6-foot heat deflecting wall constructed of concrete masonry units (CMUs) between on-site structures and unmaintained open space shall be used to provide a functional equivalency for a full fuel modification zone, see Section 6, Alternative Materials and Methods, for additional details regarding enhanced construction features for reduced FMZ.

Although FMZs are very important for setting back structures from adjacent unmaintained fuels, the highest concern is considered to be from firebrands or embers as a principal ignition factor on this site. To that end, all developments within the Specific Plan area, based on its location and ember potential, are recommended to include the latest ignition and ember resistant construction materials and methods for roof assemblies, walls, vents, windows, and appendages, as mandated by the City of Yucaipa's Fire and Building Codes (e.g., Chapter 7A).

Fuel Modification Zone Standards

An FMZ is a strip of land where combustible vegetation has been removed and/or modified and partially or completely 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 the section is to document YFD's standards 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. The Yucaipa Fire Code (Chapter 15.04.115) is consistent with the 2022 California Fire Code (Section 4907 — Defensible Space), Government Code 51175 – 51189, and Public Resources Code 4291, which require that fuel modification zones be provided around every building that is designed primarily for human habitation or use within a HFHSZ.

A typical landscape/fuel modification installation per Yucaipa Fire Code consists of a 50-foot-wide Zone A and a 50-foot-wide Zone B for a total of 100-feet in width. However, the Project will consist of a 5-foot-wide non-combustible Zone A, 45-foot wide irrigated Zone B and a 50-foot wide thinning Zone C. The Fuel Modification Plan herein and all subsequent Fuel Modification Plans prepared for the Project shall be reviewed and approved by the YFD for consistency with defensible space and fire safety guidelines.

To ensure long-term identification and maintenance, a fuel modification area shall be identified by a permanent zone marker meeting the approval of YFD. 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.

An on-site inspection will be conducted by the YFD upon completion of landscape install before a certificate of occupancy being granted by the City's building code official.

Project Fuel Modification Zone Treatments

Zone A: Non-Combustible Zone

Zone A extends 5-feet from buildings and structures.

The ember-resistant zone includes the area under and around all attached decks and requires the most stringent wildfire fuel reduction. The ember-resistant zone is designed to keep fire or embers from igniting materials that can

spread the fire to Project structures. The following provides guidance for this zone, which may change based on the regulation developed by the Board of Forestry and Fire Protection.

- Use hardscape like gravel, pavers, concrete and other noncombustible mulch materials. No combustible bark or mulch.
- Remove all dead and dying weeds, grass, plants, shrubs, trees, branches and vegetative debris (leaves, needles, cones, bark, etc.); Check roofs, gutters, stairways, etc.
- Remove all branches within 10 feet of any chimney or stovepipe outlet
- Limit plants in this area to low growing, nonwoody, properly watered and maintained plants
- Remove vegetation and items that could catch fire from around and under decks, balconies and stairs.
- Relocate firewood and lumber to Zone C.
- Replace combustible fencing, gates, and arbors attach to structures with noncombustible alternatives.
- Remove or prune flammable plants and shrubs near windows.
- Consider relocating garbage and recycling containers outside this zone.
- Consider relocating boats, RVs, vehicles and other combustible items outside this zone.

Zone B: Paved/Irrigated Zone

Zone B extends from Zone A up to 50 feet from buildings and structures.

- Remove all dead plants, grass and weeds (vegetation).
- Remove dead or dry leaves and pine needles from your yard, roof and rain gutters.
- Remove branches that hang over your roof and keep dead branches 10 feet away from your chimney.
- Trim trees regularly to keep branches a minimum of 10 feet from other trees.
- Relocate wood piles to Zone C.
- Remove or prune flammable plants and shrubs near windows.
- Remove vegetation and items that could catch fire from around and under decks, balconies and stairs.
- Create a separation between trees, shrubs and items that could catch fire, such as patio furniture, wood piles, swing sets, etc.

Zone C: Thinning Zone

Zone C extends from Zone B up to 100 feet from buildings and structures

- Cut or mow annual grass down to a maximum height of 4 inches.
- Create horizontal space between shrubs and trees.
- Create vertical space between grass, shrubs and trees.
- Remove fallen leaves, needles, twigs, bark, cones, and small branches. However, they may be permitted to a depth of 3 inches.
- All exposed wood piles must have a minimum of 10 feet of clearance, down to bare mineral soil, in all directions.

Fire Access Road Zone

Extends a minimum of 10 feet from the edge of any public or private roadway that may be used as access for fire-fighting apparatus or resources adjacent to open space. Clear and remove flammable growth for a minimum of 10 feet on each side of the access roads. Additional clearance beyond 10 feet may be required upon inspection.

1. Required clearance extends a minimum of 10 feet from the edge of any public or private roadway as well as an unobstructed vertical clearance of 20-feet.
2. Landscaping and native plants shall be appropriately spaced and maintained.
3. Trees that demonstrate lower flammability characteristics can be planted, if they are far enough from structures and Fire Department accesses, and do not overhang any structures or access at maturity.

Roadside fuel modification for the Project consists of maintaining ornamental landscapes, including trees, clear of dead and dying plant materials. Roadside fuel modification shall be maintained by the Project.

Pre-Construction Requirements

- Perimeter fuel modification areas must be implemented and approved by the YFD before combustible materials are brought on site.
- Existing flammable vegetation shall be reduced by 50% on vacant lots upon commencement of construction.
- Dead fuel, ladder fuel (fuel which can spread fire from the ground to trees), and downed fuel shall be removed, and trees/shrubs shall be properly limbed, pruned, and spaced per the 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 (structure promotes ignition or combustible) or chemical (volatile chemicals increase flammability or combustion characteristics). The plants included in the FMZ Undesirable Plant List (refer to Appendix D) are unacceptable from a fire safety standpoint and shall not be planted or allowed to establish opportunistically within the FMZs or landscape areas.

5.4.2 Vegetation Management Maintenance

Vegetation management, i.e., assessment of the fuel modification zone and fuel modification area's condition and removal of dead and dying and undesirable species; as well as thinning as necessary to maintain specified plant spacing and fuel densities, shall be completed annually by May 1 of each year, and more often as needed for fire safety, as determined by the YFD. For each development within the Specific Plan area, vegetation management shall be the responsibility of the Owner, Property Manager, HOA or similar entity and shall be funded and conducted by their contractor(s), in compliance with the Project FPP that is consistent with requirements.

During construction, each applicant will be responsible for maintaining the permanent fuel maintenance zones required for developments within the Specific Plan area. During operation, the Owner, Property Manager, HOA or similar entity will be responsible for vegetation management. For residential developments within the Specific Plan area, the respective HOA will be responsible for streetscape and vegetation management in perpetuity.

On-going/as-needed fuel modification maintenance during the interim period while the Project is built out and adjacent parcels are developed, which may be one or more years, will include necessary measures for consistency with the FPP, including:

- Regular Maintenance of dedicated Open Space.
- Removal or thinning of undesirable combustible vegetation and replacement of dead or dying landscaping.
- Maintaining ground cover at a height not to exceed 18 inches. Annual grasses and weeds shall be maintained at a height not to exceed three inches.
- Removing accumulated plant litter and dead wood. Debris and trimmings produced by thinning and pruning should be removed from the Project site or chipped and evenly dispersed in the same area to a maximum depth of 4 inches.
- Maintaining manual and automatic irrigation systems for operational integrity and programming. Effectiveness should be regularly evaluated to avoid over or under-watering.
- Complying with these FPP requirements on a year-round basis. Annual inspections are conducted following the natural drying of grasses and fine fuels, between the months of May and June, depending on precipitation during the winter and spring months.

5.4.3 Environmentally Sensitive Areas/Open Space

There should not be a need to modify the FMZ as it is planned to meet the fuel management needs of the Specific Plan area and comply with the fire code. However, if unforeseen circumstances were to arise that require hazard reduction within an area considered environmentally sensitive or part of the area designated Open Space Conservation, it may require approval from the City and the appropriate resource agencies (California Department of Fish and Game, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers) prior to any vegetation management activities occurring within those areas.

5.4.4 Undesirable Plants List

Certain plants are considered prohibited in the landscape due to characteristics that make them highly flammable. These characteristics can be physical (structure promotes ignition or combustion) or chemical (volatile chemicals increase flammability or combustion characteristics). The plants included in the Undesirable Plant List (Appendix D) are unacceptable from a fire safety standpoint. However, in the case where some of these plant species will be used, they will be isolate individuals with high level of ongoing maintenance as described in the landscape plan and shall not be planted on the site or allowed to establish opportunistically within fuel modification or landscaped areas.

5.4.5 Construction Phase Vegetation Management

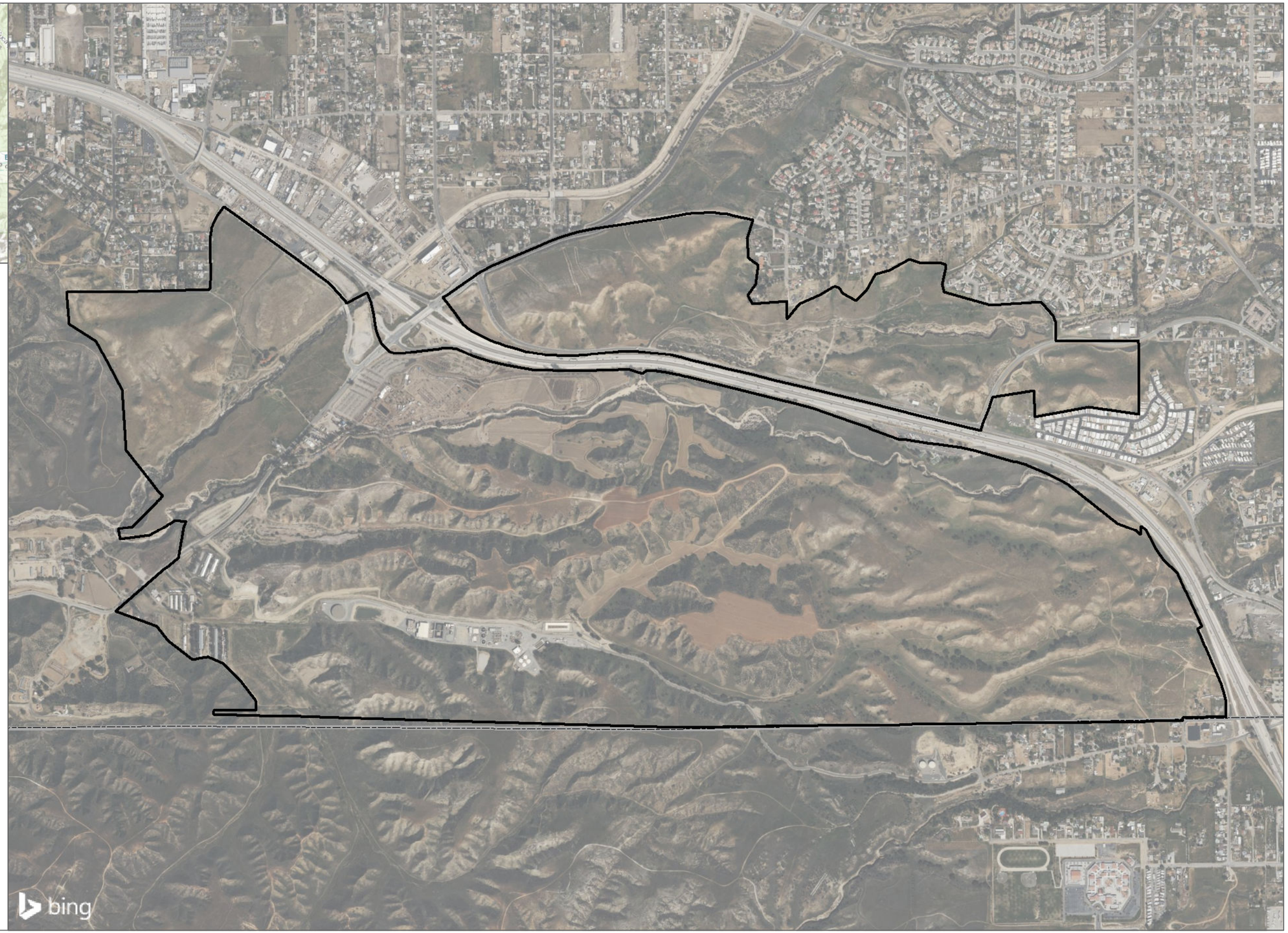
Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management for each development within the Specific Plan area shall be performed pursuant to the Project FPP and YFD requirements on all building locations prior to the start of work and prior to any import of combustible construction materials. Adequate fuel breaks 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 installed underground for fire safety purposes. 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.

INTENTIONALLY LEFT BLANK

Project Site
County Limits



SOURCE: AERIAL-BING MAPPING SERVICE 2022; DEVELOPMENT-X

DUDEK

0 550 1,100 Feet

FIGURE 10

Fuel Modification Plan

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

INTENTIONALLY LEFT BLANK

6 Alternative Materials and Methods

As previously mentioned, Freeway Corridor Specific Plan Project will be constructed in seven phases over 15 to 20 years, as the Project is a Specific Plan, it is unknown at this time if the full recommended FMZ will be achievable for all future developments proposed within the Specific Plan area, which will depend on lots and final location of structures. As such, this FPP incorporates the use of additional fire protection measures customized for the Project site based on the results of this analysis and focus on providing functional equivalency as a 100 feet wide fuel modification zone adjacent to open space areas. Additionally, based on fire behavior analysis, fuels within the open space areas are not expected to pose a significant threat to Project structures.

Research has indicated that 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 of low fuel landscape, no open windows), wildfire does not spread to homes unless the fuel and heat requirements (of the home) 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 survived (Howard et al. 1973, Foote and Gilless 1996). Similarly, San Diego County after fire assessments indicate 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 2008).

Obstacles, including non-combustible walls can block or deflect all or part of the radiation and heat, thus making narrower fuel modification distances possible. Fire behavior modeling conducted for the Project indicates that fires in the open space area would result in roughly 5-foot flame lengths under summer conditions. Extreme conditions may result in longer flame lengths approaching 18 feet.

As indicated in this report, the FMZs and additional fire protection measures proposed for developments within the Specific Plan area provides an equivalent wildfire buffer for structures adjacent to open space land where the full FMZ is not achievable. These recommendations are based on a variety of analysis criteria including predicted flame length, fire intensity (Btu), Project site topography and vegetation, extreme and typical weather, position of structures on pads, position of roadways, adjacent fuels, fire history, current vs. proposed land use, neighboring communities relative to the 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 within the Specific Plan area.

6.1 Additional Structural Protection Measures

The following additional measures will be implemented to reduce potential structure fire exposure related to the reduced FMZs. These measures are customized for the Specific Plan area, its unique topographical and vegetative conditions, and focus on providing functional equivalency as a full fuel modification zone. As detailed in Section

5.4, the FMZ for the Project would include a minimum 5-foot non-combustible zone, 45-foot-wide irrigated zone, and a 50-foot-wide thinning zone. In order to provide compensating structural protection in the absence of a 100-foot wide FMZ, and in addition to the structures being built to the latest ignition resistant codes, structures within the Specific Plan area that are unable to achieve the full 100-foot FMZ will also include the following features for additional fire prevention, protection, and suppression:

1. Windows will be upgraded on the preserved vegetation side of the structures subject to FMZ less than 100 feet to include dual pane, both panes tempered, exceeding the code requirement.
2. The vents will be ember-resistant for (recommend BrandGuard, O'Hagin, or similar vents). All vents used for this Project will be approved by YFD.
3. A 6-foot heat deflecting wall will be constructed of concrete masonry units (CMUs) between on-site structures and unmaintained open space.
4. Annually hire a 3rd party inspector to evaluate FMZ areas site wide to confirm they meet the requirements of this FPP and YFD.

Implementation of these additional fire protection features would justify a reduced FMZ. The information provided herein supports the ability of the proposed structures and 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 Specific Plan area or within its landscape.

7 Wildfire Education Program

Early evacuation for any type of wildfire emergency within the Specific Plan area is the preferred method of providing for resident, employee and visitor safety, consistent with the YFD and CAL FIRE's current approach within the City of Yucaipa and San Bernardino County. As such, all future developments within the Specific Plan area would formally adopt, practice, and implement a "Ready, Set, Go!" approach to evacuation. The "Ready, Set, Go!" concept is widely known and encouraged by the State of California and most fire agencies. Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing the potential for errors, maintaining fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and activities within the Specific Plan area during periods of fire weather extremes.

Each development within the Specific Plan area shall provided ongoing education regarding wildfires and the FPP's requirements to its population (e.g., residents, employees). The educational information must include maintaining the landscape and structural components according to the appropriate standards designed for the development. Informational handouts, fire safety website pages, mailers, fire-safe council participation, inspections, and seasonal reminders are some methods that would be used to disseminate wildfire and relocation awareness information. YFD should review and approve all wildfire educational material/programs before printing and distribution.

INTENTIONALLY LEFT BLANK

8 Conclusion

The requirements and recommendations set forth in this FPP meet fire safety, building design element, infrastructure, fuel management/modification, and landscaping recommendations of codes governing development in High and Very High FHSZ and WUI. The recommendations provided in the FPP have also been designed specifically for the proposed construction of structures within areas designated as FHSZ and/or WUI. When properly implemented on an ongoing basis, the fire protection strategies proposed in this FPP should significantly reduce the potential fire threat to vegetation within the Specific Plan area and its structures, as well as assist YFD in responding to emergencies within the Specific Plan area. The fire protection system proposed for developments within the Specific Plan area includes a redundant layering of code-compliant, fire-resistant construction materials and methods that have been shown through post-fire damage assessments to reduce the risk of structural ignition. Additionally, modern infrastructure would be provided, and all structures are required to include interior, automatic fire sprinklers consistent with the City's regulatory standards. Further, the proposed fuel modification for structures adjacent to the open space areas would provide a buffer between fuels in the open space and structures within the Specific Plan area.

The requirements and recommendations provided in this FPP have been designed specifically for the Project. This analysis and its fire protection justifications are supported by fire science research, results from previous wildfire incidents, and fire agencies that have approved these concepts. Where 100-foot FMZ is not achievable, developments within the Specific Plan area would include design features, such as asphalt roads, and irrigated landscape, as well as enhanced construction features (e.g., vents, dual-pane windows) that would provide a level of safety equal to a 100-foot wide FMZ.

Based on the results of this FPP's analysis and findings, the FPP implementation measures presented in Table 9 summarize code required measures while Table 10 summarizes measures offered that exceed Code requirements. With all of the features and measures in Tables 9 and 10, the Project's impact on fire safety would be less than significant.

Table 9. Code Required Fire Safety Features

Feature No.	Features Description
1	**Required Wildland Urban Interface Fire Safety Features described in Section 2.2.5.** Numerous features that reduce a project's exposure to flame and embers are required for Project's developed in the wildland urban interface. The Freeway Corridor Specific Plan Project would implement all of them.
2	**Ignition Resistant Construction.** Project buildings will be constructed of ignition resistant construction materials based on the latest Building and Fire Codes.
3	**Interior Fire Sprinklers.** All new structures will include interior fire sprinklers and the YFD will have the authority to grant exceptions for non-combustible, smaller buildings.
4	**Fuel Modification Zones.** Provided throughout the perimeter and interior of the site.
5	**Fire Apparatus Access.** Provided throughout the community and will vary in width and configuration but will all provide at least the minimum required unobstructed travel lanes, lengths, turnouts, turnarounds, and clearances required by the applicable code.
6	**Gates.** Gates on private roads in the project will comply with code requirements including being equipped with a key switch, have a backup battery or manual mechanical disconnect for power failure, and meet the minimum width, clearance, and material requirements.

Table 9. Code Required Fire Safety Features

Feature No.	Features Description
7	Premise Identification. All roads and structures within the project will comply with code requirements including, use of proper materials, proper sizing, and proper placement depending on the structure or road type.
8	Fire Hydrants. Provided along fire access roadways on the street side of buildings or facing approved fire apparatus access roads complaint with current code requirements.
9	Firefighting Improvements. Firefighting staging areas and temporary refuge areas are available throughout the Project's developed areas, and along roadways and site green spaces.
10	Water Availability. Water capacity and delivery will provide for a reliable water source for operations and during emergencies requiring extended fire flow.
11	Pre-Construction. The Freeway Corridor Specific Plan Project will have active developments including utilities, operable fire hydrants, construction please fuel modification zones established before bringing lumber or combustible materials onto project site.
12	Construction Procedures. New powerlines will be installed underground for fire safety purposes.

Table 10. Code Exceeding, Recommendations, or Alternative Materials and Method Fire Safety Measures

Measure No.	Feature/Description
1	FMZ with an added noncombustible zone. The Freeway Corridor Specific Plan Project will provide and maintain 100 feet of FMZ where possible in the project including a 5-foot-wide non-combustible Zone A, 45-foot-wide irrigated Zone B and a 50-foot wide thinning Zone C.
2	Advanced Protection Measures where 100-foot FMZ is not possible. In areas of the project Where 100 foot of fuel modification is not possible from the structures, advanced protection features will be put in place including tempered dual pane windows, , , ember resistant vents, and A 6-foot heat deflecting wall.
3	FMZ Inspections. HOA will hire a 3rd party, YFD-approved, FMZ inspector and landscape plan reviewer to provide twice a year certification that the HOA maintained properties including all FMZs and trail system meet the requirements of this FPP. FMZ inspections will occur in June and late September.
4	HOA Wildfire Education and Outreach. The Community HOA will include an outreach and educational role to coordinate with VFD, oversee landscape committee enforcement of fire safe landscaping, ensure fire safety measures detailed in this FPP have been implemented, and educate residents on and prepare facility-wide "Ready, Set, Go!" plans.

Ultimately, it is the intent of this FPP to guide the fire protection efforts for the Project in a comprehensive manner. Implementation of the measures detailed in this FPP will reduce the risk of wildfire within the Specific Plan area and will improve the ability of firefighters to fight fires on the properties and protect property and neighboring resources, irrespective of the cause or location of ignition.

It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not burn. Precautions and minimizing actions identified in this report are designed to reduce the likelihood that fire will impinge upon the Project's residents and employees or threaten its visitors. Additionally, 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 fuel modification requirements provided in this FPP will reduce vulnerability to wildfire for each of the developments within the Specific Plan area. It will also help accomplish the goal of this FPP to assist firefighters in their efforts to defend structures.

It is recommended that the Freeway Corridor Specific Plan Project maintain a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go!" stance on evacuation. The developments within the Specific Plan area will not to be considered shelter-in-place developments. However, the fire agencies and/or law enforcement officials may, during an emergency, as they would for any new development, providing the layers of fire protection, such as those within the Specific Plan area, determine that it is safer to temporarily refuge residents, employees or visitors within each development. When an evacuation is ordered, it will occur according to pre-established evacuation decision points or as soon as notice to evacuate is received, which may vary depending on many environmental and other factors. Fire is a dynamic and somewhat unpredictable occurrence, and it is important for anyone living at the WUI to educate themselves on practices that will improve safety.

INTENTIONALLY LEFT BLANK

9 List of Preparers

Project Manager

Michael Huff
Discipline Director
Dudek

Fire Behavior Modeling and Plan Preparer

Noah Stamm
Sr. Fire Protection Specialist
Dudek

Plan Preparer

Lisa Maier
Fire Protection Specialist
Dudek

GIS Analyst and Mapping

Lesley Terry
CADD Specialist
Dudek

INTENTIONALLY LEFT BLANK

10 References

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. http://www.fs.fed.us/rm/pubs_int/int_gtr122.pdf

Andrews, P.L. 1980. Testing the fire behavior model. In Proceedings 6th conference on fire and forest meteorology. April 22–24, 1980. Seattle, WA: Society of American Foresters. Pp. 70–77.

Andrews, Patricia L.; Collin D. Bevins; and Robert C. Seli. 2008. BehavePlus fire modeling system, version 3.0: User's Guide. Gen. Tech. Rep. RMRS-GTR-106 Ogden, Utah: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p.

Baltar, M., J.E. Keeley, and F. P. Schoenberg. 2014. County-level Analysis of the Impact of Temperature and Population Increases on California Wildfire Data. Environmetrics 25; 397-405.

Brown, J.K. 1972. Field test of a rate-of-fire-spread model in slash fuels. USDA Forest Service Res. Pap. Int-116. 24 p.

Brown, J.K. 1982. Fuel and fire behavior prediction in big sagebrush. USDA Forest Service Res. Pap. INT-290. 10p.

Bushey, C.L. 1985. Comparison of observed and predicted fire behavior in the sagebrush/ bunchgrass vegetation-type. In J.N. Long (ed.), Fire management: The challenge of protection and use: Proceedings of a symposium. Society of American Foresters. Logan, UT. April 17–19, 1985. Pp. 187–201.

California Building Standards Commission. 2019. California Building Standards Code (California Code of Regulations, Title 24). Published July 1, 2019; effective January 1, 2020. http://www.bsc.ca.gov/Codes.aspx.

CAL FIRE. 2018. Fire and Resource Assessment Program. California Department of Forestry and Fire. Website access via http://frap.cdf.ca.gov/data/frapgismaps/select.asp?theme=5.

Cohen, Jack D. 1995. Structure ignition assessment model (SIAM). In: Weise, D.R.; Martin, R.E., technical coordinators. Proceedings of the Biswell symposium: fire issues and solutions in urban interface and wildland ecosystems. 1994 February 15¬17; Walnut Creek, CA. Gen. Tech. Rep. PSW-GTR-158. Albany, California: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 85–92

Cohen, J.D. 2000. Preventing disaster: home ignitability in the wildland-urban interface. Journal of Forestry 98(3): 15–21.

Cohen, J.D. and Butler, B.W. [In press]. 1996. Modeling potential ignitions from flame radiation exposure with implications for wildland/urban interface fire management. In: Proceedings of the 13th conference on fire and forest meteorology. October 27–31; Lorne, Victoria, Australia. Fairfield, Washington: International Association of Wildland Fire.

Cohen, J.D. and Saveland, J. 1997. Structure Ignition Assessment Can Help Reduce Fire Damages in the W-UI. Fire Management Notes 57(4): 19–23.

FireFamily Plus. 2008. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 124 p http://www.firelab.org/project/firefamilyplus.

FRAP (Fire and Resource Assessment Program). 2007. Fire Hazard severity Zones in SRA. Adopted by California Department of Forestry and Fire Protection on November 7, 2007. Accessed August 2021. https://frap.fire.ca.gov

Grabner, K., J. Dwyer, and B. Cutter. 1994. "Validation of Behave Fire Behavior Predictions in Oak Savannas Using Five Fuel Models." Proceedings from 11th Central Hardwood Forest Conference. 14 p.

Grabner, K.W. 1996. "Validation of BEHAVE fire behavior predictions in established oak savannas." M.S. thesis. University of Missouri, Columbia.

Grabner, K.W., J.P. Dwyer, and B.E. Cutter. 2001. "Fuel model selection for BEHAVE in Midwestern oak savannas." Northern Journal of Applied Forestry. 18: 74–80.

Keeley, J.E. 2005. Fire history of the San Francisco East Bay region and implications for landscape patterns. International Journal of Wildland Fire 14:285-296. http://www.werc.usgs.gov/seki/pdfs/K2005_East%20Bay%20Fire%20History_IJWF.pdf

Keeley, J.E. 2006. Fire Management impacts on invasive plants in the Western United States. Conservation Biology 20:375-384.

Keeley, J.E. and CJ Fotheringham. 2001. Historic Fire Regime in Southern California Shrublands. Conservation Biology, Pages 1536-1548, Volume 15, No. 6.

Keeley, J.E., and P.H. Zedler. 2009. "Large, High-Intensity Fire Events in Southern California Shrublands: Debunking the Fine-Grain Age Patch Model." Ecological Applications 19:69–94.

Keeley, J.E. and S.C. Keeley. 1984. Post fire recovery of California coastal sage scrub. The American Midland Naturalist 111:105-117.

Linn, R. 2003. "Using Computer Simulations to Study Complex Fire Behavior." Los Alamos National Laboratory, MS D401. Los Alamos, NM.

McCreary, D.D. 2004. Fire in California's Oak Woodlands. University of California Cooperative Extension. Integrated Hardwood Range Management Program. 8 pp.

Mensing, S.A., J. Michaelsen, and R. Byrne. 1999. "A 560-Year Record of Santa Ana Fires Reconstructed from Charcoal Deposited in the Santa Barbara Basin, California." Quaternary Research 51:295–305.

Moritz, M.A. 2003. Spatiotemporal analysis of controls on shrubland fire regimes: age dependency and fire hazard. Ecology. 84(2):351-361. http://nature.berkeley.edu/moritzlab/docs/Moritz_2003_Ecology.pdf

Nichols, K., F.P. Schoenberg, J. Keeley, and D. Diez. 2011. "The Application of Prototype Point Processes for the Summary and Description of California Wildfires." Journal of Time Series Analysis 32(4): 420–429.

Pavlik, Bruce M. Muick, Pamela C. Johnson, Sharon G. and Popper Marjorie. 1991. Oaks of California. Cachuma Press, Los Olivos, CA. Remote Automated Weather Stations (RAWS). 2007.

Romero-Calcerrada R, Novillo CJ, Millington JDA, Gomez-Jimenez I (2008) GIS analysis of spatial patterns of human-caused wildfire ignition risk in the SW of Madrid (Central Spain). Landscape Ecology 23, 341-354. doi:10.1007/S10980-008-9190-2

Rothermel, R.C. 1983. How to predict the spread and intensity of forest and range fires. GTR INT-143. Ogden, Utah: USDA Forest Service Intermountain Research Station.161.

Rothermel, R.C., and G.C. Rinehart. 1983. Field Procedures for Verification and Adjustment of Fire Behavior Predictions. Res. Pap. INT-142. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 25 p.

Rothermel, Richard C. 1991. Predicting behavior and size of crown fires in the northern Rocky Mountains. Research Paper INT-438. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.

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.

Schroeder, M.J. and C.C. Buck. 1970. Fire weather – A guide for application of meteorological information to forest fire control operation. USDA Forest Service Agricultural Handbook 36D.

Syphard, Alexander D, Volker C Radeloff, Jon E. Keeley, Todd J. Hawbaker, Murray K. Clayton, Susan I. Stewart, Roger B. Hammer. 2007. Human Influence on California Fire Regimes. Ecological Applications. https://doi.org/10.1890/06-1128.1

Syphard, Alexander D, Jon E Keeley, and Teresa J. Brennan. 2011. Comparing the role of fuel breaks across southern California national forests. Forest Ecology and Management 261 (2011) 2038–2048.

Syphard AD, Bar Massada A, Butsic V, Keeley JE (2013) Land use planning and wildfire:development policies influence future probability of housing loss. PLoS ONE 8(8), e71708. doi:10.1371/JOURNAL. PONE.0071708Syphard AD, Keeley JE. 2016. Historical reconstructions of California wildfires vary by data source. International Journal of Wildland Fire 25, 1221–1227. doi:10.1071/WF16050

Syphard, Alexandra D. and Jon E. Keeley. 2015. Location, timing and extent of wildfire vary by cause of ignition. International Journal of Wildland Fire. 11 pp.

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.

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.

WRCC, 2021. Period of Record Monthly Climate Summary, Yucaipa, California (047470).

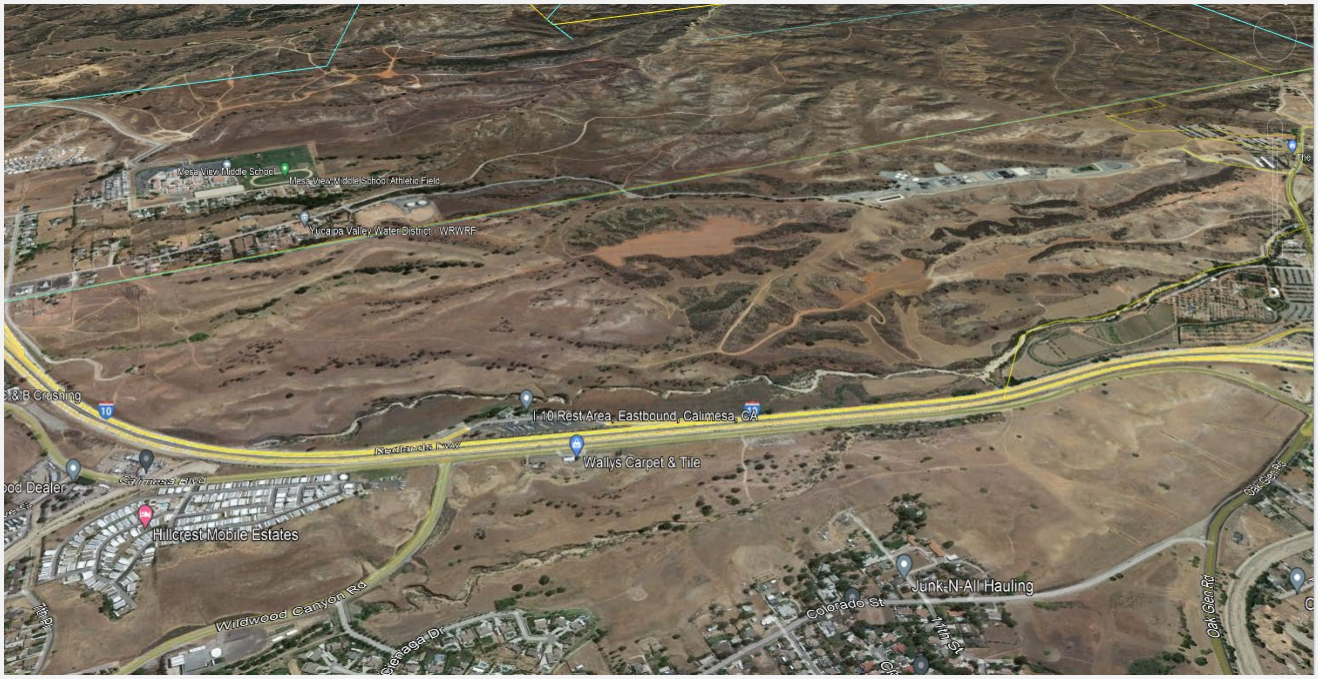
Wright, H.E. and M.L. Heinselman. 1973. The ecological role of fire in natural conifer forests of western and northern North America; Introduction. *Quaternary Research* 3:317-328.

INTENTIONALLY LEFT BLANK

Appendix A
Representative Site Images

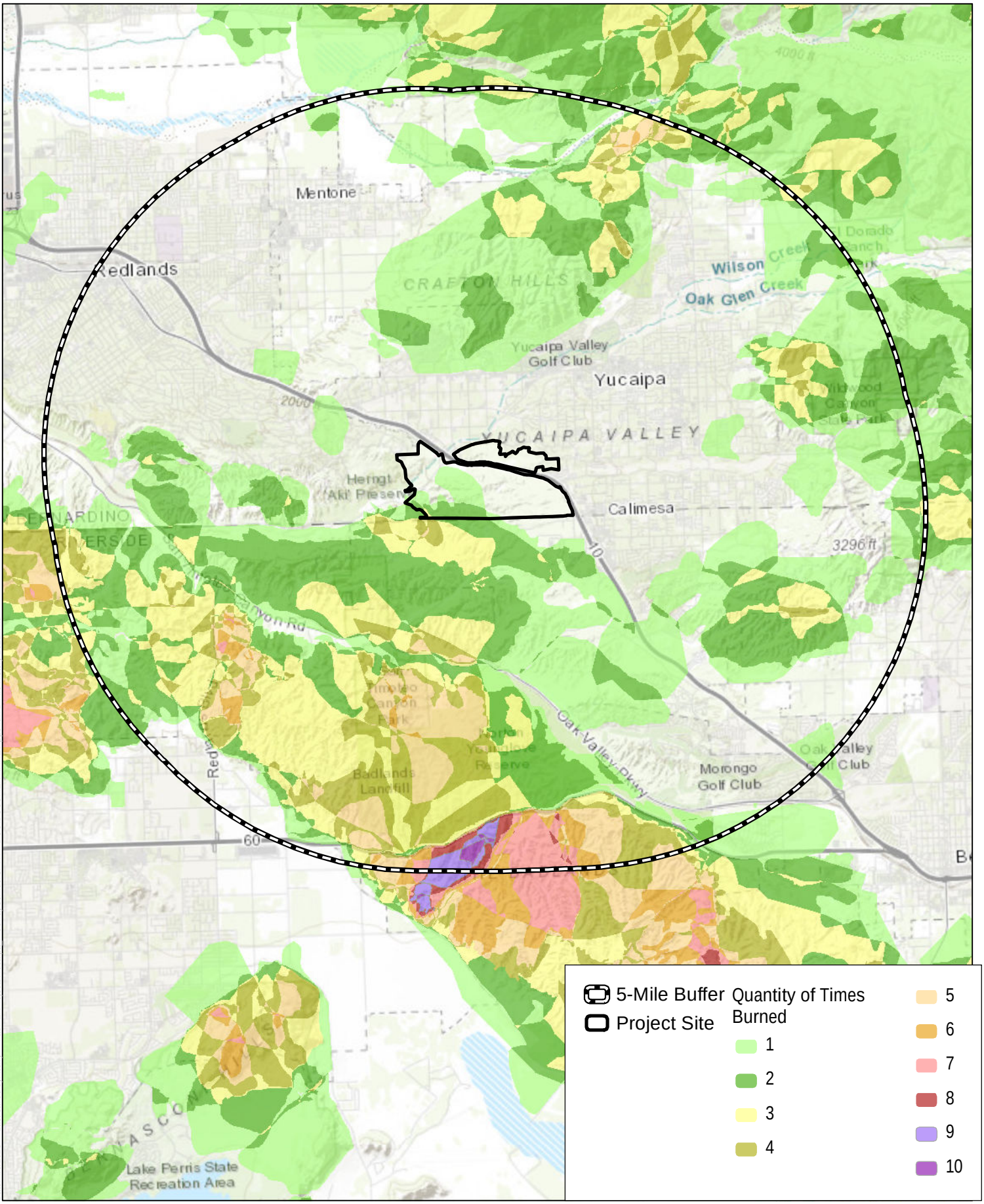
Photograph 1. View of Project Site's fuels and terrain.

Photograph 2. View to the north across Project site.



Photograph 3. View to the south across Project site.

Appendix B
Fire History



SOURCE: BASE MAP- ESRI MAPPING SERVICE; FIRE DATA-CALFIRE 2021

DUDEK

0 1 2 Miles

APPENDIX B

Fire History Map

City of Yucaipa Freeway Corridor Specific Plan Project - Fire Protection Plan

Appendix C
Fire Behavior Analysis

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:

- Grass Models GR1 through GR9
- Grass-shrub Models GS1 through GS4
- Shrub Models SH1 through SH9
- Timber-understory Models TU1 through TU5

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.

- Timber litter Models TL1 through TL9
- Slash blowdown Models SB1 through SB4

BehavePlus software was used in the development of the City of Yucaipa Freeway Corridor Project (Proposed Project) Fire Protection Plan (FPP) 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 located within the City of Yucaipa, San Bernardino County, California. Refer to Figure 5_*Fire Behavior Modeling Map Exhibit* for fire modeling scenario locations. As is customary for this type of analysis, four fire scenarios were evaluated, including two summer, onshore weather condition (west and south/southwest of the Project site) and two extreme fall, offshore weather condition (northeast and east of the Project site). The Project site is currently vacant and is surrounded by a variety of land uses including existing residential communities to the north, east, and farther west, Interstate 10 (I-10) to the south, and naturally vegetated open space lands farther to the south, southeast, and southwest. With that said, fuels and terrain within and adjacent to the Project development area could produce flying embers that may affect the Project, but defenses will be built into the proposed residential structures to prevent ember penetration and to extinguish fires that may result from ember penetration. It is the fuels directly adjacent to and within fuel modification zones that would have the potential to affect the Project's structures from a radiant and convective heat perspective as well as from direct flame impingement. 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 City of Yucaipa Freeway Corridor Project FPP, the different vegetation types observed within the Project site and adjacent to the Project site were classified into the aforementioned numeric fuel models. As is customary for this type of analysis, the terrain and fuels within and adjacent to the project area were used for determining flame lengths and fire spread. It is these fuels that would have the potential to affect the project's structures from a radiant and convective heat perspective as well as from direct flame impingement. Fuel beds, including the low- to- moderate load dry-climate grass fuels (Fuel Model Gr2 and Gr4), moderate load shrubs and chaparral fuels (Fuel Model Sh2), and low- to- moderate load grass-shrub fuels (Fuel Models Gs1 and Gs2) were found throughout the Project site area. These fuel types can produce flying embers that may affect the project area, but defenses have been built into the residential structures to prevent ember penetration. Table 1 provides a description of the five existing fuel models observed in the vicinity of the site that were subsequently used in the analysis for this project. A total of four fire modeling scenarios were completed for the Project area. These modeling scenario locations were selected based on the low probability of 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 scenarios 3 and 4). Dudek also conducted modeling of the site for post-Fuel Modification Zones' (FMZ)

recommendations for this project (Refer to Table 2 for post-FMZ fuel model descriptions). Fuel modification includes establishment of irrigated and thinned zones on the periphery of the residential structures as well as interior landscape requirements. For modeling the post-FMZ treatment condition, fuel model assignments were re-classified for the FMZs 0 and 1 (Fuel Model Gr1) and FMZ 2 (Fuel Model Gr2).

Table 1. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
Gr2	Low-load Dry Climate Grasses	Represents areas of grasses within the Project area without maintenance.	<2.0 ft.
Gr4	Moderate-load Dry Climate Grasses	Represents areas of grasses within the Project area without maintenance.	<3.0 ft.
Gs1	Low-load, Dry Climate Grass-Shrub	Represents areas of grass-shrub vegetation within the Project area without maintenance.	<2.0 ft.
Gs2	Moderate-load, Dry Climate Grass-Shrub	Represents areas of grass-shrub vegetation within the Project area without maintenance.	<3.0 ft.
Sh2	Moderate-load, Dry Climate Shrubs	Represents the shrub and chaparral vegetation located within the open space areas south of the Project without maintenance.	<3.0 ft.

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
Gr1	Short, sparse, dry climate grasses	Fuel Modification Zones 0 and 1: irrigated landscape on the perimeter of the structures within the development	<1.0 ft.
Gr2	Low-load Dry Climate Grasses	Fuel Modification Zone 2: 50% thinning of vegetation on the perimeter of Zone 1 within the development	<2.0 ft.

2.2 Topography

Slope is a measure of angle in degrees from horizontal and can be presented in units of degrees or percent. Slope is important in fire behavior analysis as it affects the exposure of fuel beds. Additionally, fire burning uphill spreads faster than those burning on flat terrain or downhill as uphill vegetation is pre-heated and dried in advance of the flaming front, resulting in faster ignition rates. Natural slope values ranging from approximately 3% to 20% were measured around the perimeter of the Project site from U.S. Geological Survey (USGS) topographic maps. Slope gradients for landscape areas are assumed to be flat (3%), as presented on the project's site plan.

2.3 Weather Analysis

Historical weather data for the San Bernardino County 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 Mill Creek RAWS (ID number 045109) 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 1961 and 2021 (extent of available data record) for 97th percentile weather conditions and from June 1 through September 30 for each year between 1961 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 five 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 3 summarizes the wind and weather input variables used in the Fire BehavePlus modeling efforts.

Table 3. Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Fuel Models	Gr2, Gr4, Gs1, Gs2, and Sh2	Gr2 and Gs1
1 h fuel moisture	4%	1%
10 h fuel moisture	6%	2%
100 h fuel moisture	10%	5%
Live herbaceous moisture	39%	30%
Live woody moisture	78%	60%
20 ft. wind speed	15 mph (sustained winds)	16 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	190 and 270	45 and 95
Wind adjustment factor	0.4	0.4
Slope (%)	6 to 20%	3 to 4%

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. Four 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 north/northeast, east, south, and west/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. Four 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 four fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

- **Scenario 1:** A fall, off-shore fire (97th percentile weather condition) burning through low-load grass dominated vegetation within the northern portion of the Proposed Project site. The terrain is flat (approximately 3% slope) with potential ignition sources from a car fire originating along Oak Glen Road or a structure fire originating in the nearby rural residential communities to the west/north/northwest of the Project site. This type of fire would typically spread through the mainly grass vegetation moderately fast towards the northern portion of the development.
- **Scenario 2:** A fall, off-shore fire (97th percentile weather condition) burning through low-load grass dominated vegetation within the northern portion of the Proposed Project site. The terrain is flat (approximately 4% slope) with potential ignition sources from a car fire originating along one of the many road east of the development or a structure fire originating in the nearby rural residential communities to the east/northeast of the Project site. This type of fire would typically spread through the mainly grass vegetation moderately fast towards the eastern portion of the development.
- **Scenario 3:** A summer, on-shore fire (50th percentile weather condition) burning through low- to- moderate load grass-shrub dominated vegetation within the hillsides south of the Proposed Project site and I-10. The terrain is moderately sloped (approximately 20% slope) with potential ignition sources from a car fire originating along Interstate 10 or within the naturally vegetated open space areas to the south. This type of fire would typically spread through the grass-shrub dominated vegetation moderately fast towards the south portion of the development site.
- **Scenario 4:** A summer, on-shore fire (50th percentile weather condition) burning through low-load grass dominated vegetation west/southwest of the Proposed Project site. The terrain is flat (approximately 6% slope) with potential ignition sources from a car fire or structure fire from the rural residential properties west of the Project site, or within the naturally vegetated open space areas to the west. This type of fire would typically spread through the grass dominated vegetation moderately fast towards the west/southwestern portion of the development.

4 Fire Behavior Modeling Results

The results presented in Tables 4 and 5 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 4, wildfire behavior adjacent to the Project site is expected to be primarily of moderate intensity through the non-maintained surface grass dominated fuels within and adjacent to the perimeter of the Project development. Worst-case fire behavior under peak weather conditions (represented by Fall Weather, Scenario 2) 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 18 feet with wind speeds of 50+ mph; fireline intensities reach approximately 3,037 BTU/feet/second, with moderate spread rates of 6.2 mph, and spotting distances up to 1.3 miles away.

Wildfire behavior through the non-maintained grass/grass-shrub and chaparral dominated fuels that are being fanned by onshore 15 mph sustained winds from the south and/or west are 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 between approximately 5 feet and 12 feet in height and spread rates between 0.1 and 1.7 mph. Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, range from 0.3 to 0.4 miles.

As depicted in Table 5, post development fire behavior expected in the irrigated and replanted with plants that are acceptable with the City of Yucaipa and San Bernardino County (FMZ Zones 0 and 1 – Gr1), as well as in an area with thinning of the existing grasses (FMZ Zone 2 – Gr2) under peak weather conditions experience a significant reduction in flame length and intensity. The approximately 18-foot flame lengths predicted for non-maintained grass dominated vegetation during pre-treatment modeling for fire scenario 2 are reduced to approximately 14 feet at the outer edges of the FMZ (Zone 2) and to 4 feet by the time the inner portions of the FMZ (Zone 1) are reached. During on-shore weather conditions, a fire approaching from the north/northwest towards the development footprint would be reduced from approximately 12-foot flames to approximately 2 feet tall for Zone 1, with 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 most of the site (a combination of Zones 0, 1 and 2). Therefore, the FMZs proposed for the Freeway Corridor Project are approximately 5-times the flame length of the worst-case fire scenario under peak weather conditions and would provide adequate defensible space to augment a wildfire approaching the perimeter of the Project site.

Table 4. RAWS BehavePlus Fire Behavior Model Results – Existing Conditions

Fire Scenario	Flame Length[1] (feet)	Spread Rate[1] (mph[2])	Fireline Intensity[1] (Btu/ft/s)	Spot Fire[1] (miles)
Scenario 1: 3% slope; Fall off-shore wind (97th percentile) - (north of Project site – Preconstruction)				
Low-load grasses (Gr2)	9.7 (18.0)[3]	1.6 (6.2)	799 (3,037)	0.4 (1.3)
Low-load grass-shrub (Gs1)	6.7 (14.0)[3]	0.6 (3.0)	353 (1,763)	0.3 (1.1)
Scenario 2: 4% slope; Fall off-shore wind (97th percentile) - (east of Project site – Preconstruction)				
Low-load grasses (Gr2)	9.7 (18.0)[3]	1.6 (6.2)	798 (3,037)	0.4 (1.4)

Table 4. RAWS BehavePlus Fire Behavior Model Results – Existing Conditions

Fire Scenario	Flame Length[1] (feet)	Spread Rate[1] (mph[2])	Fireline Intensity[1] (Btu/ft/s)	Spot Fire[1] (miles)
Scenario 3: 20% slope; Summer on-shore wind (50th percentile) - (south of Project site - Preconstruction)				
Moderate-load grasses (Gr4)	11.8	1.7	1,215	0.4
Moderate-load Grass/Shrub (Gs2)	6.5	0.5	333	0.3
Moderate-load shrubs (Sh2)	5.7	0.1	245	0.3
Scenario 4: 6% slope; Summer on-shore wind (50th percentile) - (west/southwest of Project site)				
Low-load grasses (Gr2)	5.4	0.3	221	0.2
Low-load grass-shrub (Gs1)	1.6	0.0	17	0.2

Notes:
1 Wind-driven surface fire.
2 MPH=miles per hour
3 Spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

Table 5. 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: 3% slope; Fall off-shore wind (97th percentile) - (north of Project site – Preconstruction)				
Fuel modification zones 0 and 1 (Gr1)	4.0 (4.0)[3]	115 (115)	0.7 (0.7)	0.2 (0.5)
Fuel modification zone 2 (Gr2)	9.7 (18.0)[3]	799 (3,037)	1.6 (6.2)	0.4 (1.3)
Scenario 2: 34% slope; Fall off-shore extreme wind (97th percentile) - (east/northeast of Project site)				
Fuel modification zones 0 and 1 (Gr1)	4.0 (4.0)[3]	115 (115)	0.7 (0.7)	0.2 (0.5)
Fuel modification zone 2 (Gr2)	9.7 (18.0)[3]	798 (3,037)	1.6 (6.2)	0.4 (1.3)
Scenario 3: 43% slope; Fall off-shore extreme wind (97th percentile) - (east/southeast of Project site)				
Fuel modification zones 0 and 1 (Gr1)	2.3	33	0.3	0.1
Fuel modification zone 2 (Gr2)	6.3	312	0.8	0.3
Scenario 4: 5% slope; Summer on-shore wind (50th percentile) - (west/southwest of Project site)				
Fuel modification zones 0 and 1 (Gr1)	2.3	33	0.3	0.1
Fuel modification zone 2 (Gr2)	6.4	326	0.9	0.3

Notes:
1 Wind-driven surface fire.
2 MPH=miles per hour.
3 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 6 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 4 and 5. Identification of modeling run locations is presented graphically in Figure 5_*Fire Behavior Modeling Map Exhibit*.

Table 6. 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.

INTENTIONALLY LEFT BLANK

Appendix D
Undesirable Plant List

Botanical Name	Common Name
Trees	
Abies species	Fir
Acacia species (numerous)	Acacia
Agonis juniperina	Juniper Myrtle
Araucaria species (A. heterophylla, A. araucana, A. bidwillii)	Araucaria (Norfolk Island Pine, Monkey Puzzle Tree, Bunya Bunya)
Callistemon species (C. citrinus, C. rosea, C. viminalis)	Bottlebrush (Lemon, Rose, Weeiping)
Calocedrus decurrens	Incense Cedar
Casuarina cunninghamiana	River She-Oak
Cedrus species (C. atlantica, C. deodara)	Cedar (Atlas, Deodar)
Chamaecyparis species (numerous)	False Cypress
Cinnamomum camphora	Camphor
Cryptomeria japonica	Japanese Cryptomeria
Cupressocyparis leylandii	Leyland Cypress
Cupressus species (C. fobesii, C. glabra, C. sempervirens,)	Cypress (Tecate, Arizona, Italian, others)
Eucalyptus species (numerous)	Eucalyptus
Juniperus species (numerous)	Juniper
Larix species (L. decidua, L. occidentalis, L. kaempferi)	Larch (European, Japanese, Western)
Leptospermum species (L. laevigatum, L. petersonii)	Tea Tree (Austrailian, Tea)
Lithocarpus densiflorus	Tan Oak
Melaleuca species (M. linariifolia, M. nesophylla, M. quinqenervia)	Melaleuca (Flaxleaf, Pink, Cajeput Tree)
Olea europea	Olive
Picea (numerous)	Spruce
Palm species (numerous)	Palm
Pinus species (P. brutia, P. canariensis, P. eldarica, P. halopensis, P. pinea, P. radiate, numerous others)	Pine (Calabrian, Canary Island, Mondell, Aleppo, Italian Stone, Monterey)
Platycladus orientalis	Oriental arborvitae
Podocarpus species (P. gracilior, P. macrophyllus, P. latifolius)	Fern Pine (Fern, Yew, Podocarpus)
Pseudotsuga menziesii	Douglas Fir
Schinus species (S. molle, S. terebenthifolius)	Pepper (California and Brazilian)
Tamarix species (T. Africana, T. apylla, T. chinensis, T. parviflora)	Tamarix (Tamarisk, Athel Tree, Salt Cedar, Tamarisk)
Taxodium species (T. ascendens, T. distichum, T. mucronatum)	Cypress (Pond, Bald, Monarch, Montezuma)
Taxus species (T. baccata, T. brevifolia, T. cuspidata)	Yew (English, Western, Japanese)
Thuja species (T. occidentalis, T. plicata)	Arborvitae/Red Cedar
Tsuga species (T. heterophylla, T. mertensiana)	Hemlock (Western, Mountain)
Groundcovers, Shrubs & Vines	
Acacia species	Acacia
Adenostoma fasciculatum	Chamise
Adenostoma sparsifolium	Red Shanks

Botanical Name	Common Name
Agropyron repens	Quackgrass
Anthemis cotula	Mayweed
Arbutus menziesii	Madrone
Arctostaphylos species	Manzanita
Arundo donax	Giant Reed
Artemesia species (A. abrotanium, A. absinthium, A. californica, A. caucasia, A. dracunulus, A. tridentate, A. pynocephala)	Sagebrush (Southernwood, Wormwood, California, Silver, True tarrangon, Big, Sandhill)
Atriplex species (numerous)	Saltbush
Auena fatua	Wild Oat
Baccharis pilularis	Coyote Bush
Bambusa species	Bamboo
Bougainvillea species	Bougainvillea
Brassica species (B. campestris, B. nigra, B. rapa)	Mustard (Field, Black, Yellow)
Bromus rubens	Foxtail, Red brome
Cardera draba	Noary Cress
Carpobrotus species	Ice Plant, Hottentot Fig
Castanopsis chrysophylla	Giant Chinkapin
Cirsium vulgare	Wild Artichoke
Conyza bonariensis	Horseweed
Coprosma pumila	Prostrate Coprosma
Cortaderia selloana	Pampas Grass
Cytisus scoparius	Scotch Broom
Dodonea viscose	Hopseed Bush
Eriodyctyon californicum	Yerba Santa
Eriogonum species (E. fasciculatum)	Buckwheat (California)
Fremontodendron species	Flannel Bush
Hedera species (H. canariensis, H. helix)	Ivy (Algerian, English)
Heterotheca grandiflora	Telegraph Plant
Hordeum leporinum	Wild barley
Juniperus species	Juniper
Lactuca serriola	Prickly Lettuce
Larix species (numerous)	Larch
Larrea tridentata	Creosote bush
Lolium multiflorum	Ryegrass
Lonicera japonica	Japanese Honeysuckle
Mahonia species	Mahonia
Mimulus aurantiacus	Sticky Monkeyflower
Miscanthus species	Eulalie Grass
Muehlenbergia species	Deer Grass
Nicotania species (N. bigelevil, N. glauca)	Tobacco (Indian, Tree)
Pennisetum setaceum	Fountain Grass
Perronskia Atriplicifloria	Russian Sage

Botanical Name	Common Name
Phoradendrom species	Mistletoe
Pickeringia montana	Chaparral Pea
Rhus species (R. diversiloba, R. laurina, R. lentii)	Sumac (Poison oak, Laurel, Pink Flowering)
Ricinus communis	Castor Bean
Rosmarinus species	Rosemary
Salvia species (numerous)	Sage
Sacsola austails	Russian Thistle
Solanium Xantii	Purple Nightshade (toxic)
Sylibum marianum	Milk Thistle
Thuja species	Arborvitae
Urtica urens	Burning Nettle
Vinca major	Periwnkle
Rhus Lentii	Pink Flowering Sumac

Notes:

1 For the purpose of using this list as a guide in selecting plant material, it is stipulated that all plant material will burn under various conditions.

2 The absence of a particular plant, shrub, groundcover, or tree, from this list does not necessarily mean it is fire resistive.

3 All vegetation used in Vegetation Management Zones and elsewhere in this development shall be subject to approval of the Fire Marshal.

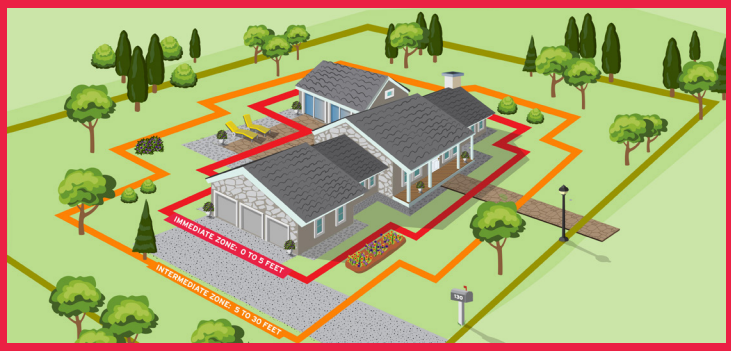
4 Additional plants that are considered undesirable due to their invasiveness nature are detailed on the California Invasive Plant Council's Web site at www.cal-ipc.org/ip/inventory/index.php.

5 Landscape architects may submit proposals for use of certain vegetation on a project specific basis. They shall also submit justifications as to the fire resistivity of the proposed vegetation.

INTENTIONALLY LEFT BLANK

Appendix E
Firewise Community Resources

HOW TO PREPARE YOUR HOME FOR WILDFIRES



WILDFIRE RISK REDUCTION STEPS THAT CAN MAKE YOUR HOME SAFER DURING A WILDFIRE

VEGETATION MANAGEMENT

1. HOME IGNITION ZONES

To increase your home's chance of surviving a wildfire, choose fire-resistant building materials and limit the amount of flammable vegetation in the three home ignition zones. The zones include the **Immediate Zone:** (0 to 5 feet around the house), the I**ntermediate Zone** (5 to 30 feet), and the **Extended Zon**e (30 to 100 feet).

2. LANDSCAPING AND MAINTENANCE

To reduce ember ignitions and fire spread, trim branches that overhang the home, porch, and deck and prune branches of large trees up to 6 to 10 feet (depending on their height) from the ground. Remove plants containing resins, oils, and waxes. Use crushed stone or gravel instead of flammable mulches in the **Immediate Zone** (0 to 5 feet around the house). Keep your landscape in good condition.

FIRE RESISTIVE CONSTRUCTION

3. ROOFING AND VENTS

Class A fire-rated roofing products, such as composite shingles, metal, concrete, and clay tiles, offer the best protection. Inspect shingles or roof tiles and replace or repair those that are loose or missing to prevent ember penetration. Box in eaves, but provide ventilation to prevent condensation and mildew. Roof and attic vents should be screened to prevent ember entry.

4. DECKS AND PORCHES

Never store flammable materials underneath decks or porches. Remove dead vegetation and debris from under decks and porches and between deck board joints.

5. SIDING AND WINDOWS

Embers can collect in small nooks and crannies and ignite combustible materials; radiant heat from flames can crack windows. Use fire-resistant siding such as brick, fiber-cement, plaster, or stucco, and use dual-pane tempered glass windows.

FIREWISE USA®
RESIDENTS REDUCING WILDFIRE RISKS

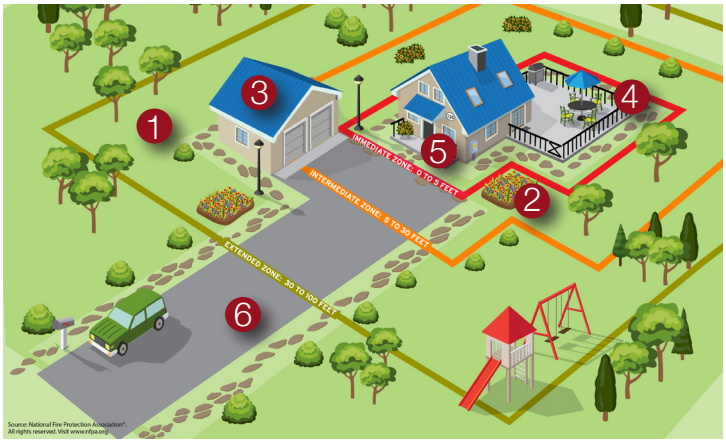
VISIT FIREWISE.ORG FOR MORE DETAILS

BE PREPARED

6. EMERGENCY RESPONDER ACCESS

Ensure your home and neighborhood have legible and clearly marked street names and numbers. Driveways should be at least 12 feet wide with a vertical clearance of 15 feet for emergency vehicle access.

- Develop, discuss, and practice an emergency action plan with everyone in your home. Include details for handling pets, large animals, and livestock.
- Know two ways out of your neighborhood and have a predesignated meeting place.
- Always evacuate if you feel it's unsafe to stay—don't wait to receive an emergency notification if you feel threatened from the fire.
- Conduct an annual insurance policy checkup to adjust for local building costs, codes, and new renovations.
- Create or update a home inventory to help settle claims faster.



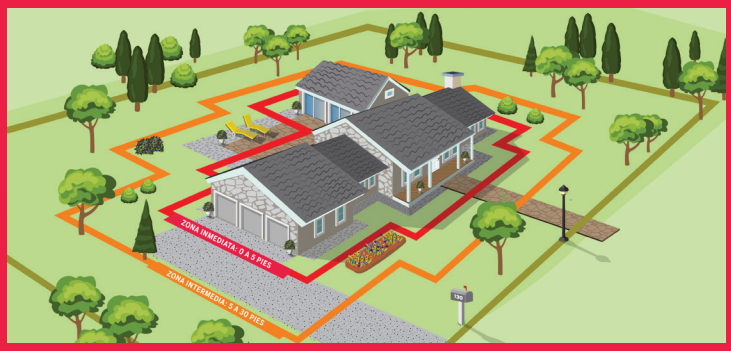
TALK TO YOUR LOCAL FORESTRY AGENCY OR FIRE DEPARTMENT TO LEARN MORE ABOUT THE SPECIFIC WILDFIRE RISK WHERE YOU LIVE.

Firewise® is a program of the National Fire Protection Association.
This publication was produced in cooperation with the USDA Forest Service, US Department of the Interior, and the National Association of State Foresters. NFPA is an equal opportunity provider. Firewise® and Firewise USA® are registered trademarks of the National Fire Protection Association, Quincy, MA 02169.

Order a Reducing Wildfire Risks in the Home Ignition Zone checklist/poster at Firewise.org

CÓMO PREPARAR SU CASA

PARA INCENDIOS FORESTALES



PASOS PARA LA REDUCCIÓN DEL RIESGO ANTE INCENDIOS FORESTALES PARA QUE SU CASA ESTÉ MÁS SEGURA DURANTE UN INCENDIO

MANEJO DE VEGETACIÓN

1 ZONAS DE IGNICIÓN DE UNA CASA

Para aumentar las posibilidades de que su casa sobreviva a un incendio forestal, elija materiales de construcción resistentes al fuego y limite la cantidad de vegetación inflamable en las tres zonas de ignición de una casa. Las zonas incluyen la **Zona Inmediata** (0 a 5 pies alrededor de la casa), la **Zona Intermedia** (5 a 30 pies), y la **Zona Extendida** (30 a 100 pies).

2 PAISAJISMO Y MANTENIMIENTO

Para reducir las igniciones de brasas y la propagación del fuego, pode las ramas que sobresalgan por encima de la casa, el pórtico y la terraza, y las ramas de árboles grandes hasta 6 a 10 pies (según su altura) desde del suelo. Quite las plantas que contengan resinas, aceites, y ceras. Use piedra molida y grava en vez de mantillos inflamables en la **Zona Inmediata** (0 a 5 pies alrededor de la casa). Mantenga su paisaje en buenas condiciones.

CONSTRUCCIÓN RESISTENTE AL FUEGO

3 TECHOS Y CONDUCTOS DE VENTILACIÓN

Los productos contra incendios de clase A para techos, tales como tejas compuestas, de metal, de hormigón y de arcilla, ofrecen la mejor protección. Inspeccione las tejas y reemplace o repare las que estén flojas o las que falten para prevenir la penetración de brasas. Tape los aleros, pero proporcione ventilación para prevenir la condensación y el moho. Proteja con rejilla los conductos de ventilación del techo y del ático para prevenir la entrada de brasas..

4 TERRAZAS Y PÓRTICOS

Nunca guarde materiales inflamables debajo de las terrazas o los pórticos. Quite la vegetación seca y los escombros que se encuentren debajo de terrazas y pórticos y entre las juntas de los tablones de las terrazas..

5 REVESTIMIENTOS Y VENTANAS

Las brasas pueden acumularse en pequeños rincones y ranuras e incendiar materiales inflamables; el calor radiante de las llamas puede agrietar las ventanas. Utilice revestimientos resistentes al fuego como ladrillos, fibrocemento, yeso o estuco y ventanas de vidrio templado de doble cristal.

NFPA FIREWISE USA®
RESIDENTES REDUCIENDO EL RIESGO DE INCENDIOS FORESTALES

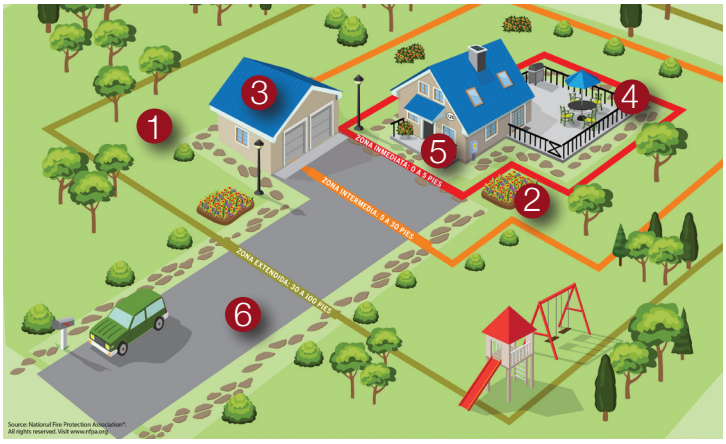
VISITE FIREWISE.ORG Y OBTENGA MÁS DETALLES

ESTÉ PREPARADO

6 ACCESO PARA SOCORRISTAS

Asegúrese de que los números y los nombres de las calles de su casa y su barrio sean legibles y estén marcados con claridad. Las entradas deberían tener al menos 12 pies de ancho con un margen vertical de 15 pies para el acceso de los vehículos de emergencia.

- Elabore, analice y practique un plan de medidas de emergencia con todas las personas que viven en su casa. Incluya detalles para mascotas, animales grandes y ganado.
- Conozca dos salidas de su vecindario y establezca un lugar de encuentro previamente designado.
- Siempre evacúe si cree que no es seguro quedarse: no espere a recibir una notificación de emergencia si se siente amenazado por el fuego.
- Realice una revisión anual de su póliza de seguro para ajustarse a los costos, códigos y las nuevas reformas de construcción locales.
- Cree o actualice un inventario de la casa para ayudarle a establecer los reclamos más rápido.



HABLE CON SU AGENCIA FORESTAL O CUERPO DE BOMBEROS LOCAL PARA APRENDER MÁS SOBRE EL RIESGO DE INCENDIOS FORESTALES ESPECÍFICO EN DONDE VIVE.

Firewise® es un programa de la National Fire Protection Association. Esta publicación se realizó en cooperación con el Servicio Forestal del Departamento de Agricultura de los EEUU, el Departamento del Interior de los EEUU y la Asociación Nacional de Guardabosques Estatales. NFPA es un proveedor que ofrece igualdad de oportunidades. Firewise® y Firewise USA® son marcas registradas de la National Fire Protection Association, Quincy, MA 02169.

Pida su lista de control/afiche Reduciendo el Riesgo de Incendios Forestales en la Zona de Ignición de Una Casa en Firewise.org

Wildfire Risk Reduction

10 Safety Tips

Every year, wildfires burn across the U.S., and more and more people are living where wildfires are a real risk. But by working together, residents can make their own property — and their neighborhood — much safer from wildfire.

Action Items to Improve Your Home's Survivability:

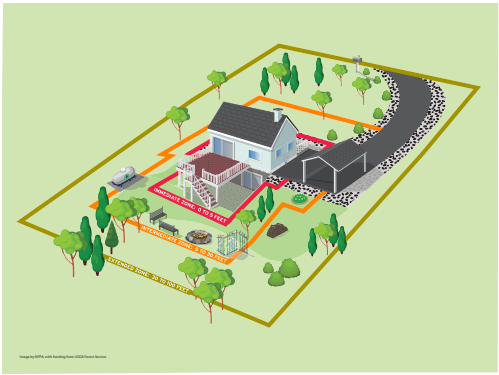
- **REMOVE** leaves, pine needles, and other flammable material from the roof, gutters, and on and under the deck to help prevent embers from igniting your home.
- **SCREEN** areas below decks and porches with 1/8" wire mesh to help prevent material from accumulating underneath.
- **COVER** exterior attic and soffit vents with 1/8" wire mesh to help prevent sparks from entering your home.
- **ENCLOSE** eaves to help prevent ember entry.
- **INSPECT** shingles or roof tiles. **REPLACE** missing shingles or tiles. **COVER** ends of tiles with bird stops or cement to help prevent ember penetration during a wildfire.

Tips for Landscaping Around Your Home

- **REMOVE** dead vegetation and other flammable materials, especially within the first 5 feet of the home.
- **KEEP** your lawn hydrated and maintained. If it is brown, cut it down to help reduce fire intensity.
- **PRUNE** tree limbs so the lowest branches are 6 to 10 feet above the ground to help reduce the chance of fire getting into the crowns of the trees.
- **MOVE** construction material, trash, and woodpiles at least 30 feet away from the home and other outbuildings.
- **DISPOSE** of branches, weeds, leaves, pine needles, and grass clippings that you have cut to reduce fuel for fire.

YOU CAN MAKE A DIFFERENCE!

Increase your wildfire safety. Make simple low-cost changes to your home and landscape starting today.



Visit **www.firewise.org** for more information.

Your Logo

NFPA

IT'S A BIG WORLD.
LET'S PROTECT IT TOGETHER®.