
Fire Protection Plan

PDS2025-TM-5665;
915 9th Street Residential
Project
Ramona, California

JUNE 2026

Prepared For:

SAN DIEGO COUNTY FIRE PROTECTION DISTRICT

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June 11, 2026

19781

David Sibbet,
Fire Services Coordinator
San Diego County Fire Protection District
5560 Overland Avenue, Suite 400
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Subject: Fire Protection Plan for the 915 9th Street Residential Project, Ramona, California

Dear Mr. Sibbet:

This Fire Protection Plan (FPP) demonstrates that the 915 9th Street Residential Project located in Ramona, San Diego County will be in compliance with applicable portions of the 2023 San Diego County Consolidated Fire Code (SDCCFC) which has adopted and amended the 2022 California Fire Code (CFC), including Chapter 49 (Municipal Code Chapter 11 – Fire Prevention and Protection, Article 2, Division 1, Ordinance 2022-04), or then current applicable fire code through direct compliance or, when not possible to comply, through AM&M. The Project will also be consistent with applicable sections of the 2022 California Building Code (CBC); and 2022 California Residential Code (CRC), including Section 337, as adopted by San Diego County.

In addition to the above referenced codes, this FPP shall be consistent with the County's Fire Prevention Fuel Modification Zones and Defensible Space requirements. The Project would be required to meet the adopted codes at the time of construction. This FPP has been prepared as prescribed in the County's "Guidelines for Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection (County of San Diego 2024)" document. For purposes of this FPP, the 915 9th Street Residential Project will be referred to as the "Project". This Project is not in a designated Fire Hazard Severity Zone.

The Project site is located within the unincorporated community of Ramona, in San Diego County, California. This FPP evaluates and identifies requirements for water supply, fuel modification and defensible space, emergency access, building ignition and fire resistance, fire protection systems, and wildfire emergency pre-planning, among other pertinent fire protection criteria. The purpose of this plan is to generate and memorialize the fire safety requirements of San Diego County along with project-specific measures based on the site, its intended use, and its fire environment. The Project site is within the San Diego County Fire Protection District's (SDCFPD) jurisdictional area. The SDCFPD operates at least two fire stations that could respond to an incident on the site in under ten minutes travel time, one of which could reach the site in under 2 minutes total response time (SDCFPD Station 80). In addition, automatic/mutual aid agreements are in place with neighboring fire agencies to augment response. The closest existing fire station to the Project site is the SDCFPD Station 80, located at 829 San Vicente Road, Ramona , California, approximately 0.3 miles from the primary access to the development. SDCFPD Station 80 includes one (1) Type 1 Fire Engine that is staffed daily by five (5) personnel, and one (1) ALS Ambulance.

Following extensive review of available digital site information, including topography, vegetation types, fire history, and the Project's site plan, Dudek fire protection planners conducted a field assessment of the Project in December 2025. As determined during the analysis of this site and its fire environment, the proposed 88 lot residential development Project, in its current undeveloped condition, is considered to include characteristics that, under favorable conditions, have the potential to facilitate fire spread. Once the Project is constructed, the on-site fire potential will be lower than its current condition due to conversion of areas of wildland fuels to

managed landscapes or paved areas and improved accessibility to firefighting personnel and equipment. It is not anticipated that fire has the potential to encroach upon the Project site and subject the structures to wildfire, given the Project does not have an interface with wildland. This FPP contemplates adjacent vegetation fire and potential for embers to impact the site from a regional wildfire and provides specific requirements that will minimize the potential for structural damage.

Early evacuation for any type of wildfire emergency near the Project Site is the preferred method of providing for resident safety, consistent with the County's current approach. As such, each property owner will be individually responsible to adopt, practice, and implement a "Ready, Set, Go!"¹ approach to site 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 potential for errors, maintaining the site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and site uses during periods of fire weather extremes.

¹ <https://www.sandiegocounty.gov/content/sdc/sustainability/news/Wildfire-Preparedness.html>

1 Project Description

The 915 9th Street Project (Project) is located at 915 9th Street in the unincorporated community of Ramona, San Diego County, California. The Project site encompasses approximately 19.65 acres and includes four parcels identified as Assessor Parcel Numbers (APNs) 284-202-21, 284-203-08, 284-205-01, and 284-244-01.

The Project proposes a residential subdivision consisting of 88 single-family residential lots and 12 lettered lots for private streets, open space, drainage, water quality, utility, and related infrastructure purposes. Development is proposed on APNs 284-202-21, 284-203-08, and 284-244-01. APN 284-205-01 is not proposed for physical development and would remain as a remainder parcel; however, its allowable residential density is proposed to be transferred to the Project.

The Project site is largely undeveloped, with the exception of an existing single-family residence and barn located in the northeastern portion of the property. The existing residence is proposed to remain, while the barn would be demolished. Surrounding land uses are primarily residential and include nearby single-family residences and a school.

The Project includes construction of single-family homes, internal private streets, sidewalks, utilities, stormwater infrastructure, and associated site improvements. Primary access to the Project would be provided from 9th Street via a system of private internal streets. The Project also includes the proposed vacation of a portion of 10th Street and installation of a gated Emergency Vehicle Access (EVA) connection. A gate will provide emergency vehicle access to the site, connecting to 10th Street from the Project site. This gate will be equipped with various features to facilitate emergency operations, such as Knox key switches, Opticom equipment, battery backup, and a magnetic loop detection system.

The Project is located within the Ramona Community Plan and includes development within the Village Residential 7.3 (VR-7.3) and Village Residential 2 (VR-2) General Plan land use designations. Water and sewer service would be provided by the Ramona Municipal Water District.

The Project site is surrounded by other rural residential and village residential development, similar to the proposed Project. Currently, the Project site consists of undeveloped land, primarily grassland vegetation types (see Figure 3, Vegetation Community Map), that is frequently mowed for fire prevention purposes.

The existing 9th Street is in compliance with the existing code for street width and allows for increased capacity, safety, and evacuation efficiency. All on-site fire access roads will be designed and maintained to support the imposed loads of fire apparatus (not less than 75,000 pounds), will meet the code requirements for width and turning radius, and will be consistent with code requirements for all weather paving surfaces (2023 SDCCFC).

2 Environmental Setting

2.1 Location

As depicted in Figure 1, Project Location, the Project site is located within the unincorporated community of Ramona, in San Diego County, south of State Route 67 (SR-67), and bound by 10th Street to the west and 9th Street to the east. The Project site is within APN's 284-202-21, 284-203-08, 284-205-01, and 284-244-01, within Section 22, Township 13 South, Range 1 East of the San Bernardino Meridian U.S. Geographical Survey 7.5-minute quadrangle map. The Project is surrounded by rural residential and village residential development.

In its existing state, the Project site consists of undeveloped land with maintained grassland vegetation. This Project site is primarily grasslands, and surrounded by similar grassland and herbaceous vegetation types and developed land uses (see Figure 3, Vegetation Community Map) (refer to Attachment 1, Representative Site Photographs).

The Project site is not within an area designated as a Fire Hazard Severity Zone (FHSZ) by the California Department of Forestry and Fire Protection (CAL FIRE) (see Figure 4, CAL FIRE Fire Hazard Severity Zone Map). CAL FIRE Fire and Resource Assessment Program (CAL FIRE 2025) fire history data indicates 79 wildfires have occurred within a 5-mile vicinity of the Project site; however, there have been no recorded wildfires on-site. The most recent wildfire in the Project vicinity was the 2023 Bunnie Fire, which burned approximately 184 acres. The largest wildfire in the Project vicinity was the 2003 Cedar Fire, which burned approximately 270,686 acres.

Project Exposure to Wildland Fires

The Project is urban infill without a wildland interface, and therefore has minimal exposure to wildland fires, and the primary threat is from potential ember cast from a vegetation fire that could have been started from a roadside ignition.

2.2 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower fire spread down-slope, unless downslope winds are influencing the fire. Flat terrain tends to have little effect on fire spread, resulting in fires that are driven by wind.

The Project site has an elevation of approximately 1,432 feet above mean sea level (amsl) on the western portion of the property, near San Vicente Road, to approximately 1,508 feet amsl in the eastern portion of the site, near 9th street. The Project site is comprised of relatively flat terrain.

2.3 Climate

Inland, northern San Diego County and the Project area's weather are influenced by the Pacific Ocean and are frequently under the influence of a seasonal, migratory subtropical high-pressure cell known as the "Pacific High" (WRCC 2022a). 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 76°F, with average

highs in the summer and early fall months (June–September) reaching 90°F. Precipitation typically occurs from November through March with annual rainfall averaging 12.4 inches (WeatherSpark 2025). The prevailing wind pattern is from the west (on-shore), but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are from the west–southwest (sea) and at night, winds are from the northeast (land). During the summer season, the diurnal winds may average slightly higher than the winds during the winter season due to greater pressure gradient forces. Surface winds can also be influenced locally by topography and slope variations. The highest wind velocities are associated with downslope, canyon, and Santa Ana winds.

The Project area’s climate has a large influence on the fire risk, as drying vegetation during the summer months becomes fuel available to advancing flames should an ignition be realized. Typically, the highest fire danger is produced by the high-pressure systems that occur in the Great Basin, which result in the Santa Ana winds of Southern California. Sustained wind speeds recorded during recent major fires in San Diego County exceeded 30 mph and may exceed 65 mph during extreme conditions. The Santa Ana wind conditions are a reversal of the prevailing southwesterly winds that usually occur on a region-wide basis during late summer and early fall. Santa Ana winds are warm and dry winds that flow from the higher desert elevations in the north through the mountain passes and canyons. As they converge through the canyons, their velocities increase. Santa Ana winds generally coincide with the regional drought period and the period of highest fire danger. The Project site is affected by Santa Ana winds from the north and east, which can influence fire spread by creating wind-driven fires.

2.4 Vegetation

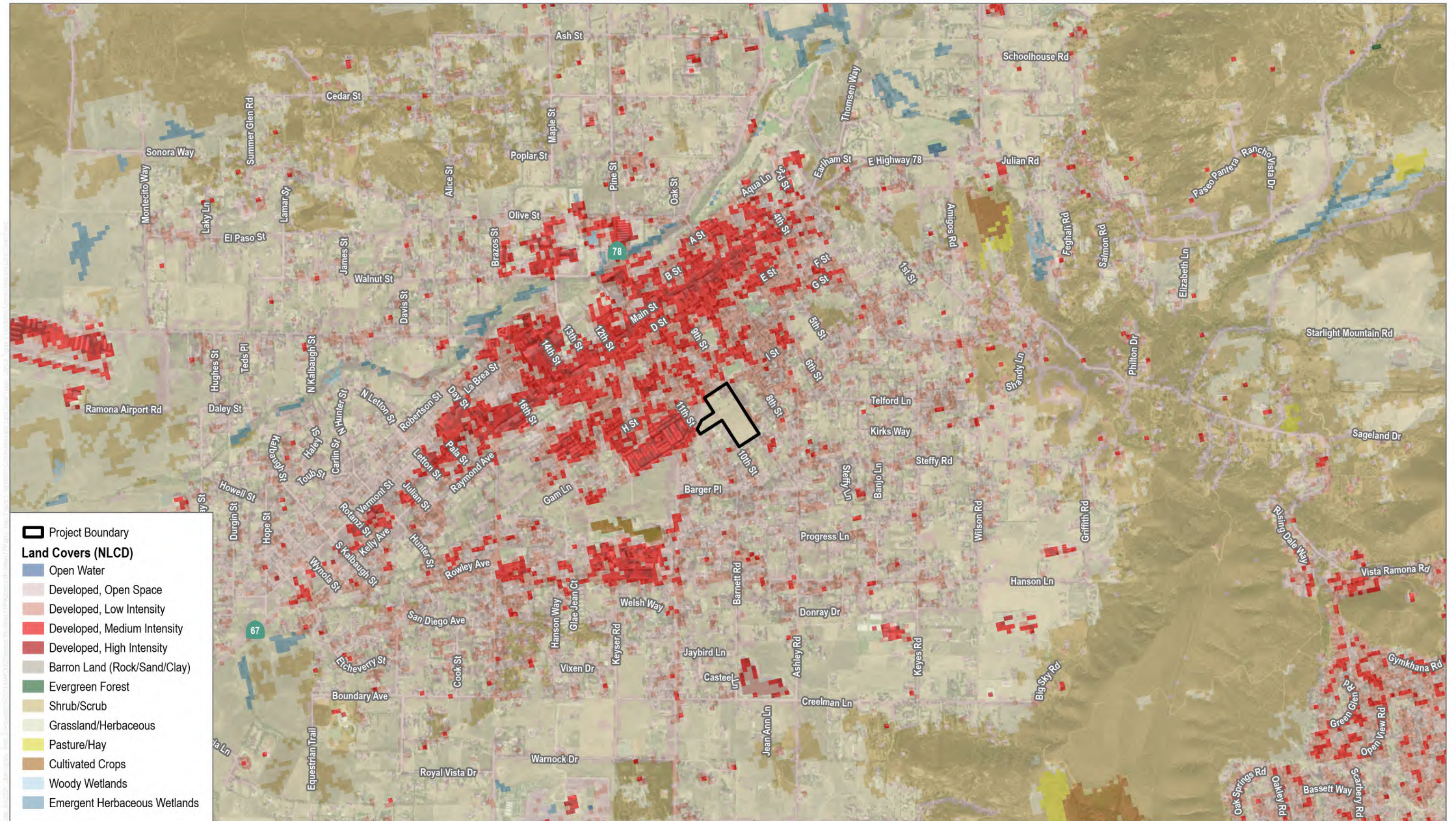
Extensive vegetation type mapping is useful for fire planning, because it enables each vegetation community to be assigned a fuel model, which is used in a software program to predict fire behavior characteristics, as discussed in Section 3, Fire Behavior Modeling. Vegetation types on the Project site primarily include grassland and herbaceous vegetation types (Figure 3, Vegetation Communities).

2.4.1 Vegetation Dynamics

The vegetation described above translates to fuel models used for fire behavior modeling, discussed in Section 3 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, the native shrub species that compose the coastal sage scrub and mixed chaparral plant communities on site are considered to exhibit higher potential hazard (higher intensity heat and flame length) than grass dominated plant communities (fast moving, but lower intensity) if ignition occurred. The corresponding fuel models for each of these vegetation types are designed to capture these differences. Additionally, vegetative cover influences fire suppression efforts through its effect on fire behavior. For example, while fires burning in grasslands may exhibit lower flame lengths and heat outputs than those burning in native shrub habitats, fire spread rates in grasslands are often more rapid.

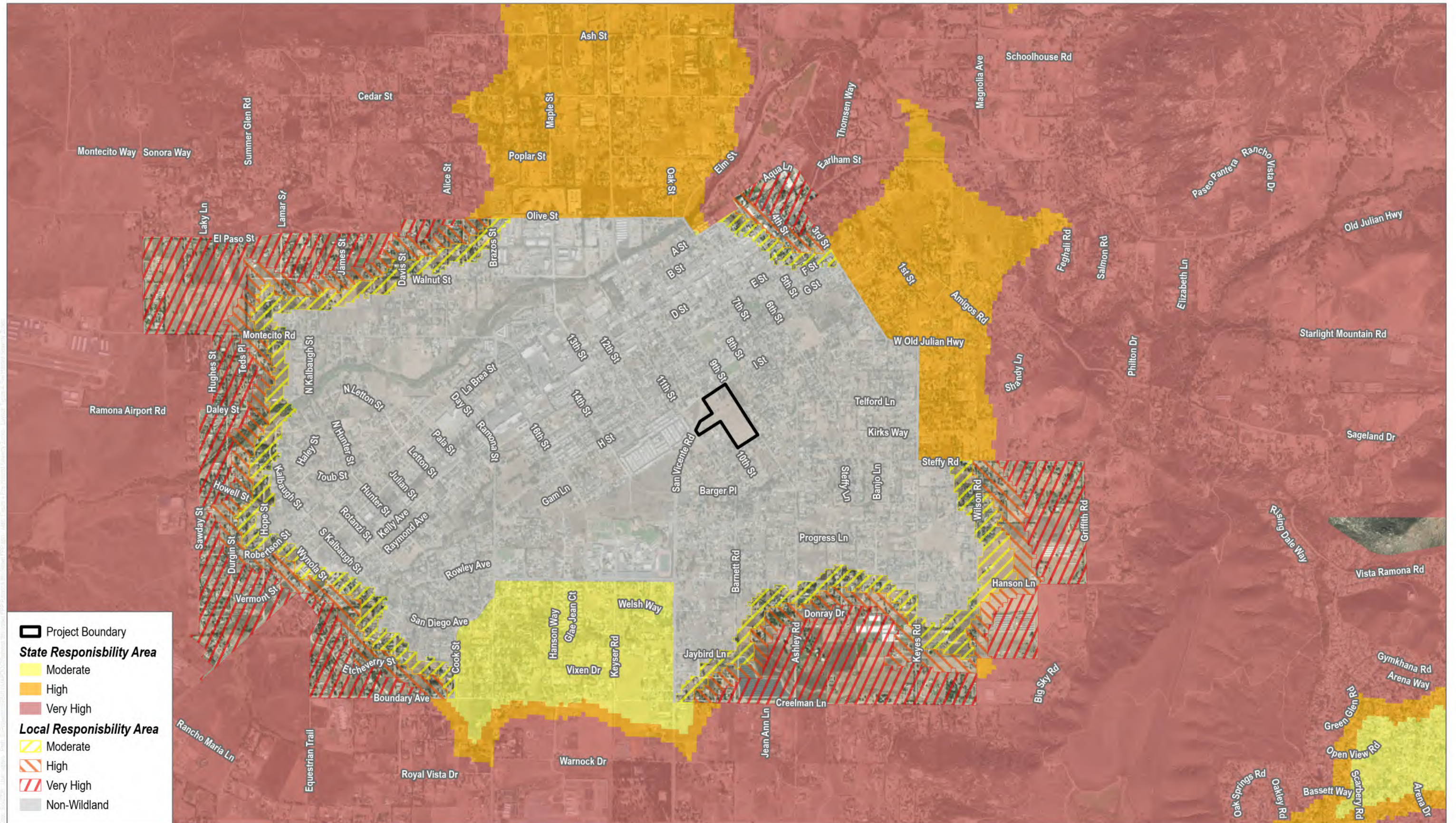
As described, vegetation plays a significant role in fire behavior and is an important component to the fire behavior models discussed in this report. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes disrupts plant succession, setting plant communities to an earlier state where less fuel is present for a period of time as the plant community begins its succession again. In summary, high-frequency fires tend to convert shrublands to grasslands or maintain

grasslands, and fire exclusion tends to convert grasslands to shrublands over time as shrubs sprout back or establish and are not disturbed by repeated fires. In general, biomass and associated fuel loading will increase over time, assuming that disturbance (e.g., fire, grazing, or farming) or fuel reduction efforts are not diligently implemented, which would not occur on this site due to the funded maintenance entity. 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 Project Site. 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. In contrast, conditions outside the fuel modification zones, where the fire threat will exist post-development (such as to the northeast and northwest), are classified as light fuel loads due to the classification as annually maintained grasslands.



SOURCE: Maxar 2024; Open Street Map 2019; NLCD 2023

FIGURE 3
Vegetation Communities and Land Covers



SOURCE: Maxar 2024; CalFire 2025

DUDEK



0 950 1,900 Feet

FIGURE 4
Fire Hazard Severity Zones

915 9th Street Ramona Project

2.5 Water Supply

Water for the Project would be provided by the Ramona Municipal Water District. An approved water supply capable of supplying the required fire flow for structural fire protection and wildland fire exposure shall be provided to the premises on which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction in accordance with Section 507 of the 2023 SDCCFC.

On-site firefighting water needs will be met by various fire hydrants along 9th Street. Additional fire hydrants may be proposed on site along internal circulation roadways to the code specifications of the SDCFPD, as discussed in Section 2.11.

2.6 Fire Access Roads

Site access, including fire lane, driveway, and entrance road widths, primary and secondary access, turnarounds, dead end lengths, signage, surface, and other requirements will comply with the County's roadway standards as identified in the most currently adopted San Diego County Consolidated Fire Code. The current codes that apply to the Project include the 2023 SDCCFC, 2022 CFC, and 2022 CBC. Fire access will be reviewed and approved by SDCFPD prior to construction.

The Project will be accessible by new roadways/driveways and would involve the construction of new residential structures, roadways, and would generate new trips to and from the Project site. Primary access to the Project site would be from two separate points on 9th Street that connects to the internal circulation roadways. Additional access to the site would connect 10th Street to the internal circulation roadways. The existing roadway, 9th Street, leading to the Project site, are in compliance with the existing code for street width and allows for increased capacity, safety, and evacuation efficiency. Internal circulation includes streets that are between 40 and 46 feet wide. One onsite roadway is a dead end cul-de-sac that is 46 feet wide, and approximately 460 feet long, that terminates in a cul-de-sac with a 40-foot turning radius bulb. All on-site fire access roads will be designed and maintained to support the imposed loads of fire apparatus (not less than 75,000 pounds) and will be consistent with code requirements for paving surfaces.

All on-site roads shall be constructed to the current San Diego County and SDCFPD road standards, including minimum 24-foot wide, unobstructed road widths. Turning radius for fire apparatus access roads will be 28 feet as measured on the inside edge of the improved width. No buildings will exceed 35 foot heights, so no additional widths for ladder truck access would be required. Roadway grades shall not exceed 15%. Minimum vertical clearance of 13 feet 6 inches will be maintained for the entire required width of fire access roads (Section 503 of the 2023 SDCCFC).

All access and internal road surfaces will be capable of supporting the imposed loads of fire apparatus (not less than 75,000 lbs.). All proposed roads would be improved with an approved paved surface to provide all weather driving capabilities. The paving and sub-base shall be installed to the standards specified in the County of San Diego Parking Design Manual. Additionally, the HOA and/or private property owners adjacent to the site's roads would maintain all roadside landscape in a fire safe condition.

Traffic calming devices (including, but not limited to, speed bumps, speed humps, speed control dips, etc.) shall be prohibited.

2.7 Dead End Roads

The Project includes a dead-end street that terminates in a cul-de-sac. The street is 46-feet wide, approximately 460 feet long, and has a code approved cul-de-sac, with a 40-foot turning radius. The code allowable dead end road length is 800 feet for this Project's lot sizes, and the minimum unobstructed radius width for a cul-de-sac in a residential area shall be 36 feet paved, 40 feet graded, or as approved by the fire code official. The Project meets the dead-end road length requirement and cul-de-sac radius, and thus does not necessitate mitigating measures.

2.8 Gates

A singular gate is proposed to facilitate secondary access between the Project site and 10th Street. The gate is intended to provide controlled access while maintaining unobstructed emergency access for fire apparatus and emergency responders. The proposed gate, and any future proposed additional gates will be designed, installed, and maintained in accordance with the 2023 SDCCFC (Section 503.5).

The gate will not impede fire department access and will be configured to allow emergency ingress and egress without delay. To facilitate emergency operations, the gate will be equipped with the following fire department-approved features:

1. Knox fire department key switch to allow emergency manual override by responding personnel.
2. Opticom emergency vehicle preemption sensor compatible with fire department equipment.
3. Battery backup power supply with fail-open functionality to ensure the gate automatically opens upon loss of primary power.
4. Magnetic loop detection system to allow vehicle egress without the use of keys, codes, or remote devices.

Electrical gate operators will be listed in accordance with UL 325, and the gate will be designed, constructed, and installed to comply with ASTM F2200 requirements for automatic gate operation. The proposed gate location, type, method of operation, and emergency access features will clearly be shown on the project plans and reviewed by the fire code official prior to installation. (2023 SDCCFC)

To ensure the proposed gate does not function as a regular access route to the Project site, there will be operational and administrative measures in place including the following:

- Homeowners Association (HOA) Covenants, Conditions, and Restrictions (CC&Rs) specifying that the gate is for emergency use only, with penalties or fines for unauthorized use.
- Signage at the gate indicating restricted use and discouraging daily traffic.
- Monitoring measures, such as cameras, to monitor and enforce unauthorized access.

The Project's HOA will be responsible for maintaining the gate and associated equipment, coordinating with the fire department as needed, and educating residents on proper gate usage and restrictions to ensure ongoing compliance with the 2023 SDCCFC Section 503.5 requirements.

2.9 Driveways

All proposed structures are along Project roadways. Driveways shall have a paved driveway meeting SDCFPD requirements as follows:

1. Grades 15% or less with surfacing and sub-base consistent with 2023 SDCCFC Section 503.2.3.
2. Single-family driveways serving no more than two residential parcels should have at least 16 feet of unobstructed width with a fire apparatus turnaround (2023 SDCCFC Section 503.2.1).

2.10 Premises Identification

Identification of roads and structures will comply with the 2023 SDCCFC, Section 505.1, as follows:

1. New and existing buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property.
2. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out.
3. Each character shall be not less than 4 inches (102 mm) high with a minimum stroke width of ½-inch (12.7 mm) for residential buildings, 8 inches high with a 1-inch stroke for commercial and multi-family residential buildings.
4. Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained.
5. Streets and roads shall be identified with approved signs.
6. Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by vehicles.
7. Signs shall be of an approved size, weather-resistant and be maintained until replaced by permanent signs. All new public roads, all private roads within major subdivisions and all private road easements serving four or more parcels shall be named. Road name signs shall comply with County of San Diego Department of Public Works Design Standard #DS-13.

A lighted directory map meeting current fire department standards, shall be installed at the driveway entrance to a residential multi-family project or a mobile home park, with more than fifteen (15) units is typically required by the 2023 SDCCFC, Section 505.4. This Project is seeking an exception based on the grounds that this development is (1) not a gated community, (2) has multiple ingress and egress points, (3) addresses to each unit will comply with the standards described in Section 505.1 of the 2023 SDCCFC, (4) the Project will be well lighted, and (5) proposes 40-foot wide roadways with code compliant fire apparatus turning radii throughout.

2.11 Fire Hydrants

Hydrants shall be designed and constructed in accordance with nationally recognized standards. The location and access shall be approved by the code official. The number and spacing of fire hydrants shall be in accordance with

Table C102.1 of Appendix C of the 2022 California Fire Code, as applicable. The fire hydrant or fire valve shall be between 14 to 24 inches above grade, no closer than 4 feet nor further than 10 feet from the roadway, and 10 feet from combustible vegetation. The main capacity shall not be less than 2,500 – 3,000 gallons per minute, unless otherwise approved by the fire code official. All hydrants shall be identified by a blue or green marker with a minimum dimension of 3 inches. (Section 507.5.7 of the 2023 SDCCFC). The fire hydrants provide enhanced firefighting capabilities in the vicinity of the Project by providing significant additional access to water connections.

2.12 Fire Response

The Project site is located within the Cal Fire/San Diego County Fire Protection District (SDCFPD) jurisdictional response area. Emergency response for the Project would be provided by SDCFPD Fire Station 80, located at 829 San Vicente Road, Ramona, CA 92065. The firefighting equipment located at Station 80 are Engine 80 and ALS Ambulance Paramedic 80 and the station is staffed with 5 responders 24 hours a day, seven days a week². Station 80 is approximately 0.3 miles from the entrance into the development on 9th Street, with a calculated travel time of approximately 1 minute and 20 seconds³. Therefore, SDCFPD can respond to the Project site within the County’s adopted travel time standards, which call for a first-due unit to arrive within 5 minutes for urban areas, such as the Project site (County of San Diego 2021).

There are additional firefighting resources within the vicinity of the Project site, including SDCFPD Station 82, located at 3410 Dye Road, Ramona and SDCFPD Station 81, located at 24462 San Vicente Road, Ramona. SDCFPD Station 82 is approximately 4.5 miles from the Project site with a calculated travel time of 8 minutes and 18 seconds, and SDCFPD Station 81 is approximately 6.9 miles from the Project site with a calculated travel time of 12 minutes and 23 seconds.

Table 1. Closest Responding Fire Stations Summary

Station No.	Location	Maximum Travel Distance	Est. Travel Time*
CAL FIRE San Diego Station 80	829 San Vicente Road, Ramona, California 92065	0.3 miles	1 minute 20 seconds
CAL FIRE San Diego Station 82	3410 Dye Road, Ramona, California 92065	4.5 miles	8 minutes 18 seconds
CAL FIRE San Diego Station 81	24462 San Vicente Road, Ramona, California 92065	6.9 miles	12 minutes 23 seconds

Note:

* Assumes travel at 35 mph travel speed and does not include donning turnout gear and fire dispatch time. Actual travel speeds are likely to be closer to 45 mph speed limits.

CAL FIRE/San Diego Unit works cooperatively with San Diego County Fire Department to provide emergency response across the region. This collaboration includes a joint helicopter program with the San Diego Sheriff’s Department. The CAL FIRE/San Diego County Sheriff partnership maintains an Air Attack Base in Ramona, and a Helicopter Base at Gillespie Field. These aircraft, fixed wing and rotary wing, are capable of reaching even the most remote areas within the SRA in approximately 20 minutes, ensuring rapid response to wildfires and other emergencies.⁴

² Personal correspondence with Station 80 on December 16, 2025.
³ Calculated using the nationally recognized RAND Corporation formula used by the Insurance Services Office (ISO) Public Protection Classification Program’s Response Time Standard: (T=0.65 + 1.7D), where T=time and D=distance).
⁴ <https://www.fire.ca.gov/what-we-do/fire-protection/aviation-program>

To assess the impact of the Project’s population increase on emergency services, the estimated call volume is calculated using historical per capita call rates from the local fire jurisdiction, based on the maximum potential number of new residents. This approach provides a reliable estimate of additional calls expected from the proposed residential development. The Project proposes the development of 88 residential lots, which would generate a population of approximately 259 residents based on the average of 2.94 persons per household⁵.

The SDCFPD provides fire protection and emergency services to approximately 44,747 residents throughout the County, encompassing a total of 1.5 million acres and 3,035 road miles⁶. SDCFPD’s estimated call volume for the entire jurisdictional area is approximately 28,735 calls per year⁷. The per capita call generation rate for the SDCFPD jurisdictional area is 0.64, or 642 annual calls per 1,000 population. Therefore, the Project would potentially generate up to 166 calls per year (roughly 14 calls per month or 3 calls per week), most of which would be expected to be medical-related calls, consistent with typical emergency call statistics (Refer to Table 2, Calculate Call Volume below).

Table 2. Calculated Call Volume Associated with the 9th Street Residential Project

Emergency Calls per 1,000	Number of Residents	Avg. No. Calls per Year (259/1,000)x642	Avg. No. Calls per Day (166.3/365)
642	259 (estimate)	166.3	0.45

Service level requirements for SDCFPD are not expected to be significantly impacted by the Project’s estimate increase in calls per year. SDCFPD currently responds to roughly 78 calls per day (28,735 calls per year, approximately 2,394 calls per month or 552.6 calls per week) in its primary service area split amongst 39 stations, approximately 2 calls per day per station. For reference, a Fire Station that responds to 5 calls per day in an urban setting is considered average and 10 calls per day is considered busy. Therefore, the Project is not expected to cause a decline in the emergency response times. The requirements described in this FPP are intended to aid firefighting personnel and minimize the demand placed on the existing emergency service system.

2.13 Fire Protection Systems – Automatic Interior Fire Sprinkler Systems

All structures within the Project site will include the installation of an automatic, residential interior fire sprinkler system. Automatic internal sprinkler systems shall be in accordance with the National Fire Protection Association (NFPA) 13-D⁸ and SDCFPD requirements that are consistent with Section 903 of the 2023 SDCCFC.

⁵ <https://adlsdasadsprodpublicwest.z22.web.core.windows.net/datasurfer/SANDAG%20v24%20Estimates%202020%20Ramona%20Community%20Planning%20Area.pdf>

⁶ <https://www.sandiegocounty.gov/content/dam/sdc/sdcfa/documents/StratPlan/StratPlanCtyFire.pdf>

⁷ Correspondence with Britany Virgen (AGPA Data and Strategic Planning Analyst) from CAL FIRE’s San Diego County Unit Administration Office on December 17, 2025.

⁸ NFPA 13D. Standard for the Installation of Sprinkler Systems in Detached Single Family Residential Occupancies. 2019 Edition.

2.14 Defensible Space

An important component of a fire protection system for this Project is the provision for fire resistant landscapes and modified vegetation buffers. Fuel Modification Zones (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. FMZs are arguably more important when situated adjacent to older structures that were built prior to the latest building codes and interior sprinkler requirements. All dwelling units on the Project site will be less susceptible to ignition based on required construction design, materials, and methods. FMZs would be located on the perimeter of all structures.

The defensible space and fuel modification zones surrounding the structures will be consistent with SDCFPD's defensible space requirements as described in the Department of Planning and Land Use Ordinance #199 (2021). This ordinance requires a 100-foot radius cleared of combustible vegetation around each structure. The Project shall maintain an effective fuel modification zone by removing, clearing or modifying combustible vegetation and other flammable materials from areas within 100 feet from buildings or structures. Fuel modification zones shall not extend beyond the property line (2023 SDCCFC Section 4907).

Section 4907 of the 2023 SDCCFC lists the requirements for each fuel modification zone, including: up to 5 feet of non-combustible hardscape within Fuel Modification Zone 0, up to 50 feet of irrigated, well-maintained landscape with fire-resistant plants (refer to Attachment 3, Suggested Plant List), Fuel Modification Zone 1 and 50 feet up to 100 feet of 50% thinning of dead and diseased vegetation within Fuel Modification Zone 2. The following are requirements of the Fuel Modification Zones (2023 SDCCFC):

- **Zone 0 “Immediate Zone” 0 to 5 feet:** extends 5 feet on a horizontal plane from all exterior wall surfaces (and patios, decks or other attachments to buildings or structures). This zone shall be constructed of continuous hardscape or non-combustible materials (such as pavement, pavers, gravel, river rock, etc.). Combustible materials must be removed from this area (which includes but is not limited to removing combustible materials from roofs, gutters, decks, porches and stairways). Firewood and lumber are prohibited in this area. Dead branches that overhang roofs, are below or adjacent to windows, or which are adjacent to wall surfaces must be removed. All branches within ten (10) feet of any chimney or stovepipe outlet must be removed.
- **Zone 1 “Intermediate Zone” from 5 to 50 feet:** extends from the immediate edge of Zone 0 for 45 feet on a horizontal plane. This zone shall consist of planting of low growth, drought tolerant and fire resistive plant species. The height of the plants in this zone starts at 6” adjacent to Zone 0 and extending in a linear fashion up to a maximum of 18” at intersection with Zone 2. Dead or dying grass, plants, shrubs, trees, branches, leaves, weeds, and pine needles must be removed from the area. Other combustible materials must not be adjacent to or under combustible decks, balconies, and stairs. Vegetation in this zone shall be irrigated and not exceed 6’ in height and shall be moderate in nature. Firewood and lumber shall be piled at a minimum of 30 feet away from any structure. Dead branches that overhang roofs, are below or adjacent to windows, or which are adjacent to wall surfaces must be removed. All branches within ten (10) feet of any chimney or stovepipe outlet must be removed.
- **Zone 2 “Extended Zone” from 50 to 100 feet:** extends from the immediate edge of Zone 1 for 50 feet on a horizontal plane. This zone consists of planting of drought tolerant and fire resistive plant species of moderate height. This area would be considered selective clearing of natural vegetation and dense chaparral by removing a minimum 50% of the square footage of this area. Horizontal and vertical spacing

among shrubs and trees must be created using fuel separation, as follows: Dead and dying woody surface fuel and trees shall be removed. Loose surface litter (consisting of fallen leaves or needles, twigs, bark, cones, and small branches) shall be permitted to a maximum depth of three (3) inches. Annual grasses and forbs must be cut down to a maximum height of four (4) inches.

Fuel modification is also required along fire access roadways and driveways within 20 feet from each side of the roadway (2023 SDCFC Section 4907.6). The Project may only modify vegetation up to the property lines. All fuel modification must be complete prior to bringing combustible construction materials on-site. This means combustible vegetation shall be thinned or removed, but new plantings do not necessarily need to be installed. Vegetation shall comply with the vegetation listed in the San Diego County Suggested and Undesirable Plant List, Appendix C, all plants listed as undesirable are prohibited from being planted on the Project site.

The 915 9th Street Residential Project's Homeowners Association shall be responsible for ensuring long-term funding and ongoing compliance with fuel modification and maintenance requirements throughout the Project site's common areas. Private property owners will be responsible for maintenance within individual lots. All fuel modification area vegetation management shall be completed annually no later than June 1st of each year and more often as needed for fire safety, as determined by the SDCFPD.

2.14.1 FMZ Measurements

The Project site will not be able to meet the 100 feet of defensible space requirement within the Project boundary (see Figure 5, Fuel Modification Plan). All structures will be able to meet the Immediate Zone, 0-5 feet from the structure. Zone 1 and Zone 2 are limited by the Project boundary throughout the entire Project site although off-site FMZ equivalency absolves some of the fuel modification zone impairments as described herein. The following zone impairments are observed:

2.14.1.1 FMZ Impairments

- Zone 1 is impaired at 12 feet from the structures along the northwestern boundary of the Project site. An undeveloped parcel of land is adjacent to the northwest of the Project site. The vegetation in this area is properly maintained, to SDCFPD Vegetation Management standards⁹, therefore, those areas are off-site FMZ equivalent. Further, a 6-foot CMU block wall will be constructed between the Project boundary and offsite undeveloped land, providing additional protection to the Project site. The full 100-feet of defensible space overlaps with San Vicente Road, an approximately 50-foot, code compliant roadway, which due to its non-combustible nature, acts as an offsite fuel break and exceeds defensible space requirements.
- Zone 1 is impaired at 43 feet along another area of the northwestern boundary of the Project site. The adjacent land use is residential and is bound to comply with the same defensible space requirements for the adjacent structure, therefore, this area is considered off-site FMZ equivalent.
- Zone 1 is also impaired at 43 feet on the northeastern boundary of the Project site. The adjacent roadway, 9th Street, is a 30-foot wide, code compliant roadway, which will serve as a fuel break adjacent to the Project site. The land use opposite the Project site, to the east of 9th Street, is residential or land owned by the Project, and is bound to comply with the same defensible space vegetation maintenance requirements for the adjacent structures, therefore, this area is off-site FMZ equivalent.

⁹ San Diego County Code of Ordinances, Title 6, Div 8, Chapter 4

- Zone 1 is impaired at 23 feet from the structures on the southeastern boundary of the Project site. The adjacent land use is residential and satisfies the intent of off-site FMZ equivalencies.
- Zone 1 is impaired at 18 feet from the structure along the southwestern boundary of the Project site. The adjacent roadway, 10th Street, is an approximately 20-foot wide, paved roadway, which will serve as a fuel break adjacent to the Project site. The adjacent land use is residential and satisfies the intent of off-site FMZ equivalencies.
- Zone 1 is impaired at 18 feet from the structures along the southwestern boundary of the Project site. The adjacent land use is residential and satisfies the intent of off-site FMZ equivalencies.

In summary, the adjacent land uses surrounding the Project site are residential and bound to comply with the same defensible space requirements for the adjacent structures, therefore, those areas are considered off-site FMZ equivalent. There are roadways surrounding the Project to the northeast (9th Street), west (San Vincente Road), and southwest (10th Street) that are paved roadways providing approximately 50 feet, 30 feet and 20 feet of non-combustible roadway fuel breaks adjacent to the Project site, respectively. The vegetation adjacent to the roadways are properly maintained year round, to SDCFPD Vegetation Management standards, therefore, those areas are considered off-site FMZ equivalent. The undeveloped parcel to the northwest of the Project site will be maintained in accordance with the vegetation maintenance standards. Further, the Project will also construct a 6-foot-tall CMU block wall along the northwestern property line, as shown in Figure 5, to further protect the Project site from a fire spreading onto the site from a vegetation fire on the vacant lot to the northwest.

2.14.1.2 FMZ Equivalency and Alternative Materials and Methods for Project Compliance

While Zone 1 and 2 are impaired on all sides of the Project, the Project benefits from off-site FMZ equivalencies by way of residential land uses, paved roadways, and maintained undeveloped land. It is important to note that the Project does not have a wildland interface; the undeveloped land to the northwest of the Project site is low load annual grasslands that have historically been maintained, and are required to be maintained annually to comply with weed abatement/vegetation management requirements for San Diego County (2023 SDCCFC Section 4906).

Property boundary constraints result in the inability to provide the requisite 100 feet of on-site fuel modification around all project structures. To mitigate for the reduced FMZ, a 6-foot tall non-combustible, heat deflecting CMU block wall will be constructed along eastern portions of the development (code equivalent mitigation measure). While it is possible that a vegetation fire could ignite on the undeveloped parcel to the northwest of the Project, the 6-foot-tall CMU block wall will provide sufficient fuels reduction and heat deflection to prevent the vegetation fire from reaching the Project.

Heat deflecting walls are extremely effective at mitigating the forward spread of fire by disrupting fuel continuity and deflecting heat upwards away from the sparse surface fuels in the FMZs (NFPA 2018). The 6-foot tall CMU block walls would provide a vertical, non-combustible surface in the line of heat, fumes, and flame travel up the slope. Once these fire byproducts intersect the wall, they are deflected upward or, in the case where lighter fuels are encountered, they are quickly consumed, heat and flame are absorbed or deflected by the wall, and the fuels closest to the wall burn out within a short (30 seconds to 2 minutes) time frame (Quarles and Beall 2002).

Walls like these have proven to deflect heat and airborne embers on numerous wildfires in San Diego, Orange, Los Angeles, Ventura, and Santa Barbara County. Rancho Santa Fe Fire Protection District, Laguna Beach Fire Department, Orange County Fire Authority, and others utilize these walls as alternative methods based on observed

performance during wildfires. This has led to these agencies approving use of non-combustible heat deflecting walls as mitigations for reduced fuel modification zones. These walls are consistent with NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire – 2008 Edition, Section 5.1.3.3 and A.5.1.3.3 and International Urban Wildland Interface Code (ICC 2012). NFPA 1144, A.5.1.3.3 states: “Noncombustible walls and barriers are effective for deflecting radiant heat and windblown embers from structures.” These walls and barriers are usually constructed of noncombustible materials (concrete block, bricks, stone, stucco) or earth with emergency access openings built around a development where 30 feet (9 meters) of defensible space is not available and the open cells filled.

With the application of a heat deflecting wall between the Project structures and undeveloped land in the northwest, the Project would be further protected from the possibility of structural ignition from wildfire through radiant and convective heat ignition.



SOURCE: C&V Consulting, 2026; SANGIS 2026; Open Street Map; ESRI World Imagery

3 Fire Behavior Modeling

Following field data collection efforts and available data analysis, fire behavior modeling was conducted to document the type and intensity of fire that would be expected on and adjacent to the Project Site given characteristic site features such as topography, vegetation, and weather. BehavePlus software package version 6.0 (Andres, Bevins, and Seli 2008), which is the industry standard, was utilized to analyze potential fire behavior within the moderate-load shrubs on the hillside south of the project site with assumptions made for existing conditions and post development slope and fuels conditions. Results are provided below.

3.1 Fire Behavior Modeling Analysis

An analysis utilizing the BehavePlus software package was conducted to evaluate fire behavior variables and to objectively predict flame lengths (feet), fireline intensities (BTU/feet/second), rate of spread (feet/minute), and spotting distance (miles) for two modeling scenarios. Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent the site. These fire scenarios incorporated observed fuel types representing the dominant on-site and off-site vegetation to the northwest, in addition to measured slope gradients, and wind and fuel moisture values derived from Remote Automated Weather Stations (RAWS) weather data sets for both the 50th percentile weather (summer, on-shore winds) and the 97th percentile weather (fall, off-shore winds). Weather and wind data for this Project were derived from the Bud Hill RAWS Station (Station 045745). Weather and wind inputs for fire behavior modeling conducted in support of this FPP utilized the guidelines and standards presented by the County of San Diego, Department of Planning and Land Use (County of San Diego 2022a). These guidelines identify acceptable fire weather inputs for fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed 44 years of fire weather data from fire stations and Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County’s analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

As identified in the County’s guidelines, Dudek utilized the Fine Dead Fuel Moisture (FDFM) tool within BehavePlus fire behavior modeling software package to determine fuel moisture. The temperature, relative humidity, and wind speed data for the Transitional weather zone were utilized based on the Project’s location. Reference fuel moistures were calculated in the FDFM tool and were based on site-specific topographic data inputs. Table 3 summarizes the FDFM inputs and the resulting fine dead fuel moisture values. Table 4 presents the fuel moisture and wind speed inputs for the fire behavior modeling efforts conducted for this analysis.

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Dry Bulb Temperature	90–109 deg. F	90–109 deg. F
Relative Humidity	10–14 %	0–4 %
Reference Fuel Moisture	2 %	1 %
Month	May June July	May June July
Time of Day	12:00–13:59	12:00–13:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Slope	0–30%	0–30%
Aspect	South/East	South/East
Fuel Shading	Exposed (< 50% shading)	Exposed (< 50% shading)
Fuel Moisture Correction	0%	0%
Fine Dead Fuel Moisture	2%	1%

Table 4. Fuel Moisture and Wind Speed Inputs

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Fuel Models	GR1	GR1
1 h fuel moisture	2%	1%
10 h fuel moisture	4%	2%
100 h fuel moisture	7%	5%
Live herbaceous moisture	40%	33%
Live woody moisture	80%	66%
20 ft. wind speed	19 mph (sustained winds) ¹	28 mph (sustained winds) wind gusts of 41 mph ¹
Wind Directions from north (degrees)	290	62
Wind adjustment factor	0.3	0.3

Note: ¹Wind speeds were derived from the San Diego County Guidelines for the Transitional Zone, Table 1: Behave Plus 5.0.1; Average-Worst case sustained winds (10 min. average and peak) Fuel Model 1 (knee high grass) at 50% slope.

Vegetation types, which were derived from the field assessment for the Project site, were classified into a fuel model. Fuel Models are simply tools to help fire experts realistically estimate fire behavior for a vegetation type. Fuel models are selected by their vegetation type; fuel stratum most likely to carry the fire; and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that surround the proposed development sites. 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). Fuel models were also assigned to the perimeter fuel management areas to illustrate post-project fire behavior changes. Based on the anticipated existing conditions and post development vegetation conditions, two different fuel models were used in the fire behavior modeling effort presented herein. Fuel model attributes are summarized in Table 5.

Table 5. Fuel Model Characteristics

Fuel Model	Description	Location	Fuel Bed Depth (Feet)
Pre-Project Conditions			
GR1	Short, sparse dry climate grass	Represents the annual grasslands on and off- site	0.4 ft
Post-Project Conditions			
FM8	Compact Litter	On-site Zone 1 and 2 fuel modification	0.2 ft.

Table 5. Fuel Model Characteristics

Fuel Model	Description	Location	Fuel Bed Depth (Feet)
GR1	Short, sparse dry climate grass	Off-site grassland adjacent to Project site	0.4 ft
NB	Non-burnable	Paved areas throughout the proposed Project site.	0 ft

A total of two fire scenarios were modeled for the development area. These scenarios were selected based on likely weather conditions and the possibility of a fire approaching from the indicated directions.

Fire Scenario Locations and Descriptions:

Existing Conditions

- **Scenario 1:** A fire burning across the Project site from the northeast corner to the southwest corner from a potential roadside ignition from 9th Street. The fire is burning during extreme Santa Ana wind conditions, being fueled by the annual grasslands onsite.
- **Scenario 2:** A fire burning across the adjacent undeveloped parcel to the northwest of the Project, during average summer wind conditions. This scenario could have been ignited by a roadside ignition from San Vincente Road, and is being fueled by the annual grasslands off the Project site.

Post Development

- **Scenario 1:** A fire burning across the Project site from the northeast corner to the southwest corner from a potential roadside ignition from 9th Street. The fire is burning during extreme Santa Ana wind conditions, burning through irrigated, maintained vegetation in the on-site fuel modification zones.
- **Scenario 2:** A fire burning across the adjacent undeveloped parcel to the northwest of the Project, during average summer wind conditions. This scenario could have been ignited by a roadside ignition from San Vincente Road, and is being fueled by the annual grasslands off the Project site.

3.2 Fire Modeling Summary

The results presented in Tables 6 and 7 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, but the models provide a worst-case wildfire behavior condition as part of a conservative approach. 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 would be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns. Identification of modeling run (fire scenarios) locations are presented graphically in Figure 6, BehavePlus Fire Behavior Analysis exhibit, and the modeling is described further in Appendix D, Fire Behavior Modeling Analysis.

Scenario 1

Under the extreme Santa Ana wind conditions modeled in the Existing Conditions scenario 1, a fire burning through the grasslands on the Project site would move at a low rate of spread of 0.7 mph during sustained and gusting winds, produce low to moderate flame lengths of 4.0 feet during sustained and gusting winds, and could produce embers that could travel up to 0.4 miles during gusting winds.

If the same vegetation fire scenario were to ignite during post development conditions, the fire would burn through the irrigated, maintained vegetation at a lower rate of spread, 0.1 mph during sustained and gusting winds, produce low flame lengths of 2.3 feet during sustained winds, and 2.9 feet during gusting winds, and could produce embers that could travel up to 0.3 miles during gusting winds.

Scenario 2

Under the average summer wind conditions modeled in the existing conditions Scenario 2, a fire burning through the grasslands in the adjacent undeveloped parcel to the northwest of the Project site would burn at a low rate of spread of 0.4 mph during sustained winds, produce low flame lengths of 3.1 feet during sustained winds, and could produce embers that could travel up to 0.2 miles during sustained winds.

Given that the vegetation in the off-site area modeled in Scenario 2 would not be modified during the post development conditions, a fire occurring in this area after the Project is developed would produce the same outputs as the existing conditions scenario.

Post development conditions in the on-site Project areas would result in a reduction of up to 1 foot in flame lengths and up to 0.6 mph in spread rates. As a result of the proposed fuel modification, the fire hazard presented by the site would be reduced compared to its current state. This means reduced fire risk for nearby residents. Flame lengths in off-site fuels modeled in Scenario 2 will produce the same outputs in existing and post development conditions, producing maximum flame lengths of approximately 3 feet during summer weather events. The proposed Fuels on the undeveloped parcel to the northwest of the Project site could pose a threat of fire ignition risk due to ember spread, but during post development conditions, the majority of wildfire risk would be reduced as vegetation is converted to paved and ignition resistant landscapes, and vegetation is regularly irrigated and maintained.

The following describes the fire behavior variables (Heisch and Andrews 2010) as presented in Tables 6 and 7:

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 litter, grass, brush and other dead and live vegetation within about 6 feet of the ground.

The information in Table 8 presents an interpretation of the outputs for fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Tables 6 and 7. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 6, Fire Behavior Analysis.

Table 6. RAWS BehavePlus Fire Behavior Model Results - Existing Conditions

Fire Scenarios	Flame Length ¹ (feet)	Fireline Intensity ¹ (BTU/feet/second)	Spread Rate ¹ (mph)	Spotting Distance ¹ (miles)
Scenario 1: 6% Slope; Extreme Santa Ana wind conditions (97th percentile offshore), sustained 28 mph (41 mph gusts), on-site				
Short, sparse dry climate grass (GR1) (On-site)	4.0 (4.0)	113 (113)	0.7 (0.7)	0.3 (0.4)
Scenario 2: 0% Slope; Average Summer Wind Conditions (50th Percentile Onshore), sustained 19 mph winds, off-site				
Short, sparse dry climate grass (GR1) (Off-site)	3.1	66	0.4	0.2

Notes:

¹ Wind-driven surface fire.

² Values in parentheses represent the respective output in the presence of 41 mph gusts.

Table 7. RAWS BehavePlus Fire Behavior Model Results - Post-Development Conditions

Fire Scenarios	Flame Length ¹ (feet)	Fireline Intensity ¹ (BTU/feet/second)	Spread Rate ¹ (mph)	Spotting Distance ¹ (miles)
Scenario 1: 6% Slope; Extreme Santa Ana wind conditions (97th percentile offshore), sustained 28 mph (41 mph gusts), on-site				
FMZ Zone 1 and 2 (FM8) (On-site)	2.3 (2.9)	33 (57)	0.1 (0.1)	0.2 (0.3)
Paved Areas (NB) (On-site)	N/A	N/A	N/A	N/A
Scenario 2: 0% Slope; Average Summer Wind Conditions (50th Percentile Onshore), sustained 19 mph winds, off-site				
Short, sparse dry climate grass (GR1) (Off-site)	3.1	66	0.4	0.2

Note:

¹ Wind-driven surface fire.

² Values in parentheses represent the respective output in the presence of 41 mph gusts.

Table 8. Fire Suppression Interpretation

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

3.3 On-site Wildland Fire Risk Assessment

Given the climatic, vegetative, topographic characteristics, and local fire history of the area, the Project site, once developed, may be subject to the occasional instance of wildfires in the Project vicinity. Potential for wildfire encroaching onto the Project is unlikely due to the lack of wildland interface, however showering embers on the site is possible, but the risk of ignition from such encroachments or ember showers is also considered low based on the type of construction, fuel modification zones, and fire protection features that will be provided for the structures.

Therefore, it will be critical that the latest fire protection technologies, developed through intensive research and real-world wildfire observations and findings by fire professionals, for both ignition resistant construction and for creating defensible space in the ever-expanding WUI areas, are implemented and enforced. The 915 9th Street Residential Project, once developed, would provide each structure with defensible space that would reduce projected flame lengths to levels that would be manageable by firefighting resources for protecting the site's structures, especially given the exterior hardening of the structures and the planned ongoing maintenance of the entire sites' landscapes.

Wildland fires are a common natural hazard in most of southern California with a long and extensive history. Southern California landscapes include a diverse range of plant communities, including vast tracts of shrublands, like those found 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 chaparral to grasslands, become highly flammable each fall; 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; and 3) homes embedded in natural and managed landscape vegetation in what may be accurately described as a wildland urban intermix. Based on this research, it can be anticipated that periodic vegetation fires or wildfires will occur in the designated open space areas adjacent to portions of the property site.

Date: 12/9/2025 User: mred Path: Z:\Projects\1978101\MAPDOC\Ramona 10th Street FPD\ans Map [empty] Layout: Figure 6 Fire Behavior Analysis Map

Fuel Moisture and Wind Speed Inputs

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Fuel Models	GR1	GR1
1 h fuel moisture	2%	1%
10 h fuel moisture	4%	2%
100 h fuel moisture	7%	5%
Live herbaceous moisture	40%	33%
Live woody moisture	80%	66%
20 ft. wind speed	19 mph (sustained winds) ¹	28 mph (sustained winds) wind gusts of 41 mph ¹
Wind Directions from north (degrees)	290	62
Wind adjustment factor	0.3	0.3

RAWS BehavePlus Fire Behavior Model Results - Existing Conditions

Fire Scenarios	Flame Length ¹ (feet)	Fireline Intensity ¹ (BTU/feet/second)	Spread Rate ¹ (mph)	Spotting Distance ¹ (miles)
Scenario 1: 6% Slope; Extreme Santa Ana wind conditions (97th percentile offshore), sustained 28 mph (41 mph gusts), on-site				
Short, sparse dry climate grass (GR1) (On-site)	4.0 (4.0)	113 (113)	0.7 (0.7)	0.3 (0.4)
Scenario 2: 0% Slope; Average Summer Wind Conditions (50th Percentile Onshore), sustained 19 mph winds, off-site				
Short, sparse dry climate grass (GR1) (Off-site)	3.1	66	0.4	0.2

RAWS BehavePlus Fire Behavior Model Results - Post-Development Conditions

Fire Scenarios	Flame Length ¹ (feet)	Fireline Intensity ¹ (BTU/feet/second)	Spread Rate ¹ (mph)	Spotting Distance ¹ (miles)
Scenario 1: 6% Slope; Extreme Santa Ana wind conditions (97th percentile offshore), sustained 28 mph (41 mph gusts), on-site				
FMZ Zone 1 and 2 (FM8) (On-site)	2.3 (2.9)	33 (57)	0.1 (0.1)	0.2 (0.3)
Paved Areas (NB) (On-site)	N/A	N/A	N/A	N/A
Scenario 2: 0% Slope; Average Summer Wind Conditions (50th Percentile Onshore), sustained 19 mph winds, off-site				
Short, sparse dry climate grass (GR1) (Off-site)	3.1	66	0.4	0.2

Note:

- ¹ Wind-driven surface fire.
² Values in parentheses represent the respective output in the presence of 41 mph gusts.



4 Emergency Pre-Planning – Evacuation

Evacuation is defined by the State of California as the organized, phased and supervised withdrawal, dispersal, or removal of civilians from dangerous or potentially dangerous areas and their reception and care in safe areas (Cal OES, 2017). The County of San Diego has guidelines on safe and efficient evacuations and repopulation procedures, as well as emergency operations information in their emergency plans.

Evacuation Procedures

Several strategies, including phased evacuation and the implementation of contra-flow lanes, are identified in the County OA EOP Evacuation Annex to assist with efficient evacuations and reduce evacuation time. Phased evacuations are often used during an emergency event to reduce congestion and transportation demand on designated evacuation routes by controlling access to evacuation routes in stages and sections. This strategy can also be used to prioritize the evacuation of certain communities that are in proximity to the immediate danger. A phased evacuation effort will need to be enforced by law enforcement agencies and coordinated with the OA Emergency Operations Center and affected jurisdictions (County of San Diego 2022c).

Often in an evacuation, emergency managers will conduct phased evacuations by issuing an evacuation warning or order for an entire predetermined evacuation zone. The Project is in evacuation zone SDC – 1161. A complete map of all evacuation zones in the County can be accessed at:

<https://protect.genasys.com/location?z=14&latlon=33.035787049756024%2C-116.86329456899364>.

The County of San Diego utilizes the Genasys Evacuation system to provide precise evacuation information. Targeting the area in immediate danger allows for better evacuation operations, reduces gridlock, and reserves sufficient travel way for emergency vehicles. Under this approach, first responders or law enforcement personnel will direct traffic at all major intersections during the evacuation process.

Project Application

Early evacuation for any type of wildfire emergency at the Project site is the preferred method of providing for resident safety, consistent with the current approach for San Diego County. As such, the Project would formally adopt, practice, and implement a “Get Ready to Pack, Get Set to Leave, 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 the Project site’s fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and Project area activities during periods of fire weather extremes.

Occupants of the 915 9th Street Project can receive emergency notifications through Alert San Diego, the SD Emergency App, the Genasys Protect App, and local radio station and social media platforms.

- **Alert San Diego:** <http://www.readysandiego.org/AlertSanDiego/>
- **SD Emergency App:** <https://www.alertsandiego.org/en-us/preparedness/SDEmergencyApp.html>
- **Genasys Protect App:** <https://genasys.com/genasys-protect-app/>

5 Conclusion

Based on the developed landscapes throughout the area and lack of wildland interface, provisions for code compliant internal circulation roadways and cul-de-sacs, along with the an under 5-minute total response time from SDCFPD Station 80 (closest responding fire station), a code-compliant 30-foot wide 9th Street primary access roadway, and lack of wildfire exposed roadways during an evacuation event, the Project is considered to meet the intent of the code.

This FPP for the 915 9th Street Residential Project documents how the Project conforms with required codes. It also provides guidance for vegetation maintenance for the proposed FMZs and landscaped areas on the Project site. 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. The Project design features, all weather roads and parking stalls, irrigated landscaping, and defensible space up to 100 feet from structures provides a reasonable level of safety for the Project. Additionally, the implementation of the heat deflecting CMU block wall along the eastern edge of the Project site acts as a code equivalent mitigation measure to enhance Project safety in areas with reduced on-site fuel modification zones.

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 at the Project site 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 assets or threaten its occupants or 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 the Project site's vulnerability to wildfire. It will also help accomplish the goal of this FPP to assist firefighters in their efforts to defend structures.

It is recommended that the 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. Fire is a dynamic and somewhat unpredictable occurrence; it is important for anyone living at the wildland-urban interface to educate themselves on practices that will improve safety.

Based on the results of this FPP's analysis and findings, the Project will provide the following fire prevention and protection, hazard mitigation, and risk reduction mitigation measures to the satisfaction of the SDCFPD prior to and as a condition of issuance of a building permit and certificate of occupancy:

- Defensible space and vegetative fuel modification for each structure.
- Heat deflecting CMU block wall in lieu of 100-feet of on-site defensible space on the eastern portion of the Project site.
- Fire apparatus access roads consisting of both public and private streets will be provided for the entire Project and will provide at least the minimum required unobstructed travel lanes, lengths, turnouts,

turnarounds, and width. Primary access and internal circulation will comply with the requirements of SDCFPD.

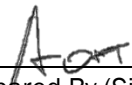
- A gate providing secondary access to the Project site via 10th Street that complies with all of the SDCFPD requirements, allowing for unhindered emergency vehicle access to the site.
- Water capacity and delivery will be provided by a reliable water source for operations and during emergencies requiring extended fire flow.
- All structures within the Project site will include the installation of an automatic, residential interior fire sprinkler system in accordance with NFPA 13-D standards.

Ongoing maintenance of all fuel modification managed by each individual property owner, the Project’s Property Manager(s), or another approved entity, is required at least annually or as needed throughout the year. Property owners will be provided informational brochures at time of occupancy, which will include an outreach and educational role to ensure fire safety measures detailed in this FPP have been implemented and development-wide “Ready, Set, Go!” plans have been prepared.

With the implementation of the code required proposed fire protection measures, compliance with applicable fire codes and standards and implementation of the proposed mitigation measure, the 915 9th Street Residential Project will result in a less than significant impact regarding fire safety.

Please feel free to contact me regarding this FPP and its conclusions.

Respectfully,



Prepared By (Signature)

June 11, 2026

Date

Austin Ott, Fire Protection Planner,
Urban Forestry + Fire Protection

Printed Name, Title

Project Applicant (Signature)

Date

Printed Name, Title

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Appendix A

Representative Photographs



Photo Location Map



Photo 1. Photo location 1, looking north



Photo 2. Photo location 1, looking northeast



Photo 3. Photo location 1, looking east



Photo 4. Photo location 1, looking southeast



Photo 5. Photo location 1, looking south



Photo 6. Photo location 1, looking southwest



Photo 7. Photo location 1, looking west



Photo 8. Photo location 1, looking northwest



Photo 9. Photo location 2, looking north



Photo 10. Photo location 2, looking northeast



Photo 11. Photo location 2, looking east



Photo 12. Photo location 2, looking southeast



Photo 13. Photo location 2, looking south



Photo 14. Photo location 2, looking southwest



Photo 15. Photo location 2, looking west



Photo 16. Photo location 2, looking northwest



Photo 17. Photo location 3, looking north



Photo 18. Photo location 3, looking northeast



Photo 19. Photo location 3, looking east



Photo 20. Photo location 3, looking southeast



Photo 21. Photo location 3, looking south



Photo 22. Photo location 3, looking southwest



Photo 23. Photo location 3, looking west



Photo 24. Photo location 3, looking northwest



Photo 25. Photo location 4, looking north



Photo 26. Photo location 4, looking northeast



Photo 27. Photo location 4, looking east



Photo 28. Photo location 4, looking southeast



Photo 29. Photo location 4, looking south



Photo 30. Photo location 4, looking southwest



Photo 31. Photo location 4, looking west



Photo 32. Photo location 4, looking northwest



Photo 33. Photo location 5, looking north



Photo 34. Photo location 5, looking northeast



Photo 35. Photo location 5, looking east



Photo 36. Photo location 5, looking southeast



Photo 36. Photo location 5, looking south



Photo 37. Photo location 5, looking southwest



Photo 38. Photo location 5, looking west



Photo 39. Photo location 5, looking northwest. Fire Station 80 pictured.

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Appendix B

Fire History Map

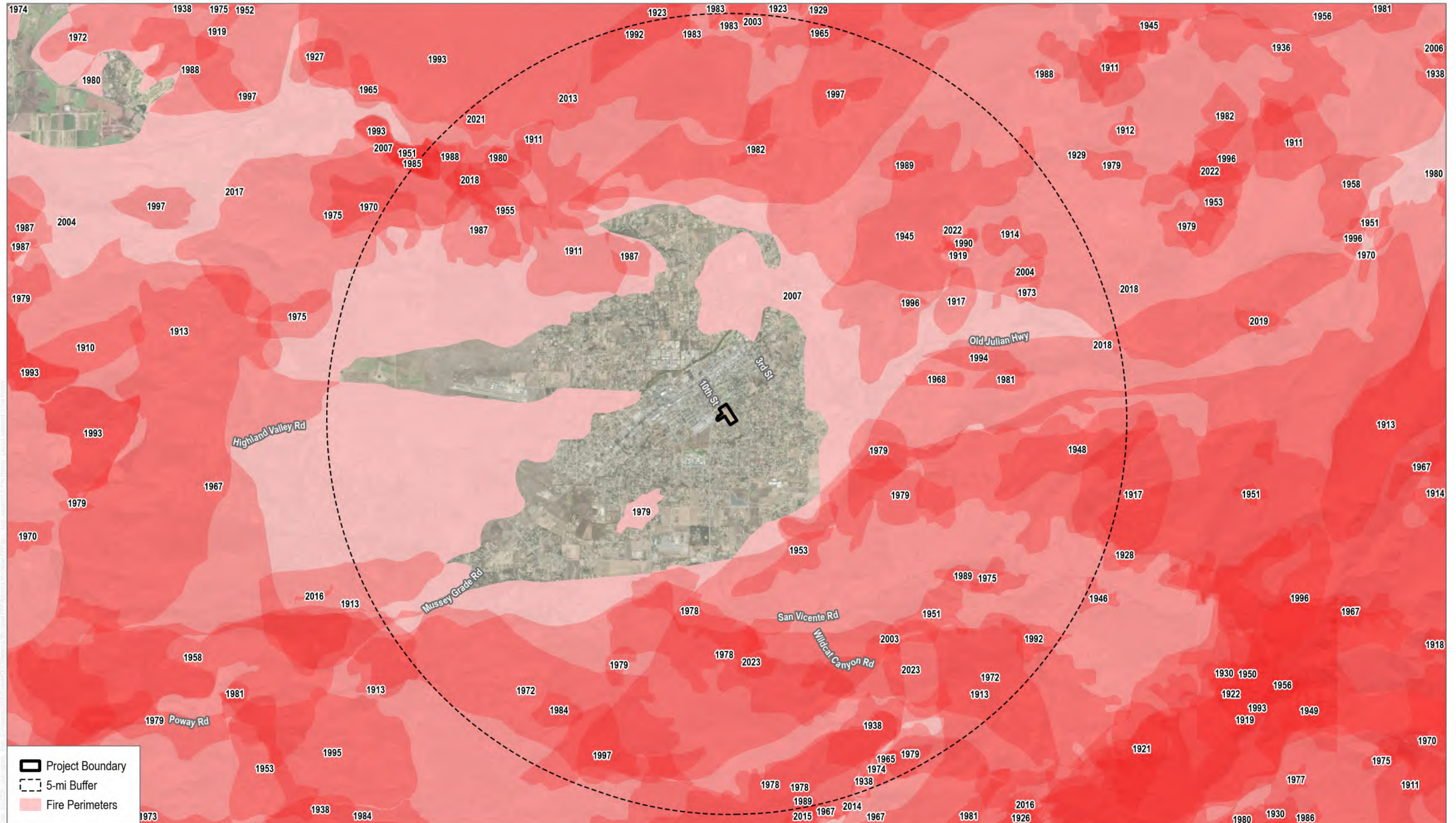


FIGURE 6

Fire History

10th Street Ramona Project

Appendix C

Suggested and Undesirable Plant List



County of San Diego, Department of Planning and Land Use
FIRE, PLANTS, DEFENSIBLE SPACE AND YOU
BUILDING DIVISION

Providing enough fire protection for rural areas of San Diego County has become difficult. This is due to the large number of residents who are moving to the rural areas of the County and the increasing amounts of brush, weeds and other vegetation that provide fuel for wildfires and cause them to burn hotter. While it's important to protect the wild native vegetation in the County's rural areas it's also important to take steps for adequate fire protection for structures. Legally clearing vegetation protects the other wild native plants and at the same time eliminates the fire hazards.

During the October 2003 Firestorms, it was painfully evident that there was insufficient "Defensible Space" on many properties which led to destroyed homes and other structures. As a result, San Diego County has amended an ordinance to require residents to keep their property free of fire hazards that include certain vegetation, green waste and rubbish. Residents can comply with these ordinances by creating a "Defensible Space" and taking other preventative steps on their property.

WHAT IS DEFENSIBLE SPACE?

This is the area around a structure where combustible vegetation, that can cause fire, has been cleared, reduced or replaced. This space acts as a barrier between an advancing fire and a structure.

HOW DO I CLEAR LEGALLY?

Combustible vegetation can only be removed by mowing, cutting and grazing as long as the root structure is left intact. Any trees you remove shall have the stumps cut no higher than 8" above the ground. The only exception would be an orchard. Orchard trees may have their stumps completely removed.

CAN I CLEAR INTO AN OPEN SPACE EASEMENT?

Depending upon fuel loads and topography, the Local Fire District may require clearing within an open space easement. This clearing does not require a permit so long as you obtain a letter from the Local Fire District specifying the amount of additional clearing required and comply with any clearing provisions stated in the recorded open space easement document or recorded subdivision map. .

WHAT IS COMBUSTIBLE VEGETATION?

This is any material that in its natural state will readily ignite, burn and cause fire to move to any structure or other vegetation. This would include dry grass, brush, weeds, litter and waste. This would not include fire resistant landscaping some of which can be found in the "Suggested Plant List For Defensible Space" on page 4 of this handout.

HOW LARGE SHOULD THE DEFENSIBLE SPACE BE?

- You need to clear combustible vegetation in a 100' radius from any structure. Only the fire agency may authorize you to clear more. You are not required to

cross your property line in order to clear the 100'. The neighboring property owner may be required to clear the additional distance by the fire agency.

HOW DO I MAINTAIN THE DEFENSIBLE SPACE?

- You may plant fire-resistant, irrigated, landscaping in the first 50' of the 100' from your structure. These plants need to be maintained all year around.
- You need to keep natural vegetation in the remaining 50' of the 100' space. This would be the area furthest away from your structure. The plants need to be thinned and cut back to no more than 6" above the ground. You may need to do this several times a year since the plants grow back.
- Do not completely remove all vegetation which would leave the ground bare. Some vegetation is necessary to prevent erosion.
- Remove dead and dying vegetation.
- Trim trees that overhang or touch your structures.

WHAT TYPES OF FIRE-RESISTANT PLANTS SHOULD I CHOOSE FOR MY DEFENSIBLE SPACE?

You will find a list of suggested plants for Defensible Space on page 4 of this handout. Generally these plants:

- Grow close to the ground.
- Have a low sap or resin content
- Grow without accumulating dead branches, needles or leaves.
- Are easily maintained and pruned
- Are drought-tolerant

WHAT TYPES OF PLANTS SHOULD I NOT PLANT OR KEEP ON MY PROPERTY?

On page 16 of this handout you will find an extensive list of plants that you should avoid. These plants and trees burn easily since they have large amounts of oil, sap, rough bark and other material that is flammable.

WHAT OTHER THINGS SHOULD I DO TO PROTECT MY PROPERTY AGAINST FIRE?

- You should clear combustible vegetation on your property if it is within 30' of your property line.
- Vary the height of plants and adequately space them. Taller plants need to be spaced wider apart.
- Existing trees and large shrubs should be pruned by cutting off any branches up to 6' above the ground to prevent ground fires from spreading upwards into trees.
- For fire truck access, remove vegetation within 10' of each side of your driveway.
- Remove any tree limbs within 10' of your chimney
- Work with your neighbors to clear common areas between houses, and prune areas of heavy vegetation that are a fire threat to both properties.
- Avoid planting trees under or near electrical lines. They may grow into, or make contact with overhead lines under windy conditions, causing fire.

- If you have a heavily wooded area on your property, remove some of the trees to which will lower the fire hazard. You will improve growing conditions for your trees if you remove dead, weak, or diseased trees. This will leave you with a healthy mixture of both new and older trees.
- Any removed trees may be chipped and left on your property if they don't present a fire hazard. Contact your local fire agency to find out how to do this.
- Don't forget to legally dispose of all your cut vegetation. You may contact your local landfill to inquire about green waste recycling. Open burning may not be allowed. Contact your fire agency for more information.
- Stack firewood and scrap wood piles at least 50' from any structure and clear away any combustible vegetation within 10' of the piles. Many homes have "survived" as a fire moved past it, only to burn later from a wood pile that caught fire after the firefighters had moved on to protect other homes.
- Check and clean your roofs and gutters on all structures several times during the spring, summer and fall to remove debris that can easily ignite from a spark.

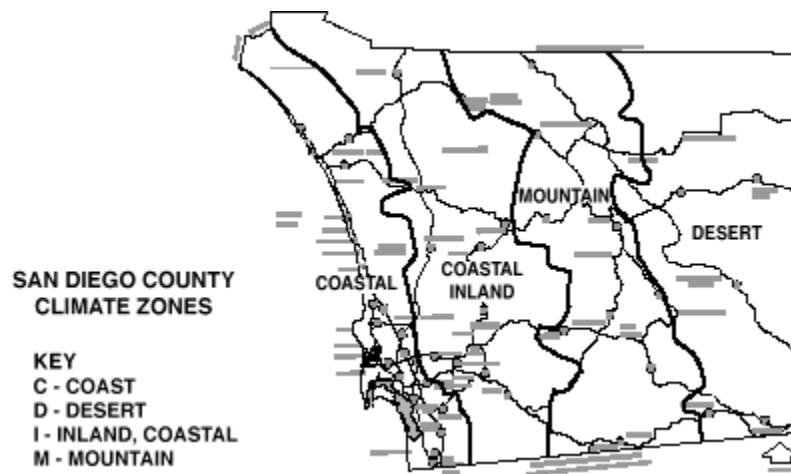
ACCEPTABLE PLANTS FOR A DEFENSIBLE SPACE IN FIRE PRONE AREAS

All plants on the following list are considered drought-tolerant in the climate zone indicated. Remember, however, that no plant is totally fire resistant. Drought-tolerant plants are trees, shrubs, groundcovers, and other vegetation that can grow and reproduce with only natural moisture such as rainfall. Occasional irrigation is necessary only in extreme drought situations.

Plants that are indicated by the "R" are the least drought-tolerant plants on the list. These plants grow best in riparian areas. Riparian areas can be described as areas where the water table is very near the surface of the ground. Although the ground may be dry, the plants growing there will be green and lush all year around.

When first planting drought-tolerant plants, you need to water deeply to encourage the roots to find natural moisture in the soil. This type of watering needs to continue for at least three years. More water should be provided in summer and less (if any) in the winter. After three years, you should be watering the plants less and depending more on the natural rainfall to provide moisture.

Plants on the list which are noted with ** are San Diego County native or naturalizing plant species. These are types of plants native to or brought into the San Diego County area. These plants are able to grow and reproduce in the local climate and the natural rainfall is enough moisture.



SUGGESTED PLANT LIST FOR A DEFENSIBLE SPACE

<u>BOTANICAL NAME</u>	<u>COMMON NAME</u>	<u>Climate Zone</u>
TREES		
Acer		
platanoides	Norway Maple	M
rubrum	Red Maple	M
saccharinum	Silver Maple	M
saccarum	Sugar Maple	M
macrophyllum	Big Leaf Maple	C/ (R)
Alnus rhombifolia	White Alder	C/I/M (R)
Arbutus		
unedo	Strawberry Tree	All zones
Archontophoenix		
cunninghamiana	King Palm	C
** Arctostaphylos spp.	Manzanita	C/I/D
Brahea		
armata	Blue Hesper Palm	C/D

<i>edulis</i>	Guadalupe Palm	C/D
<i>Ceratonia siliqua</i>	Carob	C/I/D
<i>Cercidium floridum</i>	Blue Palo Verde	D
** <i>Cercis occidentalis</i>	Western Redbud	C/I/M
<i>Cornus</i>		
<i>nuttallii</i>	Mountain Dogwood	I/M
<i>stolonifera</i>	Redtwig Dogwood	I/M
<i>Elaeagnus</i>		
<i>angustifolia</i>	Russian Olive	I/M
<i>Eriobotrya</i>		
<i>japonica</i>	Loquat	C/I/D
<i>Erythrina caffra</i>	Kaffirboom Coral Tree	C
<i>Ginkgo biloba</i> "Fairmount"	Fairmount Maidenhair Tree	I/M
<i>Gleditsia triacanthos</i>	Honey Locust	I/D/M
<i>Juglans</i>		
<i>californica</i>	California Walnut	I
<i>hindsii</i>	California Black Walnut	C/I
<i>Lagerstroemia indica</i>	Crape Myrtle	I/D/M
<i>Ligustrum lucidum</i>	Glossy Privet	I
<i>Liquidambar styraciflua</i>	Sweet Gum	C/I/M
<i>Liriodendron tulipifera</i>	Tulip Tree	I
<i>Lyonothamnus floribundus</i>		
<i>ssp. asplenifolius</i>	Fernleaf Catalina Ironwood	C
<i>Melaleuca</i> spp.	Melaleuca	C/I/D

Myoporum spp.	Myoporum	C/I
Nerium oleander	Oleander	C/I/D
Parkinsonia aculeata	Mexican Palo Verde	D
Pistacia		
chinensis	Chinese Pistache	C/I/D
vera	Pistachio Nut	I
Pittosporum		
phillyraeoides	Willow Pittosporum	C/I/D
viridiflorum	Cape Pittosporum	C/I
Platanus		
acerifolia	London Plane Tree	All zones
** racemosa	California Sycamore	C/I/M
Populus		
alba	White Poplar	D/M
** fremontii	Western Cottonwood	I
trichocarpa	Black Cottonwood	I/M
Prunus		
xblireiana	Flowering Plum	M
caroliniana	Carolina Laurel Cherry	C
cersifera 'Newport'	Newport Purple-Leaf Plum	M
** ilicifolia	Hollyleaf Cherry	C
** lyonii	Catalina Cherry	C
serrulata 'Kwanzan'	Flowering Cherry	M
yedoensis 'Akebono'	Akebono Flowering Cherry	M

Quercus		
** agrifolia	Coast Live Oak	C/I
** engelmannii	Engelmann Oak	I
suber	Cork Oak	C/I/D
Rhus		
** lancea	African Sumac	C/I/D
** Salix spp.	Willow	All zones (R)
Tristania conferta	Brisbane Box	C/I
Ulmus		
parvifolia	Chinese Elm	I/D
pumila	Siberian Elm	C/M
** Umbellularia californica	California Bay Laurel	C/I
SHRUBS		
Agave	Century Plant	D
americana	Desert Century Plant	D
deserti	Shaw's Century Plant	D
** shawii		
** Amorpha fruticosa	False Indigobush	I
Arbutus		
** menziesii	Madrone	C/I
** Arctostaphylos spp.	Manzanita	C/I/D
** Atriplex		
canescens	Hoary Saltbush	I
lentiformis	Quail Saltbush	D

** Baccharis		
glutinosa	Mule Fat	C/I
pilularis	Coyote Bush	C/I/D
Carissa grandiflora	Natal Plum	C/I
** Ceanothus spp.	California Lilac	C/I/M
Cistus spp.	Rockrose	C/I/D
** Cneoridium dumosum	Bushrue	C
** Comarostaphylis		
diversifolia	Summer Holly	C
Convolvulus cneorum	Bush Morning Glory	C/I/M
Dalea		
orcuttii	Orcutt's Delea	D
** spinosa	Smoke Tree	I/D
Elaeagnus		
pungens	Silverberry	C/I/M
** Encelia		
californica	Coast Sunflower	C/I
farinosa	White Brittlebush	D/I
Eriobotrya		
deflexa	Bronze Loquat	C/I
Eriophyllum		
** confertiflorum	Golden Yarrow	C/I
staechadifolium	Lizard Tail	C
Escallonia spp.	Escallonia	C/I

Feijoa sellowiana	Pineapple Guava	C/I/D
Fouquieria splendens	Ocotillo	D
** Fremontodendron		
californicum	Flannelbush	I/M
mexicanum	Southern Flannelbush	I
Galvezia		
juncea	Baja Bush-Snapdragon	C
speciosa	Island Bush-Snapdragon	C
Garrya		
elliptica	Coast Silktassel	C/I
** flavescens	Ashy Silktassel	I/M
** Heteromeles arbutifolia	Toyon	C/I/M
Lantana spp.	Lantana	C/I/D
Lotus scoparius	Deerweed	C/I
Mahonia spp.	Barberry	C/I/M
Malacothamnus		
clementinus	San Clemente Island Bush Mallow	C
** fasciculatus	Mesa Bushmallow	C/I
Melaleuca spp.	Melaleuca	C/I/D
** Mimulus spp.	Monkeyflower	C/I (R)
Nolina		
parryi	Parry's Nolina	I
parryi ssp. wolfii	Wolf's Bear Grass	D
Photinia spp.	Photinia	All zones

Pittosporum		
crassifolium		C/I
rhombifolium	Queensland Pittosporum	C/I
tobira 'Wheeleri'	Wheeler's Dwarf	C/I/D
undulatum	Victorian Box	C/I
viridiflorum	Cape Pittosporum	C/I
Plumbago auriculata	Cape Plumbago	C/I/D
Prunus		
caroliniana	Carolina Laurel Cherry	C
** ilicifolia	Hollyleaf Cherry	C
** yonii	Catalina Cherry	C
Puncia granatum	Pomegranate	C/I/D
Pyracantha spp.	Firethorn	All zones
Quercus		
** dumosa	Scrub Oak	C/I
Rhamus		
alaternus	Italian Blackthorn	C/I
** californica	Coffeeberry	C/I/M
Rhaphiolepis spp.	Rhaphiolepis	C/I/D
Rhus		
continus	Smoke Tree	M
** integrifolia	Lemonade Berry	C/I
laurina	Laurel Sumac	C/I
lentii	Pink-Flowering Sumac	C/D

** ovata	Sugarbush	I/M
** trilobata	Squawbush	I
Ribes		
viburnifolium	Evergreen Currant	C/I
** speciosum	Fuschia-Flowering Gooseberry	C/I/D
Romneya coulteri	Matilija Poppy	I
Rosa		
** californica	California Wild Rose	C/I
minutifolia	Baja California Wild Rose	C/I
** Salvia spp.	Sage	All zones
** Sambucus spp.	Elderberry	C/I/M
** Symphoricarpos mollis	Creeping Snowberry	C/I
Syringa vulgaris	Lilac	M
Tecomaria capensis	Cape Honeysuckle	C/I/D
Teucrium fruticans	Bush Germander	C/I
** Toxicodendron		
diversilobum	Poison Oak	I/M
Verbena		
lilacina	Lilac Verbena	C
Xylosma congestum	Shiny Xylosma	C/I
** Yucca		
schidigera	Mojave Yucca	D
whipplei	Foothill Yucca	I
GROUNDCOVERS		

** Achillea	Yarrow	All zones
Aptenia cordifolia	Aptenia	C
** Arctostaphylos spp.	Manzanita	C/I/D
** Baccharis		
pilularis	Coyote Bush	C/I/D
** Ceanothus spp.	California Lilac	C/I/M
Cerastium tomentosum	Snow-in-Summer	All zones
Coprosma kirkii	Creeping Coprosma	C/I/D
Cotoneaster spp.	Redberry	All zones
Drosanthemum hispidum	Rosea Ice Plant	C/I
Dudleya		
brittonii	Britton's Chalk Dudleya	C
** pulverulenta	Chalk Dudleya	C/I
virens	Island Live-Forever	C
** Eschscholzia californica	California Poppy	All zones
Euonymus fortunei		
'Carrierei'	Glossy Winter Creeper	M
'Coloratus'	Purple-Leaf Winter Creeper	M
** Ferocactus viridescens	Coast Barrel Cactus	C
Gaillardia grandiflora	Blanket Flower	All zones
Gazania spp.	Gazania	C/I
** Helianthemum spp.	Sunrose	All zones
Lantana spp.	Lantana	C/I/D

Lasthenia		
** californica	Common Goldfields	I
glabrata	Coastal Goldfields	C
** Lupinus spp.	Lupine	C/I/M
Myoporum spp.	Myoporum	C/I
Pyracantha spp.	Firethorn	All zones
Rosmarinus officinalis	Rosemary	C/I/D
Santolina		
chamaecyparissus	Lavender Cotton	All zones
virens	Santolina	All zones
Trifolium frageriferum	O'Connor's Legume	C/I
Verbena		
rigida	Verbena	All zones
** Viguiera laciniata	San Diego Sunflower	C/I
Vinca		
major	Periwinkle	C/I
minor	Dwarf Periwinkle	M
VINES		
Antigonon leptopus	San Miguel Coral Vine	C/I
Distictis buccinatoria	Blood-Red Trumpet Vine	C/I/D
** Keckiella cordifolia	Heart-Leaved Penstemon	C/I
Lonicera		
japonica 'Halliana'	Hall's Honeysuckle	All zones
** subspicata	Chaparral Honeysuckle	C/I

Solanum		
jasminoides	Potato Vine	C/I/D
PERENNIALS		
Coreopsis		
gigantea	Giant Coreopsis	C
grandiflora	Coreopsis	All zones
** maritima	Sea Dahlia	C
verticillata	Coreopsis	C/I
Heuchera maxima	Island Coral Bells	C/I
** Iris douglasiana	Douglas Iris	C/M
** Iva hayesiana	Poverty Weed	C/I
Kniphofia uvaria	Red-Hot Poker	C/I/M
Lavandula spp.	Lavender	All zones
Limonium californicum		
var. mexicanum	Coastal Statice	C
perezii	Sea Lavender	C/I
Oenothera spp.	Primrose	C/I/M
** Penstemon spp.	Penstemon	C/I/D
Satureja douglasii	Yerba Buena	C/I
Sisyrinchium		
bellum	Blue-Eyed Grass	C/I
californicum	Golden-Eyed Grass	C
Solanum		
xantii	Purple Nightshade	C/I

** Zauschneria		
	californica	California Fuschia
	cana	Hoary California Fuschia
	'Catalina'	Catalina Fuschia
ANNUALS		
** Lupinus spp.	Lupine	C/I/M

UNDESIRABLE PLANT LIST

The following species are highly flammable and should be avoided when planting within the first 50 feet adjacent to a structure. The plants listed below are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio.

<u>BOTANICAL NAME</u>	<u>COMMON NAME</u>
<u>Abies species</u>	Fir Trees
<u>Acacia species</u> groundcovers)	Acacia (trees, shrubs,
<u>Adenostoma sparsifolium</u> **	Red Shanks
<u>Adenostoma fasciculatum</u> **	Chamise
<u>Agonis juniperina</u>	Juniper Myrtle
<u>Anthemis cotula</u> ***	Mayweed, Stinking Chamolile
<u>Araucaria species</u>	Monkey Puzzle, Norfolk Island Pine
<u>Arctostaphylos species</u> **	Manzanita
<u>Artemesia californica</u> **	California Sagebrush
<u>Arundo donax</u>	Giant Cane
<u>Bambusa species</u>	Bamboo
<u>Brassica species</u> ***	Mustard
<u>Callistemon species</u>	Bottlebrush
<u>Calocedrus decurrens</u>	Incense Cedar
<u>Cardaria draba</u> ***	Hoary Cress, Perennial
Peppergrass	
<u>Ceanothus species</u>	Ceanothus
<u>Cedrus species</u>	Cedar
<u>Chamaecyparis species</u>	False Cypress
<u>Cinnamomum species</u>	Camphor Tree
<u>Cirsium vulgare</u> ***	Wild Artichoke
<u>Conyza Canadensis</u> ***	Horseweed
<u>Coprosma pumila</u>	Prostrate Coprosma
<u>Cortaderia selloana</u>	Pampas Grass
<u>Cotoneaster lacteus</u>	Cotoneaster
<u>Cryptomeria japonica</u>	Japanese Cryptomeria
<u>Cupressocyparis leylandii</u>	Leylandii Cypress
<u>Cupressus forbesii</u>	Tecate Cypress
<u>Cupressus glabra</u>	Arizona Cypress
<u>Cupressus macrocarpa</u>	Monterey Cypress
<u>Cupressus sempervirens</u>	Italian Cypress
<u>Cynara cardunculus</u> ***	Artichoke Thistle
<u>Cytisus species</u> Broom,etc.	Scotch Broom, French
<u>Dodonea viscosa</u>	Hopseed Bush

Elaeagnus angustifolia
Elaeagnus pungens
Eriogonum fasciculatum**
Eucalyptus species
Gensita species***
Heterotheca grandiflora**
Jubaea chilensis
Juniperus species
Lactuca serriola***
Larix species
Lonicera japonica
Miscanthus species
Muehlenbergia species**
Nicotiana species
Palmae species
Pennisetum setaceum
Picea species
Pickeringia Montana**
Pinus species
Podocarpus species
Pseudotsuga menziesii
Ricinus communis
Rosmarinus species
Salsola australis***
Salvia species**
Schinus molle
Schinus terebinthifolius
Silybum marianum***
Spartium junceum
Tamarix species
Taxodium species
Taxus species
Thuja species
Trachycarpus fortunei
Tsuga species
Ulex europea***
Urtica urens**
Washingtonia species
 Palm

Russian Olive
 Silverberry
 Common Buckwheat
 Eucalyptus
 Broom
 Telegraph Plant
 Chilean Wine Palm
 Junipers
 Prickly Lettuce
 Larch
 Japanese Honeysuckle
 Eulalia Grass
 Deer Grass
 Tree Tobacco
 Palms
 Fountain Grass
 Spruce Trees
 Chaparral Pea
 Pines
 Fern Pine
 Douglas Fir
 Castor Bean
 Rosemary
 Russian Thistle, Tumbleweed
 Sage
 California Pepper
 Brazilian Pepper
 Milk Thistle
 Spanish Broom
 Tamarisk
 Cypress
 Yew
 Arborvitae
 Windmill Palm
 Hemlock
 Gorse
 Burning Nettle
 California/Mexican Fan

** San Diego County native species
 *** Introduced weeds to San Diego County

California Department of Forestry and Fire Protection (619) 590-3100
United States Forest Service (619) 674-2901
County Fire Service Coordinator (858) 495-5092
County Farm and Home Advisor (858) 694-2845
Insurance Information Network of California -- Brochures

REFERENCES

- Combustible Vegetation and Other Flammable Materials Ordinance. Sections 68.401 thru 86.406 of the County of San Diego's Zoning Ordinance.
- California Department of Fish and Game (858) 467-4201
- U.S. Fish and Wildlife Service (760) 431-9440
- Protecting Your Property From Soil Erosion
(www.sdcounty.ca.gov/dpw/docs/fire/homeerosion.pdf
<<http://www.sdcounty.ca.gov/dpw/docs/fire/homeerosion.pdf>>)
- Homeowner's Guide for Flood, Debris, and Erosion Control After Fires
(www.sdcounty.ca.gov/dpw/docs/fire/AfterFire.pdf
<<http://www.sdcounty.ca.gov/dpw/docs/fire/AfterFire.pdf>>)
- Burn Institute (www.burninstitute.org)

Appendix D

Fire Behavior Modeling 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, Marsden-Smedley and Catchpole 1995, Grabner et. al. 1997, Alexander 1998, Grabner et al. 2001, Arca et al. 2007). 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 to 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 in key areas within and adjacent to the proposed Project site. 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 or other disturbance 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.

2 Modeling Inputs

Dudek utilized the BehavePlus software package to analyze fire behavior potential for the proposed development site in the unincorporated area of Ramona, San Diego County, California. For this analysis, two existing conditions scenarios were evaluated, including one average summer weather condition (off-site) and one extreme weather offshore wind condition (on-site). Additionally, the on-site scenario was run for post-development conditions. The Project site currently is undeveloped and largely vegetated by low lying grassland. The on-site topography is relatively flat, with gentle slopes in the middle of the site. It is the fuels in the adjacent undeveloped grasslands to the northwest of the Project site that could have the potential to affect the Project's structures from a radiant and convective heat perspective; however, the structures would be surrounded by irrigated landscape and hardscape areas, as well as a heat deflecting block wall between the structures and the undeveloped land.

BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The outputs produced by this analysis include flame length measured in feet, rate of spread measured in miles/hour, fireline intensity measured in BTU/feet/second, and ember spotting distance measured in miles. The following provides a description of the input variables used in processing the BehavePlus models for the Project site. In addition, data sources are cited and any assumptions made during the modeling process are described.

2.1 Vegetation (Fuels)

The seven fuel characteristics help define the 13 standard fire behavior fuel models and the five custom fuel models developed for Southern California (Anderson 1982; Weise & Regelbrugge 1997). 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 at the Project 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 development of 40 more fire behavior fuel models developed for use in BehavePlus modeling efforts (Scott & Burgan 2005). 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
- Timber litter Models TL1 through TL9
- Slash blowdown Models SB1 through SB4

To support the fire behavior modeling efforts conducted for the Project, a Dudek Fire Protection Planner analyzed the different vegetation types observed on and adjacent to the site and they were subsequently classified into the aforementioned fuel models. As is customary for this type of analysis, the terrain and fuels directly adjacent to the site and proposed fuel modification zones (FMZ) are used for determining flame lengths and fire spread. Fuel model attributes are summarized in Table 1, Existing Conditions Fuel Model Characteristics and in Table 2, Post-Development Fuel Model Characteristics.

Table 1. Existing Conditions Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) ¹
GR1	Short, sparse dry climate grass	Represents the annual grasslands on and off- site	0.4 ft

Note:

- ¹ Listed fuel bed depths reflect the fuel models that best depict the vegetation in and around the Proposed Project site and not an exact measure of local vegetation (Anderson 1982; Scott & Burgan 2005).

Table 2. Post-Development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) ¹
GR1	Short, sparse dry climate grass	Represents the off-site annual grassland fuels in the adjacent undeveloped land adjacent to the Project site to the northwest.	0.4 ft
FM8	Compact Litter	On-site Zone 1 and 2 fuel modification	0.2 ft
NB	Non-burnable	Paved areas throughout the proposed Project site.	0 ft

Note:

- ¹ Listed fuel bed depths reflect the fuel models that best depict the vegetation in and around the Proposed Project site and not an exact measure of local vegetation (Anderson 1982; Scott & Burgan 2005).

2.2 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower fire spread down-slope in the absence of wind. Flat terrain tends to have insignificant effect on fire spread, resulting in fires that are driven by wind. The Project site has an elevation of approximately 1,432 feet above mean sea level (amsl) on the western portion of the property, near San Vincente Road , to approximately 1,508 feet amsl in the eastern portion of the site, near 9th street. The Project site is comprised of relatively flat terrain, with gentle slopes.

2.3 Weather Analysis

An analysis utilizing the BehavePlus software package was conducted to evaluate fire behavior variables and to objectively predict flame lengths (feet), fireline intensities (BTU/feet/second), rate of spread (feet/minute), and spotting distance (miles) for two modeling scenarios. Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent the site. These fire scenarios incorporated observed fuel types representing the dominant on-site and off-site vegetation to the west, and in addition to measured slope gradients, and wind and fuel moisture values derived from Remote Automated Weather Stations (RAWS) weather data sets for both the 50th percentile weather (summer, on-shore winds) and the 97th percentile weather (fall, off-shore winds). Weather and wind data for this Project were derived from the Bud Hill RAWS Station (Station 045745). Weather and wind inputs for fire behavior modeling conducted in support of this FPP utilized the guidelines and standards presented by the County of San Diego, Department of Planning and Land Use (County of San Diego 2022a). These guidelines identify acceptable fire weather inputs for fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed 44 years of fire weather data from fire stations and Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County’s analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

As identified in the County’s guidelines, Dudek utilized the Fine Dead Fuel Moisture (FDFM) tool within BehavePlus fire behavior modeling software package to determine fuel moisture. The temperature, relative humidity, and wind speed data for the Transitional weather zone were utilized based on the project’s location. Reference fuel moistures were calculated in the FDFM tool and were based on site-specific topographic data inputs. Table 3 summarizes the FDFM inputs and the resulting fine dead fuel moisture values. Table 4 presents the fuel moisture and wind speed inputs for the fire behavior modeling efforts conducted for this analysis.

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Dry Bulb Temperature	90–109 deg. F	90–109 deg. F
Relative Humidity	10–14 %	0–4 %
Reference Fuel Moisture	2 %	1 %
Month	May June July	May June July
Time of Day	12:00–13:59	12:00–13:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Slope	0–30%	0–30%
Aspect	South/East	South/East
Fuel Shading	Exposed (< 50% shading)	Exposed (< 50% shading)
Fuel Moisture Correction	0%	0%
Fine Dead Fuel Moisture	2%	1%

Historical weather data for Ramona was utilized in determining appropriate fire behavior modeling inputs for the Project area. Wind and weather conditions were derived from Remote Automated Weather Stations (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. The Bud Hill RAWS Station (Station 045745) was utilized to find average and extreme weather values for the Project area. The station is approximately 3 miles north of the Project site and adequately approximates Project site weather conditions. Data from fire seasons dating back to 2005 and up through 2025 were included in the analysis.

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 December 31 for each year between 2005 and 2025 for 97th percentile weather conditions and from June 1 through August 31 for each year between 2005 and 2025 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 are an average surface wind at 20 feet above the vegetation over the analysis area. Table 4, Fuel Moisture and Wind Inputs summarizes the weather and wind input variables used in the BehavePlus modeling process.

Table 4. Fuel Moisture and Wind Inputs

Model Variable	Summer Weather (50th Percentile) Onshore Wind	Peak Weather (97th Percentile) Offshore Wind
Fuel Models	GR1	GR1
1 h fuel moisture	2%	1%
10 h fuel moisture	4%	2%
100 h fuel moisture	7%	5%
Live herbaceous moisture	40%	33%
Live woody moisture	80%	66%
20 ft. wind speed	19 mph (sustained winds) ¹	28 mph (sustained winds) wind gusts of 41 mph ¹
Wind Directions from north (degrees)	290	62
Wind adjustment factor	0.3	0.3
Slope	0%	6%

Note: ¹Wind speeds were derived from the San Diego County Guidelines for the Transitional Zone, Table 1: Behave Plus 5.0.1; Average-Worst case sustained winds (10 min. average and peak) Fuel Model 1 (knee high grass) at 50% slope.

3 Fire Behavior Modeling Scenarios

Two focused scenarios were completed for existing conditions fuels conditions, and both scenarios were completed for the post-development conditions. The results of the modeling include anticipated values for surface fires, which include flame length, rate of spread, fireline intensity, and ember spotting distance. 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. Two existing condition and one post-development fire modeling scenario locations were selected to better understand the different fire behaviors that may be experienced on or adjacent to the site based on slope and fuel conditions; these fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

Existing Conditions On-Site and Off-Site Scenarios

- **Scenario 1:** A fire burning across the Project site from the northeast corner to the southwest corner from a potential roadside ignition from 9th Street. The fire is burning during extreme Santa Ana wind conditions, with 28 mph sustained winds and 41 mph gusts, being fueled by the annual grasslands onsite.
- **Scenario 2:** A fire burning across the adjacent undeveloped parcel to the northwest of the Project, during average summer wind conditions of 19 mph sustained winds. This scenario could have been ignited by a roadside ignition from San Vicente Road, and is being fueled by the annual grasslands off the Project site.

Post-Development Conditions On-Site and Off-Site Scenarios

- **Scenario 1:** A fire burning across the Project site from the northeast corner to the southwest corner from a potential roadside ignition from 9th Street. The fire is burning during extreme Santa Ana wind conditions, with 28 mph sustained winds and 41 mph gusts burning through irrigated, maintained vegetation in the on-site fuel modification zones.
- **Scenario 2:** A fire burning across the adjacent undeveloped parcel to the northwest of the Project, during average summer wind conditions of 19 mph sustained winds. This scenario could have been ignited by a roadside ignition from San Vicente Road, and is being fueled by the annual grasslands off the Project site.

4 Fire Behavior Modeling Results

The results presented in Tables 6 and 7 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, but the models provide a worst-case wildfire behavior condition as part of a conservative approach. 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 would be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns. Identification of modeling run (fire scenarios) locations are presented graphically in Figure 6, BehavePlus Fire Behavior Analysis exhibit.

Scenario 1

Under the extreme Santa Ana wind conditions modeled in the Existing Conditions scenario 1, a fire burning through the grasslands on the Project site would move at a low rate of spread of 0.7 mph during sustained and gusting winds, produce low to moderate flame lengths of 4.0 during sustained and gusting winds, and could produce embers that could travel up to 0.4 miles during gusting winds.

If the same vegetation fire scenario were to ignite during post development conditions, the fire would burn through the irrigated, maintained vegetation at a lower rate of spread, 0.1 mph during sustained and gusting winds, produce low flame lengths of 2.3 feet during sustained winds, and 2.9 feet during gusting winds, and could produce embers that could travel up to 0.3 miles during gusting winds.

Scenario 2

Under the average summer wind conditions modeled in the existing conditions Scenario 2, a fire burning through the grasslands in the adjacent undeveloped parcel to the northwest of the Project site would burn at a low rate of spread of 0.4 mph during sustained winds, produce low flame lengths of 3.1 feet during sustained winds, and could produce embers that could travel up to 0.2 miles during sustained winds.

Given that the vegetation in the off-site area modeled in Scenario 2 would not be modified during the post development conditions, a fire that would ignite in this area after the Project is developed would produce the same outputs as the existing conditions scenario.

Post development conditions in the on-site Project areas would result in a reduction of up to 1 foot in flame lengths and up to 0.6 mph in spread rates. As a result of the proposed fuel modification, the fire hazard presented by the site would be reduced compared to its current state. This means reduced fire risk for nearby residents. Flame lengths in off-site fuels modeled in Scenario 2 will produce the same outputs in existing and post development conditions, producing maximum flame lengths of approximately 3 feet during summer weather events. The proposed Fuels on the undeveloped parcel to the northwest of the Project site could pose a threat of fire ignition risk due to ember spread, but during post development conditions, the majority of wildfire risk would be reduced as vegetation is converted to paved and ignition resistant landscapes, and vegetation is regularly irrigated and maintained.

The results of fire behavior modeling analysis for existing conditions and post-development conditions are presented in Table 5, RAWs BehavePlus Fire Behavior Model Results – Existing Conditions and Table 6, RAWs

BehavePlus Fire Behavior Model Results – Post-Development Conditions. The following describes the fire behavior outputs (Heisch and Andrews 2010) as presented in Tables 5 and 6:

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.
- **Spotting Distance (mi):** Spotting distance is the maximum distance at which potential spot fires may occur based on fire brands from a spreading wind-driven surface fire.

Table 5. RAWS BehavePlus Fire Behavior Model Results - Existing Conditions

Fire Scenarios	Flame Length ¹ (feet)	Fireline Intensity ¹ (BTU/feet/second)	Spread Rate ¹ (mph)	Spotting Distance ¹ (miles)
Scenario 1: 6% Slope; Extreme Santa Ana wind conditions (97th percentile offshore), sustained 28 mph (41 mph gusts), onsite				
Short, sparse dry climate grass (GR1) (On-site)	4.0 (4.0)	113 (113)	0.7 (0.7)	0.3 (0.4)
Scenario 2: 0% Slope; Average Summer Wind Conditions (50th Percentile Onshore), sustained 19 mph winds, on and off-site				
Short, sparse dry climate grass (GR1) (Off-site)	3.1	66	0.4	0.2

Notes:¹ Wind-driven surface fire.² Values in parentheses represent the respective output in the presence of 41 mph gusts.**Table 6. RAWS BehavePlus Fire Behavior Model Results - Post-Development Conditions**

Fire Scenarios	Flame Length ¹ (feet)	Fireline Intensity ¹ (BTU/feet/second)	Spread Rate ¹ (mph)	Spotting Distance ¹ (miles)
Scenario 1: 6% Slope; Extreme Santa Ana wind conditions (97th percentile offshore), sustained 28 mph (41 mph gusts), onsite				
FMZ Zone 1 and 2 (FM8) (On-site)	2.3 (2.9)	33 (57)	0.1 (0.1)	0.2 (0.3)
Paved Areas (NB) (On-site)	N/A	N/A	N/A	N/A
Scenario 2: 0% Slope; Average Summer Wind Conditions (50th Percentile Onshore), sustained 19 mph winds, on and off-site				
Short, sparse dry climate grass (GR1) (Off-site)	3.1	66	0.4	0.2

Note:¹ Wind-driven surface fire.² Values in parentheses represent the respective output in the presence of 41 mph gusts.

The information in Table 7, Fire Suppression Interpretation presents an interpretation of the flame length and fireline intensity outputs as related to fire suppression efforts. Identification of modeling run locations is presented graphically in Figure 4 of the FPP.

Table 7. Fire Suppression Interpretation

Flame Length (ft)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4 feet	Under 100 BTU/ft/s	Fires can generally be attacked at the head or flanks with 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 with hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and 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.